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CONCEPTUAL TEXT RETRIEVAL

NORIS (77)

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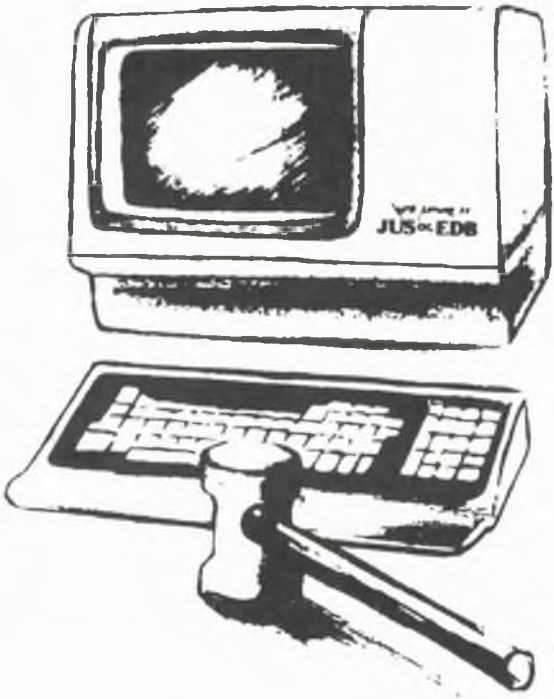

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CompLex no. 9/88

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The project basic to this report
has been funded by
Royal Norwegian Council for
Scientific and Industrial Research
(NTNF)

TANO

ISBN 82-518-2593-8
The publications in the CompLex series of reports are supported by:

Association of Norwegian Insurance Companies
Digital Equipment Corporation A/S
Ericsson Information Systems A/S
IDA, Integrert Databehandling a.s
K-link, Kredittkassen
Lawdata, The foundation for legal information retrieval
Norwegian Association of Chartered Auditors
Norwegian Bankers' Association
Norwegian Bar Association
Norwegian Telecommunication Authority
Service Bureau of the Norwegian Association of Industries
Wikborg, Rein & Co

Fotografisk opptrykk ved
Engers Boktrykkeri A/S, Otta

Foreword

This report has been developed over some time. It reports on elements of the ongoing research at the Norwegian Research Center for Computers and Law organized within the project NORIS (77), with the objective of developing knowledge based systems oriented towards the public administration. This project is composed of different elements, which are seen as part of a whole, often referred to as the F*KUS concept. This concept has been sketched in Bing *et al* 1987. In this sketch is included an enhancement of traditional text retrieval system using what is described as a "norm based thesaurus", and which later has been given the acronym ARCTIS for "Automated Retrieval of Concepts in Textual Information Systems".

The notion of ARCTIS has been developed over some years. The idea first emerged through informal discussions with colleagues - especially Thorne L McCarty and Johannes Hansen - at a symposium organized in 1981 by professor Herbert Fiedler at the Gesellschaft für Mathematik und Datenverarbeitung in Bonn, where the use of knowledge based methods in law was the main issue.

Since then, the idea has been sketched and further developed a number of times. It has been discussed at the 1985 workshop on law, linguistics and artificial intelligence organized by Charles Walter at the University of Houston (cf Bing 1986), the First International Conference on Artificial Intelligence and Law (ICAIL 1987) at Northeastern University, Boston (cf Bing.1987b), the RIAO88 at MIT, Boston 1988 and the 4th international conference on computers and law in Rome 1988 (cf Bing 1988).

The paper presented here has profited from the exchange of ideas, criticisms and comments made by colleagues at these occasions. I would like to thank the Bergen Bank Foundation, the University of Houston, the Conceil National de Recherche Scientefique, the Corte Suprema di Cassazione, and the Faculty of Law at Oslo University, the Research Council for Science and Humanities as well as the Research Council for

Industry and Science for making funds available to take part in such events.

Nevertheless, this report is also an interim report. It provides the stepping stone into an implementation of ARCTIS, relating the effort with other experiences and on-going projects. ARCTIS is currently under implementation at the NRCCL by Dag Syvert Mæsel, using the law of intestate succession as a trail domain. A report discussing the implementation and giving test results is expected late 1988.

Smestad, July 1988

Jon Bing

Contents

1. The problem

1.1 Introduction

Computerized systems for legal information are traditionally based on text retrieval. The retrieval presumes the creation of a search file, indexing in principle all words occurring in the documents, with pointers to the text file, where the documents are stored. The searching is traditionally based on Boolean arguments, which are matched to the search file. Documents are read by accessing the text file through the pointers associated with the indexing terms of the search file.

Text retrieval permits the documents to be retrieved in authentic form, without any added editorial material like headnotes, citations, indexing terms *etc.* In the US, Canada, and Northern Europe the tendency has been to use documents with little or no additional editorial material. When such material has been included, it generally is based on the editorial effort going into making a parallel paper based version of the same documents.[1] In Latin speaking countries, there have been a tendency to emphasize intellectual indexing, headnotes or abstracts of cases, and bibliographical information, often described as a "documentary superstructure" of the document.[2]

If a document is enriched by editorial material, the traditional retrieval strategies may still be employed. The system treats the words in

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1. This is the case with WESTLAW in the US, though the system documents cases not published by West, and which are made subject to the same elaboration.

2. The information system of the European Communities, CELEX, has been developed within this tradition. The documents are designed with a set of more than 30 fixed fields in six groups: bibliographical data, text and key words, classifications, dates, cross-references and other analytical fields. Cf Bing *et al* 1984:279.

the additional material as the words in the authentic text.[3] Many systems, however, do offer the user the possibility of defining the field in which the terms should occur. Combining the documentary superstructure with such facilities, a system may offer text retrieval as well as many of the retrieval functions generally associated with proper data base systems.[4]

There are a number of problems related to the traditional method.[5]

One of these problems is that to retrieve a document, the user has to specify the search request using the exact words occurring in the document. One would like to use more general concepts or technical, legal terminology. A traditional solution would be the design of a thesaurus which supported the use of general or technical terms, and produced alternative words or phrases. Another traditional solution would be intellectual indexing of each document.

The traditional methods are, however, associated with difficulties of both a methodological and practical nature. I this brief paper the difficulties will not be discussed, but it may be of interest to note that no successful solution based on traditional methods has been implemented in operative legal information services.

It has been recognized that there is a need to use technical legal concepts, relying on the conceptual structure of the legal domain being researched, and which is familiar to a lawyer through his or her

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3. This has caused some problems of terminology, as the method often is described as "full text retrieval". The methods of text retrieval may, however, be used regardless of whether the document contains the "full" (or authentic) text or only an abstract or another "document surrogate". In this paper, "text retrieval" is used for the retrieval strategy, and the type of documents is qualified as "authentic", "abstract", "indexing terms", *etc.*

4. For instance, the Norwegian SIFT system has developed facilities which enhances the text retrieval with most properties of a relational data base system.

5. Some of these have been summarized in Bing 1987b.

education and training. In this paper, we will not argue for the need for "conceptual searching", this has been the subject of other studies.[6]

In this brief paper, some of the attempts will be reviewed - with the hope that this is pointing to the future, and a type of information systems which will be based on techniques different from those employed in the current text retrieval systems.

Obviously, not all the developments within AI and law will be discussed - expert systems, which will advice on the solution of specified legal problems, may be perceived as information systems, but will not be discussed. The concern is still with systems that have as their main objective the retrieval of legal sources, which will be made available to the user in authentic form. One should also be aware that it may be difficult to survey the complex area of AI and law, and that consequently the selected results and projects should have been complemented by other activities escaping the notice of the author.

It is open to question whether a successfully implemented method for "conceptual searching" really will increase the performance compared to traditional text retrieval systems. In principle this is an empirical question, which only may be answered if a method is available for controlled, comparative experiments.

In the latter part of this paper, we will present a possibility currently being studied at the Norwegian Research Center for Computers and Law (NRCCL), ARCTIS. This is one attempt of enhancing text retrieval systems, using some of the methods developed in the research of knowledge based systems.

1.2 Thesauri as a strategy for "conceptual searching"

The Latin tradition mentioned above, has emphasized the use of thesauri. In these one has seen a possibility to approach the problem of "conceptual searching", and associated this with research in the area of "artificial intelligence and law".

A major example is the unique thesaurus developed in Italy for the ITALGIURE system, operated by the Centro elettronico di documentazione

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6. Cf for instance Bing 1987a with references.

of the Corte suprema di cassazione in Rome.[7] The thesaurus is based on reduction of all natural language Italian words (actually lemmae) to definitions based on a small number of basic elements (*semi dei linguaggio*, or "seeds of language"). For instance, the word "incendiary" will be represented by the combination "fire *and* (destruction *or* diffusion)". In retrieving documents, the terms of the search requests are made subject to the same reduction, and the resulting combination of basic elements is matched against the complete list of definitions, and translated into the natural language words containing identical definitions. In this way, one has attempted to solve the synonym problem of text retrieval based on documents in authentic or uncontrolled language.

It has been suggested that legal concepts may be defined in the same way. However, it would seem obvious that this only would solve a small part of the problem associated with "conceptual searching". It might translate a technical, legal term into the large number of natural language terms or phrases which entail that concept in the documents. But it would not be sufficient to specify relations between concepts, and would not be able to cope with different conceptual structures in different legal domains.

In this paper, the problems and limitations of the thesaurus based solution will not be pursued. It seem obvious that traditional thesauri cannot be developed to cope with the problems of conceptual searching. And it may be indicative that the Italian efforts relating to the thesaurus, lately have been discontinued.

1.3 Why conceptual retrieval?

Though this paper will not argue for the justification of developing methods for conceptual retrieval, a few comments on the need for such an enhancement may be offered.

It is open to question whether a successfully implemented method for "conceptual searching" really will increase the performance compared to traditional text retrieval systems. In principle this is an

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7. For a brief English description of the system, cf Giannantonio 1984. A more in depth discussion is offered by Borruso 1978, who also is one of the main architects of the system.

empirical question, which only may be answered if a method is available for controlled, comparative experiments.

This is, however, also a practical reason for developing conceptual retrieval methods. The main cause for performance failure in traditional text retrieval systems, is what is known as the synonym problem: One idea ("concept") may be represented in a large number of different natural language words or phrases. Users have to successfully identify these words or phrases to maximize recall, and in this the user will in practice fail. It is thought that an adequate conceptual retrieval method may contribute to a solution of this basic problem. As concepts also may be defined in context, and consequently be context sensitive (defined according to the conceptual structure of the legal micro-domain in question), the most severe synonym problem, to which for instance traditional thesauri do not offer an obvious solution, may be addressed.

It should be emphasized that our interest is restricted to making a conceptual retrieval method available in conjunction with a traditional text retrieval system. The user should, as the final response to his or her search request, be able to access the possible relevant documents in authentic form. This make it important to take into account a number of practical problems in operational legal information systems: Such systems are frequently updated, and resources are scarce with respect to intellectual indexing *etc* of the documents. Therefore, a method should be designed to minimize the intellectual effort for establishing and maintaining the conceptual retrieval functions.

These reasons are sufficient justification for examining alternative methods. No attempt will be made in this paper to evaluate the possible effect in retrieval performance. The study is concerned with identifying promising methods for conceptual research - their evaluation has to be postponed to a later stage when the methods are available for testing.

2. Knowledge based methods for text retrieval

In this paper, the discussion is, as stated initially, related to the application of knowledge based methods to enhance the performance of retrieval systems. Most discussions of AI based legal information systems are concerned with variants of expert systems or question-answer systems.

In this section, two examples of systems with the objective to facilitate the retrieval of natural language documents will be discussed, the POLYTEXT and the LIRS. Other examples have not been available for in-depth study. And, indeed, the discussion in this section is only an introduction to these two efforts.

2.1 The POLYTEXT system

The POLYTEXT system was a research project conducted jointly by the Stanford Research Institute, California, and the KVAL[8] Institute for Information Science, Stockholm. The project was initiated in 1979, and aimed at a novel design of a text retrieval system.[9] The project was discontinued for lack of funds in the early 1980-ies, but at that time a demonstration system was operational.[10]

The basic unit in the POLYTEXT system is a "message". Each message had a uniform structure:

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8. The acronym is for the Swedish "Arbetsgruppen för kvantitativ lingvistik", literary "Working Party for quantitative linguistics".

9. Cf Karlgren/Walker (undated).

10. Cf Löf 1980.

unique identifier
date of insertion
author
modality (degree of certainty, assigned by author
topic
comment
pragmatic (system instruction)

The system will allow any number of messages linked to other messages. By defining one message as the topic of another, one may braid messages into some sort of dialog where one message is a comment upon another, without changing the original text. This reflects a basic design idea: The information system should reflect a diversity of views.

The system was tested in a demonstration based on legal texts. In this example, three types of structures were used to represent the same text. One structure used indexing terms, where each term was a message pointing to its source in the text. One structure was hierarchical, based on the structure of the original document, where each node is represented by a message, and the hierarchical structure is represented as topic-commentary relations. And one structure was based on propositional logic, where each proposition was implemented as a frame with a message identifying the frame, a message for the predicate, and a message for each of the arguments. The arguments were then related as commentaries to the frame-message by topic-commentary relations.

The demonstration used the LIFER package for communication with the data base, and permitted the user to communicate with an "intelligent system". POLYTEXT would seem to be a general method for solving text retrieval using knowledge based methods. The demonstration implementation was based on a diminutive text data base consisting of the rules of the Arbitration Institute of the Stockholm Chamber of

Commerce. POLYTEXT had represented these rules according to the structure described above.

One very small example may illustrate some of the basic design of the POLYTEXT system. Rule 3 has the following text:

> Two members of the Board shall form a quorum. If no majority is attained, the Chairman shall have a casting vote. Decisions of the Board are final and cannot be reviewed by the Chamber of Commerce.

This rule is then indexed by a number of indexing terms. One of these indexing terms is then the term "decision", which is represented by the following message:

Message	M23
Date	18. Oct 79 13:08:18
From	STAFFAN
Certainty	Tentative
Topic	(M20)
Comment	((RULE3 ALL)) DECISION

This message may seem a cumbersome way of representing a single term, but is should be remembered that it allows for something more than simple text retrieval. In the message, "STAFFAN" is the first name of the author conducting the experiment, and "M20" is the name of the message introducing the rules of arbitration, consequently linking all indexing terms through this reference.

The necessary LIFER[11] rules for handling the different message structures were developed. This, and similar messages representing indexing terms for Rule 3, would enable the system to respond to the following search request as illustrated:

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11. LIFER is a facility developed by SRI International to allow access in natural language to other computer programs.

Search Request: Can the decisions of the board be reviewed

POLYTEXT response: Two members of the Board shall form a quorum. If no majority is attained, the Chairman shall have the casting vote. Decisions of the Board are final and cannot be reviewed by the Chamber of Commerce.
ACCORDING TO: Rule 3

POLYTEXT represented a stimulating experiment and a new approach to text retrieval. It not only made possible retrieval on the basis of index terms, but supported also search through a "propositional model" of the rules not dissimilar to a search through the conceptual model of a legal domain, cf McCarty 1984:142-143.

It is evident, however, that to exploit the message structure, the necessary analysis has to be undertaken. Currently, such analysis would have to rely on a manual process as in the demonstration system, and this reliance on intellectual indexing is a drawback.

2.2 AIR

AIR is an acronym for Adaptive Information Retrieval, introducing one of the few new concepts in text retrieval for a long time.

The basis of AIR is the theory of *connectionism*, which has been applied to text retrieval. The prototype system has been established for a data base of 1,600 document - these being, however, very brief, consisting only of title as text and author as a fixed field. It is maintained, however, that there is no great problem associated with scaling up the system.[12]

In AIR, the documents are represented as a weighted graph, an example of which is given in fig 11.

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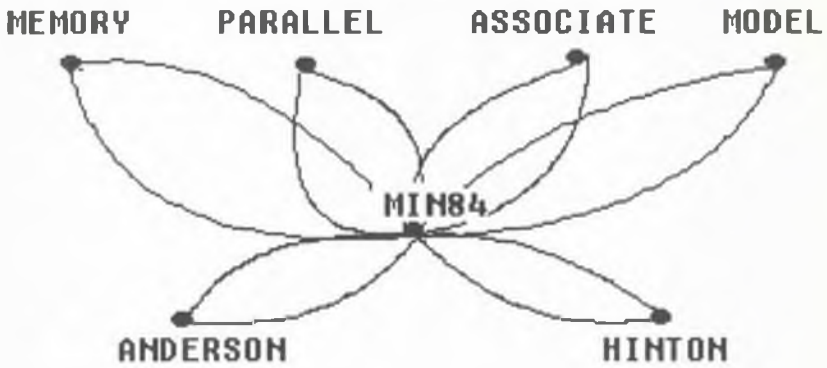
12. The discussion is based on Belew 1987.

Figure 1 - Weighted graph corresponding to one document



In this graph, the upper line represent the words in the document. All different words appear as nodes, with the exception of "noise words", roughly corresponding to the traditional stop words. The second line include the document identification, and the third line the author or authors of the document in question.

The nodes are linked. The links are symmetrical, one going from word to document identification, the other going in the opposite direction (the direction is indicated by the curvature of the link). The links are assigned weights, which initially is based on the inverse frequency - the higher the frequency of a word in the data base, the lower the weight.

Search requests are formulated by specifying search terms and values for the fixed fields. This retrieve initially the nodes identical to the requirements specified in the request. These initial nodes are assigned a weight by the system, and this is then distributed along the links. In this process, some nodes will collect a high weight, others only a marginal weight or none at all. Nodes collecting weight above a certain threshold will be defined as "retrieved", and the corresponding documents can be accessed.

The scheme would seem to be closely related to the vector retrieval methods mentioned briefly above. It allows for retrieving documents in a

ranked order, which is important to overcome the problem of output overload. It is also allows, like the vector retrieval systems, documents being used as requests, retrieving "similar" documents. It is also somewhat more associative than the vector retrieving techniques, as it may through the links identify as possible relevant documents containing none of the words in the original search request. One would, however, also expect it to have a performance similar to vector retrieval systems - which by experiment has been demonstrated to be lower than what is achieved by for instance class ranking. But this still has to be further examined, as the weighted links may represent the semantic structure of the domain in a way which will allow systems like AIR to achieve better results.

This latter aspect is actually why AIR is suggested to be part of the efforts to develop conceptual retrieval. Concepts are represented in AIR as a **network**, where the whole interlinked pattern of nodes is the representation in the system of a certain concept. Using such networks as representation of concepts, it is believed that connectionism systems may support conceptual retrieval. To facilitate this, one foresee the possibility of enriching the different levels of the graph - adding some sort of thesaurus to the words (defining words as narrower or broader than other words), citations to the document identifications and relationships to the fixed fields (for instance a cooperation between two authors).

Though it is too early to judge the advantages of the approach, it certainly is welcome to find something rather novel. By exploring this possibility, one will learn more of the possibility of representing texts, and also more of the properties of well known methods like vector retrieval.

2.3 The LIRS

The Legal Information Retrieval System (LIRS) was developed by Hafner in 1978, and documented in Hafner 1981. The system was designed for the domain of negotiable instruments law (Uniform Commercial Code art 3 and 4). The domain was represented in a semantic network model containing approximately 300 concept nodes.

The LIRS data base contained cases, statues, and official comments. In all, the data based contained 186 cases, 110 section of the UCC, and 188 official comments.

In the data base, each item was identified by a unique name (a LISP atom), and all data associated with the item could be accessed through this atomic structure.

The meaning of a data item was represented by a set of expressions in a formalism (Document Description Language, an extension of the Situation Description Language based on the classification model for the domain). The descriptors identified the plaintiff, the defendant, legal situations exemplified, hypothetical situations discussed, situations whose legal consequences are discussed, formal criteria for a legal concept defined in the document, cross-references *etc.* For one of her examples (Jackson v First National Bank of Memphis, Inc, 403 SW2d 102 (1966)), the descriptors include (Hafner 1981:62-63):

```
(PL DRAWER)
(DEF DRAWEE-BANK)
(COA C-IMP-DED)
(EX (FORGED DRAWERS-OR-MAKERS-SIG)(NOT EXAMINED PROPERLY))
(LEFF (FORGED DRAWERS-OR-MAKERS-SIG)(BASIS UCC3-406)(BASIS UCC4-
    406)
(LEFF NEGL-IN-CONT-UNAUT (BASIS UCC3-406)(BASIS UCC4-406))
(LEFF (NOT HANDLED-W-REAS-CARE)(BASIS UCC4-406-3))
```

According to this description, the case discusses (PL) the drawer of a negotiable instrument who sued (DEF) the drawee bank with the objective (COA) of being reimbursed for a deduction of his checking account which was claimed to be improper. The case involved (EX) a forged signature, and also a party who did not properly examine his cancelled checks when returned. The case discusses the effects of the forged signature (first LEFF), the effect of the negligence (second LEFF), and the effect of the bank's failure to handle a check with reasonable care (third LEFF). The sections cited in support of the different positions, are indicated by BASIS.

The system also includes a network for the statutory sections and subsections, to represent the relationship between the different elements, and an indexing scheme for efficient retrieval.

The LIRS retrieval language allowed search requests to be formulated in a modified Document Description Language, using Boolean operators to combine the elements. Several retrieval facilities were available, the basic being the FIND command, which could be used in three modes with varying degrees of extension of the expressions in the search request (EXACT, EXTEND and INFER). In the

INFER mode, documents would be retrieved if their descriptors matched any simple extension of the Situation Description Language expression in the search request, and - depending on attributes specified in the search requests - documents whose descriptors matched any full extension of the descriptors in the search request.

To facilitate use communication, the LIRS included a DESCRIBE command, which interprets complex SDL descriptions into a simple form of English.

An example of the FIND command in EXACT mode, may be given (Hafner 1981:92-93):

```
*SETMODE EXACT.
*FIND CASES(DESC DISHONORED) AND NOT (PL HOLDER).
    FIND FOUND 2 ITEMS.
*PRINT
    BANCO-V-STATE                                MERCANT-V-WORLEY
*DESCRIBE CURRENT.
    BANCO-V-STATE
        THE PLAINTIFF WAS A HIDC.
        THE DEFENDANT WAS A MAKER.
        THE CAUSE OF ACTION WAS A C-INST.
        IS AN EXAMPLE OF A DISHONORED DRAFT, A LETTER-OF-
CREDIT, AND A FRAUDULENTLY-OBTAINED SLOI.

    DISCUSSES THE LEGAL EFFECTS OF:
        A C-INST
        A HOLDER-OF-SEC-INT, CITING IN SUPPORT UCC3-302
        A TRANSFEREE WHO HAS NOT HAD NOTICE-OF-DEFENSES,
CITING IN SUPPORT UCC3-302;
        A HIDC.

DECIDES THAT THERE WAS:
        A HOLDER-OF-SEC-INT, CITING AS A BASIS UCC4-208-1;
        A FOR-VALUE TRANSFEREE, BECAUSE OF A HOLDER-OF-SEC-INT;
CITING AS A BASIS UCC4-209, UCC3-303-B, AND WALTHAM-V-FLETT, AND
REFUSING TO APPLY UCC3-303-COM-3,
        A TRANSFEREE WHO HAS NOT HAD NOTICE-OF-DEFENSES;
        A HIDC, BECAUSE OF THE TRANSFEREE WHO HAD NOT HAD
NOTICE-OF-DEFENSES AND FOR-VALUE TRANSFEREE, AND DESPITE THE
INST OTHER THAN A NEGISNT; CITING AS A BASIS UCC3-302.
```

Commenting upon LIRS, and comparing the representation with that of TAXMAN, McCarty (1984:140) points out that most complex concepts, like "drawer's or maker's signature" is represented as single atomic terms, while it may be considered whether they could not more appropriately be represented as structured descriptions. LIRS does not have a means for representing time or change of state, each event is an atomic attribute to the object in question. McCarty points out that,

> "A CHECK thus has the possible attributes RETURNED-TO-CUSTOMER and EXAMINED-PROMPTLY, but there is no way to describe the action of 'returning' or 'examining' the check itself."

With respect to our interest in utilizing knowledge based methods for enhancing text retrieval, the approach by Hafner has several attractive elements. Though running the danger of over-simplifying the approach, it may be seen as (1) creating a model of the domain using a certain formalism, and (2) using the same formalism to describe the documents relevant to this domain. By (3) formulating a search request, also using the same formalism, it is possible to rely upon the legal conceptual knowledge in identifying which documents are of interest to the user.

The approach has several features in common with the more traditional methods. The conceptual model of the domain may be seen as some sort of thesaurus, obviously not a traditional thesaurus, but what we may call a *norm based thesaurus*, as it should reflect the structure of legal norms within the domain. The description of each documents is akin to the intellectual indexing undertaking in many systems, creating a *conceptual documentary superstructure* to each document.

Though attracted to the approach, it has the serious practical drawback of requiring that each document be intellectually indexed according to the formalism. This may be possible in an experimental environment, and there may be possibilities of computer assisted systems for the production of such representations.[13]

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13. Cf McCarty 1984:141-142 (with note 16) mentions the possibility of a human abstractor engaged in an interactive dialog with the system, and constrained by the conceptual model. A more speculative approach, also mentioned by McCarty, is the use of a "sketch parser" to analyze directly the text of the case - making reference to the Yale FRUMP system or extracting sketchy information from the Associated Press wire service. Mentioned of this system is also made by

Continued on next page

On this background, it might be tempting to approach the problem in a slightly different way. One might make the nodes of the norm based thesaurus exit into a conventional text retrieval system by describing each node as a list of terms synonymous within the context, and using the implied logic of the model to include simple logical operators. If the performance of such a system would be acceptable, it would not presume a description of each new or amended document added to the data base. One might concentrate on specifying and maintaining the norm based thesaurus.

This is the basis for the rest of this paper.

2.4 RUBRIC

A rather bold attempt to marry AI technology and text retrieval is the RUBRIC system, developed during the last few years by Advanced Decision Systems.

The RUBRIC system is in a way similar to ARCTIS discussed below, in the respect that a rule representation is established and utilized in accessing the data base. The rules have a simple basic format, which sets out an implication between criteria in the antecedent with a concept in the consequent, qualified by a uncertainty value. The criteria in the antecedent may be combined using different types of operators.

In order to access the data base, the system uses basically traditional search requests, but if documents satisfy the request, it is inferred that the text "is about" a certain concept to a specified uncertainty degree.

An example of the use of RUBRIC in the area of mergers and acquisitions within the domain of corporate law[14] may have rules defining two main classes of tender offers, friendly tender offers and hostile offers (rule 5 and 6 below). Another rule specifies the inference that a friendly tender offer is identified if the document is an offer to purchase, with indicators of friendly relation. Similarly hostile offers are

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Continued from previous page
Tong/Appelbaum 1988:907 in their comparison of RUBRIC with a frame based system.

14. Cf Tong/Reid/Crowe/Douglas 1987.

defined (rule 7 and 8). To determine that the document is an offer to purchase, certain indicators in the text are defined (rule 9), and similarly indicators of whether the offer is friendly or hostile are defined (rule 10 and 11). Below the rules are reproduced:

Figure 2 - Rules in the RUBRIC system: A sample

```
5:  (INSTANCE tender-offer (friendly to))
6:  (INSTANCE tender-offer (hostile to))
7:  (IMPLIES friendly to ((*AND* offer-purchase-doc friendly)
    0.9))
8:  (IMPLIES hostile to (*AND* offer-purchase-doc hostile) 0.9))
9:  (EVIDENCE offer-purchase-doc
      ((*OR* (PHRASE "OFFER" "PURCHASE")
             (PHRASE "OFFER" "EXCHANGE")) 1.0))
10: (EVIDENCE friendly
      ((SENTENCE "BOARD" "OFFER" "RECOMMEND") 0.9))
11: (EVIDENCE hostile ((*NOT* friendly) 1.0))
```

Search requests are formulated in much the same way as concepts are defined in the rule structure. To find a hostile tender offer for any and all stock in a company where the offer is subject to a financing condition, the request (indicated by "r-1"), might have a form as indicated below:

```
(IMPLIES r-1
      ((*AND* hostile-to all-stock finance-cond) 1.0))
```

As mentioned, the RUBRIC system allows to determine that the document is "about" a certain issue. It is not able to ascertain the specific role of identified actors *etc*, in this its limitations are similar to that implied by Boolean logic, and - indeed - ARCTIS discussed below.

This may be amplified by an example. A frame-based system - like for instance the LIRS discussed below - would be able to answer queries like (cf Tong/Appelbaum 1988:907):

"'Takeovers of an international company by a third world nation.'

Since RUBRIC cannot ascertain the specific role of the participants in the takeover, it could not respond to this very precise query, but could answer a query about:

'Takeovers involving international companies and third world nations.'"

Recently, result of a performance test has been made available. The experiment was conducted primarily on moderately sized (1-10 Mb) data bases of newswire style documents. Tong/Appelbaum (1988:907) reports one experiment based on a data base of 730 "representative articles" of Reuter newswire documents. The experiment

> "... has produced recall/precision curves which indicate that for a well defined subject area RUBRIC is capable of giving 68% precision while maintaining 68% recall. These curves are summarized below, where we show composite precision/recall figures for a number of queries in the general area of international terrorism.

Precisions (%)	Recall (%)
90	36
80	57
70	67
60	75
50	80
40	87
30	93
20	97
10	100

> These precision/recall figures are derived from the RUBRIC generated relevance values by successively reducing the relevance threshold, and at each stage marking documents above the threshold as retrieved and those below it as not retrieved. Thus for each value of the threshold we can compute a point on a precision/recall curve.

This curve is indeed very impressive, and indicates the potential power of such an approach. But without more details of the experiment - for instance the number of search requests used to produce average curves,

methods for determining target set (total number of relevant documents) *etc*, it is difficult to assess the results in a more detailed manner. Also, absolute performance figures are of limited value, one would like to see comparative results, where the RUBRIC approach was compared to alternatives, for instance conceptor based search requests using the same search terms.

It has been reported (Tong/Appelbaum 1988:908) that RUBRIC is used by two systems, both operated by Advanced Decision systems. One is working on a data base of mixed documents (manuals, almanacs, brief reports *etc)*, of a size approximating 100 Mb, and with an expected growth to 2 Gb. This has approximately 2,000 rules in its knowledge base and allows a retrieval speed of 1 to 10 seconds. The second system works with newswire style materials, and has a size of approximately 150 Mb, using 500 rules and a typical retrieval speed in the range of 1 to 60 seconds.

The RUBRIC system would seem to offer a surprisingly elegant bridge between a knowledge based system and a text retrieval systems. For us, it also has interest to note the similarities of this approach and that of the norm based thesaurus, currently being developed by the NRCCL.

Obviously, there are aspects of the system currently not discussed in the available literature. It would seem that the evidence rules, which are used to qualify documents as containing a certain concept, are rather restrictive. With respect to the initial example, it is trivial to give instances of texts containing the concept of 'friendly', but not containing the three words specified in rule 10 within the same sentence - a grammatical variable of the verb would suffice. Whether this comment is relevant, would depend on which tools are foreseen to maintain the evidence rules[15] - if they are wholly manual, one would run into exactly the same problems as with respect to traditional thesauri. However, solutions along the lines suggested for ARCTIS, may also be adopted in this case.

Also, the example seem to be based on types of rather well-structured documents with some standard format. If the system is foreseen only to work with such documents, the problem mentioned above may be less acute.

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15. Such tools are available, cf Tong/Appelbaum 1988:907. Details are not given, but it is maintained that additional tools easily may be added.

And, finally, the formalism adopted for search requests is too demanding with respect to the user group generally associated with legal information services. For other user groups, one may, however, require a higher degree of discipline and a specialist knowledge.

3. ARCTIS: The norm based thesaurus

3.1 Using statutes for initial creation of norm structures

The approach of the NRCCL is based on the development of a norm based thesaurus. In this paper, examples from this development will be given.

The term "norm based thesaurus" is, perhaps, somewhat misleading. It is derived from the fact that the approach implies using a structure derived from legal analysis of statutes - a representation of legal norms - in a somewhat similar way that conventional thesauri are used to enhance the search requests specified by the user. The acronym ARCTIS - Automated Retrieval of Concepts in Textual Information Systems - has been suggested for the method.

The domain selected is that of old age pension under the Social Security Act.[16] The old age pension scheme is a key element in the overall social security and welfare schemes, as all other types of pensions (invalidism, industrial injuries, pensions to widows or widowers, *etc)* are using rules from the old age pension scheme as subroutines through citations.

In many jurisdictions - often referred to as civil law countries - there is an intimate relation between the statutes and the valid legal norms: A norm has to be directly related to a section of a statute (follow from the interpretation of one or several sections) to be deemed valid, in the sense that the courts are permitted to apply the norm.

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16. Lov om folketrygd, 17.6.1966 No 12, Chapter 7. The domain is selected for a number of practical reasons, one of them former research at the NRCCL, which has discussed elements of the social security administration, another the massive use of computer assisted case handling system within this administration, cf Bing/Schartum 1986.

Norwegian law does not include the strict version of this doctrine. Many areas of law are, however, governed by the principle of legality.[17] According to this, the state cannot exercise its authority by inflicting duties upon individuals without the authority of statutory law. The principle of legality is important within the public administration. For a certain area of public administration, a statute is passed which include provisions for passing subsidiary regulations. In this way, through delegation and regulations, a body of law is created in the form of a hierarchy of several levels. This structure has the interesting property that all rules must be linked through to the top level, which is the statute.

At least for areas where the principle of legality applies, it may be argued to be a plausible hypothesis that the statute itself in a sense is a model of the legal domain qualified by the same statute, and that all norms derived from regulations, decisions by courts or administrative bodies, *etc*, can be slotted into this structure.

If this hypothesis is accepted, one may reduce the problem of creating a "model" of the domain to a problem of extracting the normative structure from the relevant statute (or statutes).[18]

The problem then would be to reduce the natural language of the statutes to such a structure sufficiently formalized to permit conceptual searching.

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17. The principle of legality has the status of customary, constitutional law in Norway, which open for the discussion whether or to what extent it is applicable to the whole or parts of the the social security law - a discussion which will not be pursued in this paper.

18. Referring back to the LIRS system, the approach suggested here would correspond to lifting the model of negotiable instruments law out of the appropriate sections of the UCC, and use this model for the description of case law, rather than develop an independent model which then is used to describe both case law and statutes. One should, however, appreciate the different traditions in drafting legislation. Compared to the Anglo-American statutes, Norwegian legislation would seem to be more general, relying heavily for their interpretation and application on legislative history and regulations.

For this, we have suggested to apply the normalization developed by Allen.[19] The normalization would bring the statutory language into a form where the norms have an explicit *"if ... then"*-structure, and where each "idea" or "concept" of the representation is identified and linked to the structure by explicit logical connectors, (*and, or, and not, greater than, equal, etc*). The result of the normalization is a fragment which is quite similar to the original text, but where the connectors have been made unambiguous and explicit.

As a formalism, it is not very powerful. Remembering the comments of McCarty on the formalism adopted by Hafner, it is easy to see that what is achieved is no more than a conceptual map of the domain. Relationships between concepts, the question of application in time and space, changes of states, modalities *etc.* are only represented to the extent that they are part of the explicit rule structure. Also, no modelling of the objects or the events being governed by the norms have taken place - they remain mere words, but with the added property of being exactly located in a normative structure.

To halt at this level have two justifications. One is that this level is a useful specification of the normative structure when converting the structure into a formalism.[20] Secondly, the normalized form may quite easily be translated into arrow diagrams, which lend themselves to a graphical representation. This will be utilized in the suggested user interface to ARCTIS. The comparatively speaking low level of ambition is directly related to the application foreseen with respect to text retrieval.

If the first step is a normalization of the statutory language, this obviously implies a transformation of the text of the statutes into normalized form. For the examples given in this paper, the normalization has been carried out by hand - the author has read the text, and converted it into a normalized form.

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19. This has been described in a number of papers; a paper related to the problems addressed here is Allen/Saxon 1985.

20. The NRCCL has developed a special formalism for describing normative structures, SMARN, as an extension of the object oriented programming language SIMULA. The normalized structure is a useful specification of the specification in SMARN (or other formalisms) richer in details and semantics.

Chapter 7 of the social security act consists of 10 sections (numbered sect 7-1 to 7-10). In normalized form, this breaks down to 65 fragments or rules.

It may be considered whether the domain is sufficiently coherent to lend itself to this type of modelling. Statutory texts have an interesting property which to some extent permits a measure of coherence - their citation structure. A table of the citation structure of SSA Chapter 7 illustrates some of the bonds to other chapters, and outside the SSA:[21]

	SSA	Ch 7	external	sum
SSA sect 7-1	1	1		2
SSA sect 7-2	9	1		10
SSA sect 7-3	3	1		4
SSA sect 7-4	3	4		7
SSA sect 7-5		1		1
SSA sect 7-6				
SSA sect 7-7		2		2
SSA sect 7-8	2	1	2	5
SSA sect 7-9	6	9	5	20
SSA sect 7-10	1	1		2
sum	25	21	7	53

21. Both authentic and editorial citations are noted. Citations to chapters are not included, but collective citations to several sections are included.

The table illustrates reasonable strong bond between the different sections, and may be seen as a confirmation that the domain is sufficiently self-contained to allow modelling.

As an appendix, the fragments pertaining to the right to and the calculation of the basic pension, which is part of the old age pension, has been reproduced in a rough translation into English. An example of such a fragment may be rule 8 (SSA sect 7-2(2)(a)):

8. IF
    entitled to basic pension
    AND
        spouse receiving old age pension
        OR
        spouse receiving invalid pension
        OR
        spouse receiving rehabilitation support while
        waiting for invalid pension
THEN
    basic pension
    EQUALS
    0.75 basic amount[22]

One is considering the possibility of building a parser which will use the statutory text as input, and have an approximation of normalized form as output. Such a parser is still only a possibility.

The fragments of normalized text will then be fused. The fragments have arguments where the words have been carefully massaged in order to appear in basic and unique forms, making one word or phrase correspond to one concept. These are seen as flags, and fragments with identical flags will be fused together. The explicit logical structure of the normalized form, will facilitate such a fusion. The result is a complex, network structure in which a great number of the fragments have fused together to form larger fragments.[23]

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22. Basic amount is a sum set by parliament, and regulated at least annually, on which the calculation of all pensions is based.

23. The possibility of automatic fusion of the fragments have been considered, and a program has been developed at the NRCCL. I addition to fusion, the program indexes the argument flags in order to

Continued on next page

After the construction of the structure representing statutory norms, it is possible to use an identical approach for the regulations. In this way a second hierarchical level can be established. This level can be linked to the first level by means similar to those described. The result will be a hierarchical structure of complex networks representing an approximation of the normative structure of the legal domain in question.

3.2 Normalized form as arrow diagrams

The normalized form offers to possibilities of representing the structure to the user: Either as fragments written in normalized form, as exemplified above, or as arrow diagrams. At the NRCCL, the use of arrow diagrams have been seen as promising. This is mainly due to the application as an interface to a text retrieval system. It is foreseen that the end user will have less problems coping with arrow diagrams than with the normalized form directly.

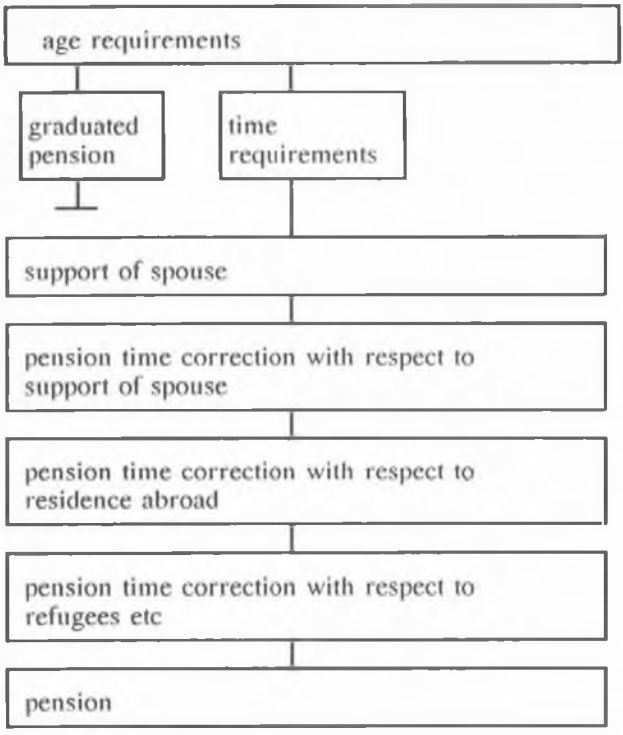
This presumes that the work station available has satisfactory graphical support, and that color may be desirable.

To some extent, it may be seen as alternative whether one fit in a segment as a subsequent, or subordinate, segment. One will notice that some of the elements represent an exit to regulations (cf rule 16 and 15), and that there are explicit exits to expert judgement (cf rule 14 and 15), elements which appropriately should be modelled on a subordinate level.

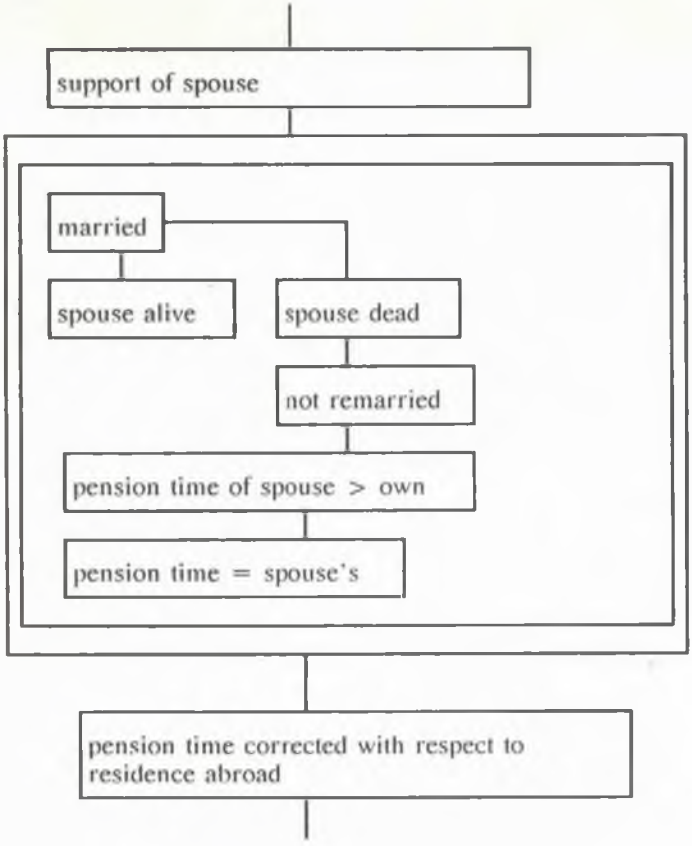
For the user interface, it would be appropriate to fit in a top level, mapping the general structure of the norms. An approximation of this top level for the sub-domain of the appendix, might be as follows:

Continued from previous page

facilitate control of the terminology. It has not been employed for the examples included in the paper. It is obvious that the result of such a program still has to be carefully edited and supplemented by a lawyer with a understanding of the legal domain in question.



Opening the box representing correction of pension time with respect to the support of spouse, would open a window specifying a more detailed structure:



This tiny example should be sufficient to illustrate the basic design idea of how to present the structure to the end user. By extensive use of arrow diagrams on several hierarchical levels, it is believed that the user quite easily would be able to traverse the formal representation of the normative structure. As the structure is based on the statutory provisions, it is believed that the user also would recognize the structure, and the background knowledge of the user would be utilized.

In accessing the text retrieval system through the structure, the user would traverse the diagrams. There may easily be forged explicit links between the different elements, and the provisions of statutes or

regulations represented by these elements. Such links would have to be inserted manually as pointers to the text file of the retrieval systems, and be maintained when the basic legal instruments are amended. As this is limited to amendments in the statutes and regulation, this type of "intellectual indexing" is on a relatively modest scale.

The look up-function provided by such pointers may have interest for certain users, but are not the main justification of ARCTIS. For this, an interface between the formalism and the text retrieval system has to be designed.

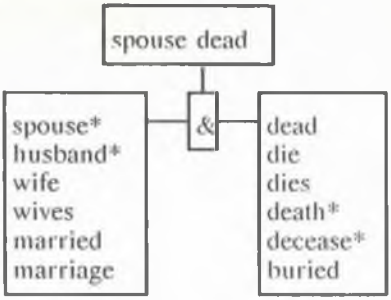
3.3 Interfacing the rule structure to the text retrieval system

The result of the exercise discussed above, will be a rudimentary rule structure for the legal domain in question, edited into a somewhat coherent representation, allowing the user to traverse the diagrams used to represent the structures both in width and depths.

Each of the phrases embedded in the rule structure may be perceived as a node in the hierarchical network. The phrase itself may be seen as a flag or an index to the node within the network.

Each node may be expanded into a list of terms. These terms may take the form of single words, or phrases formulated according to the rules of the search language of the text retrieval system, for instance truncating terms, combining terms with Boolean or distance operators *etc.*

Initially, these lists may be drawn up by a lawyer familiar with the domain represented, and the language of the documents represented within the domain. A small example may illustrate the point. One of the nodes in the example above was named "spouse dead". This could be represented in the following manner:



It is quite easy to see how the system, when the user identifying this node as relevant for his or her problem, may use this specification of terms to automatically generate a search request. The request would consist of two classes of words, where each word in a class would be synonyms within the context of the structure. The request could exit to the text retrieval system and be processed as a traditional class request.[24]

If the user indicates more than one node, a more complex request is generated. This request draws upon the defined relations between the nodes to generate the logic of the requests, disjunctive nodes resulting in a Boolean disjunction between the node lists, conjunctive nodes resulting in a class relation between the lists. It will be appreciated that the resulting requests will have to limit the relations between nodes to those corresponding to logical operators in the text retrieval system. Obviously, the semantic of such a request will have the same limitations as traditional requests for text retrieval. For instance, the roles of indicated actors cannot be specified (unless reflected in the language itself), negations will be represented with more or less the same phrases as the

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24. The use of Boolean the conjunction (*and*) is inappropriate, and has been replaced by the class operator (*&*). This type of retrieval strategy, *the conceptor based strategy*, has been discussed in detail with respect to alternative strategies, cf for instance Bing *et al* 1984:173-174, and Bing 1986. In this paper it would be inappropriate to go further into the discussion of retrieval strategies for text retrieval systems, but it is thought that the use of class operators and the resulting class ranking of the retrieved documents, is an essential part of the implementation of ARCTIS.

positive version (for instance, the node list for "remarried" and "not remarried" may be identical), *etc.* These limitations, inherent to traditional text retrieval, cannot be overcome unless some semantic representation of the content of the documents are specified - either by intellectual indexing or by some form of automatic parsing of the text of the documents. This limitation should be seen as a consequence of our basic design idea, which required that ARCTIS should interface with a traditional text retrieval system, where no additional amendments of the documents should take place.

Using this interface, the text retrieval system will retrieve documents in the traditional way, presenting them as a ranked list to the user. Though the structure is based on the statutes and regulations, cases or other types of documents will be retrieved if matching the requirements set out in the search request. When updating the data base, new documents will be retrieved if meeting these requirements. In this way, the system may have a flexibility not easily achieved in a system relying on intellectual indexing of the documents at the time of inclusion in the data base.

The node lists also will provide the user with an easy access to ARCTIS structure. Each node will be considered a document, which is made accessible through the same text retrieval system as used for access to the data base.[25] In this way, the node lists for ARCTIS will be a small data base which may be searched separately. Using the search request

WIFE & DECEASE*

the user will (probably among several other node lists) retrieve the node list exemplified above, and may enter ARCTIS at any of the identified nodes. In this way, the user may examine the normative structure taking the identified node as the point of departure. The user may therefore access ARCTIS either top-down through the hierarchical structures, or randomly through the text retrieval system identifying possible relevant elements of the structure.

The node lists are initially defined by a lawyer, drawing on his or her background knowledge. But the lists have to be maintained, further

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25. Ranking algorithms would be modified to take into account the proximity of nodes when ranking the retrieved node lists, presenting first those nodes satisfying the highest number of classes in the search request *and* having the closest proximity in the specified structure.

synonyms added, inappropriate terms deleted *etc*. This may, of course, be done in the traditional way of reviewing the specified lists periodically.

One should, however, also consider the possibility of utilizing the user interaction to maintain node lists. First, the user may be invited to amend the automatically generated search requests. The system would save the amendments, compare them, and - if a node list several times was amended - suggest to the system manager that a permanent amendment be made. Second, the user accessing the text retrieval system in the traditional way, not using ARCTIS, also will specify search requests. These also should be saved and analyzed. Matching node lists should be compared, and the same possibility for suggesting amendments could be made.[26]

Further possibilities could be considered. The research in text retrieval has indicated several possibilities for expanding search requests by additional terms. A promising possibility is known as *local metrical relevance feedback*.[27] A node list would be used as a search request, retrieving all documents containing the words of the list. The locations in the retrieved documents would be identified, and the text surrounding each location ("the local text", measured by "metric" distance from the matching word) would be correlated. Terms occurring frequently in conjunction with the node list terms could be considered candidates for inclusion in the lists. This could be done periodically to capture the dynamic of language usage reflected in the updating of the data base.[28]

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26. In some systems, notably in the US and Canada, it is seen as an infringement of the privacy of the user to store and analyze search requests. Without commenting upon the justification of this, one may note that the situation is different in other jurisdictions. The Norwegian Lawdata foundation routinely store and analyze user requests under a license from the Data Inspectorate, which is seen as a sufficient warranty for the privacy of its users.

27. Cf Attar/Fraenkel 1980.

28. In implementing this scheme, the NRCCL will cooperate with the Lawdata foundation, and make the node lists accessible through the SIR ("shell for information retrieval"), currently operational as a user interface to the SIFT text retrieval system. SIR supports synonym lists independent of the text retrieval system itself, and the node lists will

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be treated as such synonym lists and linked from SIR to ARCTIS. SIR has been designed to facilitate learning through user feedback, and to accommodate ARCTIS, which was at an early design stage when SIR was implemented.

4. Conclusions

ARCTIS, with the node lists as a bridge between the traditional text retrieval systems and the normative structure, may seen to facilitate a modest from of "conceptual retrieval".

It is rather evident that in designing this approach, the focus has been the traditional text retrieval systems rather than a pure interest in representing normative structures. The NRCCL has projects pursuing other objectives, for instance related to legal expert systems and legislative planning systems. But such approaches should not eclipse the fact that there is an acute need for the upgrading of the traditional text retrieval systems.

This realization is seen as the justification of the modest attempt to develop a ARCTIS as an interface to text retrieval. This will make some new possibilities available to users. It is an attempt with a moderate level of ambition, and a realistic possibility for implementation in current user environments. But, of course, a number of practical considerations have been present as constraints for the design and development.

It is, however, believed that this effort will be of value also in a more long range perspective. The domains possible to cover by the norm based thesauri would seem much larger that those covered by expert systems, where the modelling would require larger resources - especially in terms of the intellectual effort necessary to specify the rule structures. It is believed that in the foreseeable future, expert systems will have to coexist with text retrieval systems, and ARCTIS is envisaged to facilitate this, backing up the expert system on a specific domain with this modest form of conceptual retrieval for the larger, related domains.[29]

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29. The NRCCL is pursuing this avenue of research in its current F*KUS program, supported by the Norwegian Research Council for Science and Technology, which also has funded the research presented in this paper.

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Appendix 1
Approximate normalization of
Norwegian Social Security Act Ch 7
Old age pension: Selected sections.

SSA sct 7-1(1)

1. IF
    older than 67 yeas
THEN
    entitled to old age pension

2. IF
    older than 67 years
    AND
    younger than 70 years
THEN
    entitled to graduated old age pension

SSA sect 7-1(2)

3. IF
    entitled to old age pension
THEN
    entitled to basic pension
    AND
    entitled to supplementary pension

4. IF
    pension time
    GREATER THAN
    3 years after 16 years of age and before 67 years of age
THEN
    entitled to supplementary pension

SSA sect 7-2(2)(a)

7. IF
    entitled to basic pension
    AND
        unmarried
        OR
        spouse not receiving old age pension
        OR
        spouse not receiving invalid pension
        OR
        spouse not receiving rehabilitation support while waiting for invalid pension
THEN
    basic pension
    EQUALS
    basic amount

SSA sect 7-2(2)(b)

8. IF
    entitled to basic pension
    AND
        spouse receiving old age pension
        OR
        spouse receiving invalid pension
        OR
        spouse receiving rehabilitation support while waiting for invalid pension
THEN
    basic pension
    EQUALS
    0.75 basic amount

9. IF
    entitled to basic pension
    AND
        spouse receiving *part* of old age pension
        OR
        spouse receiving *part* of invalid pension
        OR
        spouse receiving *part* of rehabilitation support while waiting for invalid pension
THEN
    basic pension
    EQUALS
        0.75 basic amount
        TIMES
        part

SSA sect 7-2(3)

10. IF
    entitled to basic pension
    AND
        pension time
        GREATER THAN
        40 years
THEN
    basic pension
    EQUALS
    basic amount

11. IF
    entitled to basic pension
    AND
        pension time
        LESS THAN
        40 years
THEN
    basic pension
    EQUALS
        basic amount
        TIMES
        part of 40 years

12. IF
        spouse is receiving full old age pension
        OR
        spouse is receiving full invalid pension
        OR
        spouse is receiving rehabilitation support waiting for invalid pension
        OR
        spouse is receiving *part* of old age pension
        OR
        spouse is receiving *part* of invalid pension
        OR
        spouse is receiving *part* of rehabilitation support while waiting for invalid pension
    AND
        pension time of spouse
        GREATER THAN
        pension time of applicant
THEN
    pension time of applicant
    EQUALS
    pension time of spouse

13. IF
spouse is receiving full old age pension
OR
spouse is receiving full invalid pension
OR
spouse is receiving rehabilitation support waiting for invalid pension
OR
spouse is receiving*part* of old age pension
OR
spouse is receiving *part* of invalid pension
OR
spouse is receiving *part* of rehabilitation support while waiting for invalid pension
AND
spouse is deceased
AND
applicant is not remarried
AND
pension time of spouse
GREATER THAN
pension time of applicant
THEN
pension time of applicant
EQUALS
pension time of spouse

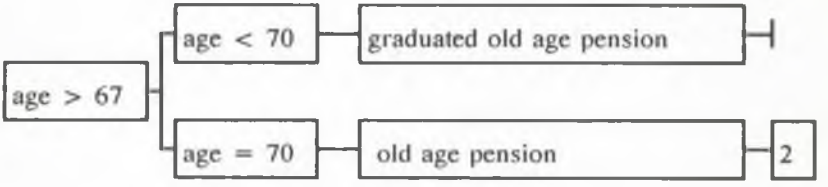
SSA sect 7-2(3)(2)

14. IF
foreign refugee
AND
domiciled in Norway
AND
special reasons make it appropriate
THEN
up to full basic pension

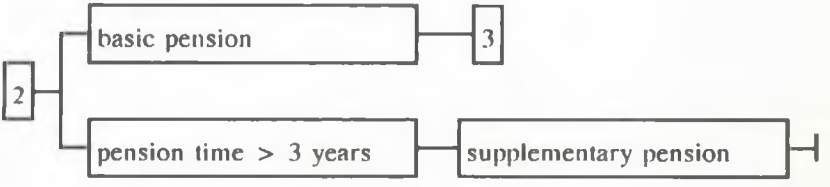
15. IF
    Norwegian citizen
    AND
    considered in similar situation as a refugee
    AND
    requirements in regulation satisfied
THEN
    up to full basic pension

Appendix 2
APPROXIMATION OF ARROW DIAGRAMS
THE RIGHT TO AND CALCULATION OF
BASIC PENSION OF OLD AGE PENSION

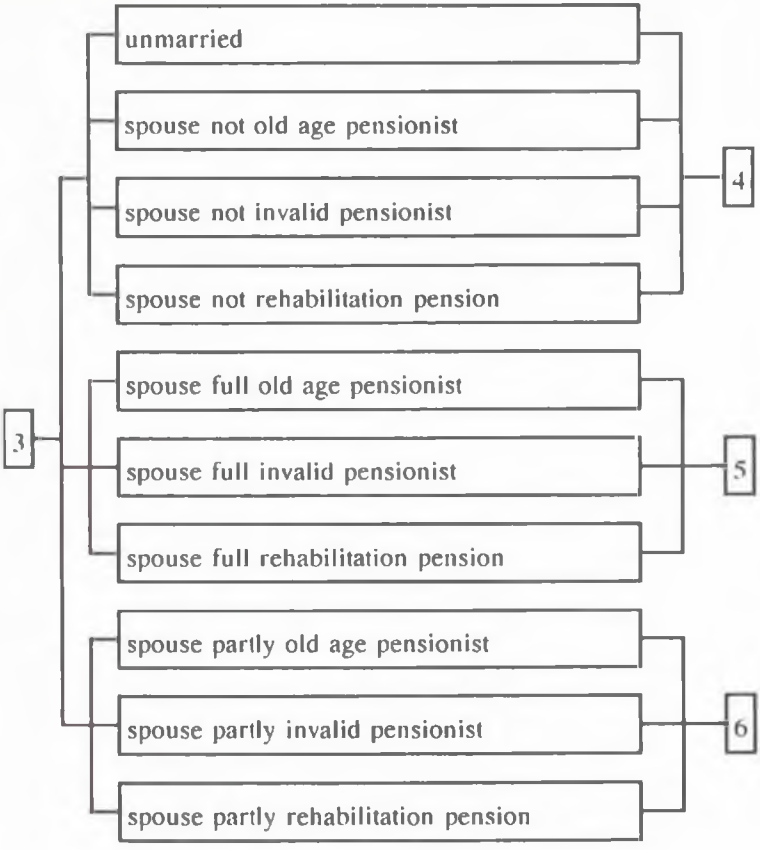
Rule 1 and 2



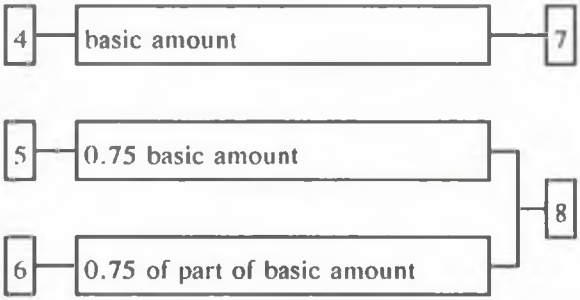
Rule 3 and 4



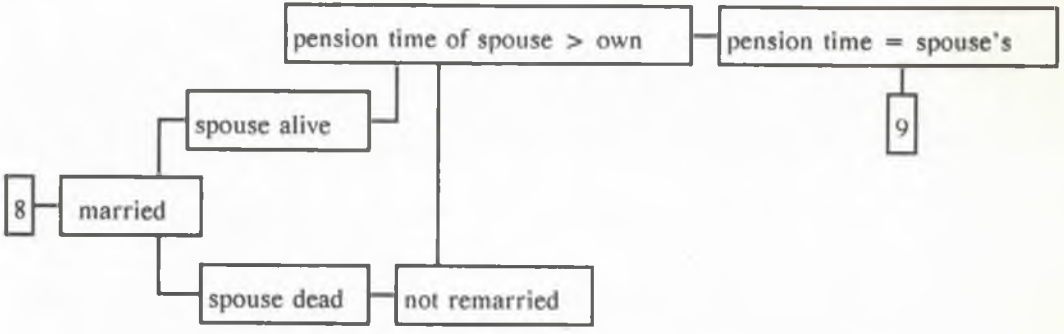
Rule 7, 8, and 9


unmarried
spouse not old age pensionist
spouse not invalid pensionist
spouse not rehabilitation pension
4
spouse full old age pensionist
3
spouse full invalid pensionist
5
spouse full rehabilitation pension
spouse partly old age pensionist
spouse partly invalid pensionist
6
spouse partly rehabilitation pension

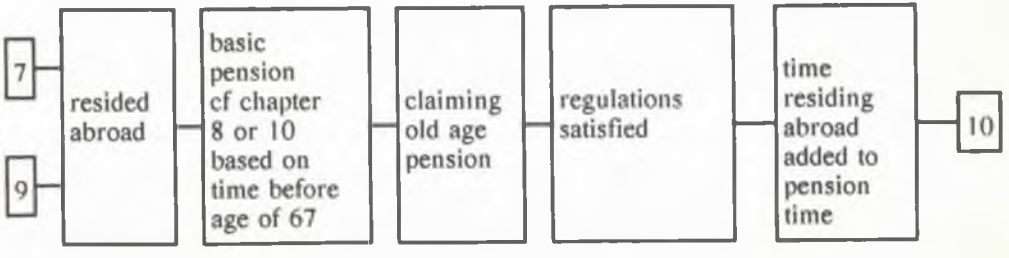
Rule 7, 8, and 9 (continued)



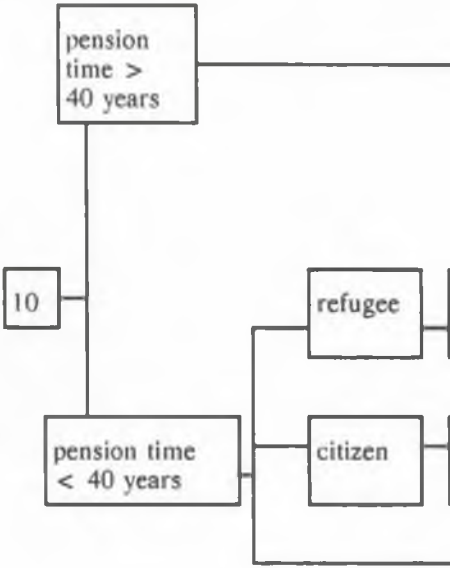
Rule 12 and 13

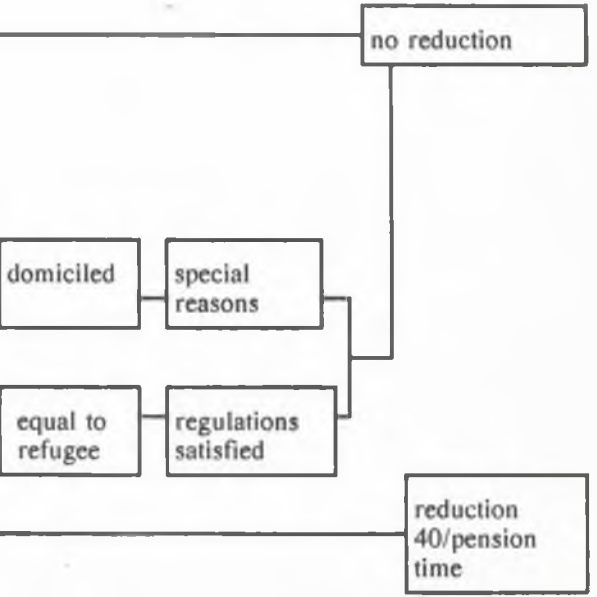


Rule 16



Rule 10, 11, 14, and 15




no reduction
domiciled
special reasons
equal to refugee
regulations satisfied
reduction 40/pension time

Appendix 3
(Norwegian)
TILNÆRMET NORMALISERING AV
FOLKETRYGDLOVEN KAP 7 - ALDERSPENSJON

Ftl § 7-1, 1.ledd

1. HVIS
   eldre enn 67 år
SÅ
   rett til alderspensjon

2. HVIS
   eldre enn 67 år
   OG
   yngre enn 70 år
SÅ
   rett til gradert alderspensjon

Ftl § 7-1, 2.ledd

3. HVIS
   rett til alderspensjon
SÅ
   rett til grunnpensjon
   OG
   rett til tilleggspensjon

4. HVIS
trygdetid
STØRRE ENN
3 år etter fylte 16 år og før fylte 67 år
SÅ
rett til tilleggspensjon

Ftl §7-2 nr 1, 2.ledd

5. HVIS
godskrevet pensjonspoeng ett år
SÅ
regnes året som helt år

Ftl § 7-2 nr 1, 2.ledd

6. HVIS
fyller 67 år
ELLER
fyller 68 år
ELLER
fyller 69 år
OG
opptjent pensjonspoeng i året
SÅ
regnes året som kalenderår for grunnpensjon

Ftl § 7-2 nr 2 litra a

7. HVIS
rett til grunnpensjon
OG
ugift
ELLER
ektefelle som ikke oppebærer alderspensjon
ELLER
ektefelle som ikke oppebærer uførepensjon
ELLER
ektefelle som ikke oppebærer attføringspenger i ventetid før uførepensjon kan
tilstås
SÅ
grunnpensjon
LIK
grunnbeløp

Ftl § 7-2 nr 2 litra b

8. HVIS
rett til grunnpensjon
OG
ektefelle oppebærer alderspensjon
ELLER
ektefelle oppebærer full uførepensjon
ELLER
ektefelle oppebærer attføringspensjon før uførepensjon kan tilstås
SÅ
grunnpensjon
LIK
0,75 grunnbeløp

9. HVIS
rett til grunnpensjon
OG
ektefelle oppebærer *brøkdel* av alderspensjon
ELLER
ektefelle oppebærer *brøkdel* av uførepensjon
ELLER
ektefelle oppebærer *brøkdel* av attføringspensjon før uførepensjon kan tilstås
SÅ
grunnpensjon
LIK
0,75 grunnbeløp
MULTIPLISERT
brøkdel

Ftl § 7-2nr 3, 1.ledd

10. HVIS
rett til grunnpensjon
OG
trygdetid
STØRRE ENN
40 år
SÅ
grunnpensjon
LIK
grunnbeløp

11. HVIS
rett til grunnpensjon
OG
trygdetid
MINDRE ENN
40 år
SÅ
grunnpensjon
LIK
grunnbeløp
MULTIPLISER
brøkdel av 40 år

12. HVIS
ektefelle oppebærer full alderspensjon
ELLER
ektefelle oppebærer full uførepensjon
ELLER
ektefelle oppebærer attføringspensjon før uførepensjon kan tilstås
ELLER
ektefelle oppebærer *brøkdel* av alderspensjon
ELLER
ektefelle oppebærer *brøkdel* av uførepensjon
ELLER
ektefelle oppebærer *brøkdel* av attføringspensjon før uførepensjon kan tilstås
OG
ektefelles trygdetid
STØRRE ENN
trygdesøkendes trygdetid
SÅ
trygdesøkendes trygdetid
LIK
ektefelles trygdetid

13. HVIS
ektefelle oppebærer full alderspensjon
ELLER
ektefelle oppebærer full uførepensjon
ELLER
ektefelle oppebærer attføringspensjon før uførepensjon kan tilstås
ELLER
ektefelle oppebærer *brøkdel* av alderspensjon
ELLER
ektefelle oppebærer *brøkdel* av uførepensjon
ELLER
ektefelle oppebærer *brøkdel* av attføringspensjon før uførepensjon kan tilstås
OG
ektefelle er død
OG
trygdesøkende ikke ingått nytt ekteskap
OG
ektefelles trygdetid
STØRRE ENN
trygdesøkendes trygdetid
SÅ
trygdesøkendes trygdetid
LIK
ektefelles trygdetid

Ftl § 7-2 nr 3, 2.ledd

14. HVIS
utenlandsk flyktning
OG
bosatt i riket
OG
særlige grunner gjør det rimelig
SÅ
inntil full grunnpensjon

15. HVIS
norsk statsborger
OG
ansees å stå i lignende stilling som utenlandsk flykting
OG
bestemmelser i forskrifter oppfylt
SÅ
inntil full grunnpensjon

Ftl § 7-2 nr 4

16. HVIS
oppehold utenfor riket
OG
oppebåret grunnpensjon etter ftl kap 8 eller 10 på grunnlag av trygdetid frem til fylte
67 år
OG
går over til alderspensjon
OG
bestemmelser i forskrifter oppfylt
SÅ
opphold utenfor riket *medregnes* i trygdetid

Ftl § 7-3 nr 1

17. HVIS
godskrevet pensjonspoeng for *minst* 3 år
SÅ
rett til tilleggspensjon

Ftl § 7-3 nr 2

18. HVIS
    rett til tilleggspensjon
    OG
    pensjonspoeng for *minst* 40 år
SÅ
    tilleggspensjon
    LIK
        0,45 grunnbelop
        MULTIPLISERT
        sluttpoengtall

19. HVIS
    rett til tilleggspensjon
    OG
    pensjonspoeng for *brøkdel* av 40 år
SÅ
    tilleggspensjon
        LIK
            brøkdel av 40 år
            MULTIPLISERT
            0,45 grunnbelop
            MULTIPLISERT
            sluttpoengtall)

20. HVIS
    antall pensjonspoeng
    STØRRE ENN
    20
SÅ
    sluttpoengtall
    LIK
    gjennomsnittet av 20 høyeste tall

21. HVIS
antall pensjonspoeng
MINDRE ENN
20
SÅ
sluttpoengtall
LIK
gjennomsnittet av poengtallene

Ftl § 7-4

22. HVIS
alderspensjonist
ELLER
fyller 67 år
OG
fyller vilkårene for pensjon etter ftl kap 10
ELLER
rett til uforepensjon etter ftl § 8-6
ELLER
fraskilt
OG
gjenlevende fyller vilkårene etter ftl § 10-6
OG
ektefelle dør
OG
vilkårene i ftl § 10-5 nr 1 er oppfylt
SÅ
tilleggspensjon
LIK
0,55 egen tilleggspensjon
PLUSS
avdødes tilleggspensjon, jfr ftl § 10-5 nr 2, 1.ledd

23. HVIS
gjenlevendes tilleggspensjon
MINDRE ENN
egen tilleggspensjon
SÅ
gjenlevendes tilleggspensjon
LIK
egen tilleggspensjon

24. HVIS
tilleggspensjon
OG
alderspensjonist
OG
fraskilt
OG
tidligere ektefelle dør
SÅ
avdødes tilleggspensjon
LIK
fastsatt i medhold av ftl § 10-6, 2.ledd

Ftl § 7-4 nr 3

25. HVIS
alderspensjonist
OG
nytt ekteskap
SÅ
tilleggspensjon *omregnes* etter ftl §§ 7-2 og 7-3

Ftl § 7-5, 1.ledd jfr 3.ledd

26. HVIS
    norsk statsborger
    ELLER
        flyktning
        ELLER
        statslos
    OG
    bosatt i Norge
    ELLER
    trygdet
    OG
    bosatt i Norge
    OG
    omfattes av departementets bestemmelser
    OG
    født ett av årene 1898-1917
SÅ
    40 (ftl § 7-3 nr 2)
    LIK
    20

27. HVIS
    norsk statsborger
    ELLER
        flyktning
        ELLER
        statsløs
    OG
    bosatt i Norge
    ELLER
    trygdet
    OG
    bosatt i Norge
    OG
    omfattes av departementets bestemmelser
    OG
    født ett av årene 1918-1936
SÅ
    40 (ftl § 7-3 nr 2)
    LIK
    20
    PLUSS
        fødselsår
        MINUS
        1917

Ftl § 7-5, 2.ledd jfr 3.ledd

28. HVIS
    norsk statsborger
    ELLER
        flyktning
        ELLER
        statslos
    OG
    bosatt i Norge
    ELLER
    trygdet
    OG
    bosatt i Norge
    OG
    omfattes av departementets bestemmelser
    OG
    født ett av årene 1918-1936
    OG
    poengtall
    STØRRE ENN
    4
SÅ
    beregnes tilleggspensjon for *brøkdel* av poengtall som overstiges 4
særskilt etter
    ftl § 7-3 nr 2

Ftl § 7-6

29. HVIS
    alderspensjonist
    OG
    gift
    OG
    lever adskilt
SÅ
    tilleggspensjon
    LIK
    egenpensjon

Ftl § 7-7

30. HVIS
alderspensjonist
OG
forsørger ektefelle
OG
ektefelle ikke oppebærer uførepensjon
OG
ektefelle ikke rett til alderspensjon
SÅ
ektefelletillegg
LIK
0,5 grunnpensjon uten ventetillegg (jfr § 7-10)

Ftl § 7-8

31. HVIS
alderspensjonist
OG
forsørger barn under 18 år
SÅ
rett til barnetillegg

32. HVIS
rett til barnetillegg
SÅ
barnetillegg
LIK
0,25 grunnbeløp

33. HVIS
rett til barnetillegg
OG
yrkesaktiv ektefelle
OG
ektefelle forsørger barn sammen med alderspensjonist
OG
ektefelles pensjonsgivende inntekt
STØRRE ENN
4 grunnbeløp
OG IKKE
lever adskilt
SÅ
barnetillegg
LIK
0,125 grunnbeløp

34. HVIS
rett til barnetillegg
OG
gradert alderspensjon (jfr tl § 7-10)
SÅ
barnetillegg
LIK
barnetillegg
MULTIPLISERT
grad

Ftl § 7-8, 2.ledd

35. HVIS
forsørger fosterbarn
OG
forsørget fosterbarn de siste to år før krav om tillegg settes frem
ELLER
særlige forhold foreligger
OG
Rikstrygdeverket fraviker
SÅ
rett til barnetillegg

Ftl 7-8, 3.ledd

36. HVIS
    forsørger barn
SÅ
    bare 1 barnetillegg for ett barn

37. HVIS
    forsørger barn
    OG
        flere forsørgere
        OG
        forsørgere er alderspensjonister
SÅ
    berettiget alderspensjonist den som krav på høyest barnetillegg

38. HVIS
    forsørger barn
    OG
        flere forsørgere
        OG
        alderspensjonister
        OG
        lever adskilt
SÅ
    berettiget alderspensjonist den som har omsorg for barnet

Ftl § 7-8, 4.ledd

39. HVIS
    rett til etterbetaling (en periode) av barnetillegg
SÅ
    etterbetaling
    LIK
        etterbetaling
        MINUS
        allerede utbetalt barnetillegg (en periode)

40. HVIS
rett til etterbetaling (en periode) av barnetillegg
OG
allerede utbetalt barnetillegg (en periode)
OG
gått i fradrag i underholdsbidrag for barnet (jfr ftl § 15-6, 2.ledd)
ELLER
ikke er kommet til barnet til gode
SÅ
etterbetaling
LIK
etterbetaling

Ftl § 7-8, 5.ledd

41. HVIS
barn
OG
barnet har rett til pensjon etter ftl kap 10
SÅ
ikke rett til barnetillegg

Ftl § 7-9, nr 1

42. HVIS
alderspensjonist
OG
innlagt helseinstitusjon
ELLER
privat forpleiningssted
OG
oppholdet godtgjort etter ftl
ELLER
innlagt i institusjon med rett til forpleining av det offentlige i medhold av andre
lover
ELLER
innsatt i en av fengselsvesenets anstalter
SÅ
rett til alderspensjon etter ftl § 7-9
FRA OG MED
den måned forpleiningen tok til

43. HVIS
rett til alderspensjon etter ftl § 7-9
OG
ved innleggelsen opphold i aldershjem
ELLER
ved innleggelsen opphold i annen sosial institusjon
OG IKKE
unntak i forskrifter fastsatt av departementet etter ftl § 7-9 nr 6
SÅ
omregning straks

Ftl § 7-9 nr 2

44. HVIS
rett til alderspensjon etter ftl § 7-9
SÅ
alderspensjon etter ftl § 7-9
LIK
0,25 grunnbelop
PLUSS
0,10 tilleggspensjon (jfr ftl §§ 7-3 - 7-5)

Ftl § 7-9 nr 3

45. HVIS
alderspensjon etter ftl § 7-9
OG
forsorger ektefelle
SÅ
ektefelletillegg etter § 7-9
LIK
etterlattepensjon (jfr ftl § 10-5)

46. HVIS
alderspensjon etter ftl § 7-9
OG
barnets alder
MINDRE ENN
18 år
SÅ
barnetillegg etter § 7-9
LIK
barenpensjon (jfr ftl § 10-11 nr 2, 2.ledd)

47. HVIS
alderspensjon etter ftl § 7-9
OG
barnets alder
MINDRE ENN
18 år
OG
den annen av barnets foreldre død
ELLER
pensjonisten av annen årsak har omsorgen av barnet alene
SÅ
barnetillegg etter § 7-9
LIK
barnepensjon (jfr ftl § 10-11 nr 2, 3.ledd)

Ftl § 7-9 nr 4

48. HVIS
rett til alderspensjon etter ftl § 7-9
SÅ
kompensasjonstillegg (lov av 19.12.1969 nr 80)
LIK
125 kr pr år
PLUSS
0,10 særtillegg (lov av 19.6.1969 nr 61 § 2, 1.ledd)

49. HVIS
ektefelletillegg etter § 7-9
ELLER
barnetillegg etter § 7-9
SÅ
medregnes kompensasjonstillegg og særtillegg
MINUS
pensjon som barn selv oppebærer etter ftl
PLUSS
pensjon som barn selv oppebærer etter lov av 19.12.1969 nr 8
PLUSS
pensjon som barn selv oppebærer etter 19.6.1969 nr 61
PLUSS
pensjon som ektefelle selv oppebærer etter ftl
PLUSS
pensjon som ektefelle selv oppebærer etter lov av 19.12.1969 nr 8
PLUSS
pensjon som ektefelle selv oppebærer etter 19.6.1969 nr 61

50. HVIS
    alderspensjon etter ftl § 7-9
    PLUSS
    barnetillegg etter ftl § 7-9
    PLUSS
    ektefelletillegg etter ftl § 7-9
  STØRRE ENN
    alderspensjon etter ftl
    PLUSS
    ektefelletillegg etter ftl
    PLUSS
    barnetillegg etter ftl
    PLUSS
    kompensasjonstillegg etter lov av 19.12.1969 nr 8
    PLUSS
    særtillegg etter lov av 19.6.1969 nr 61
SÅ
  alderspensjon etter ftl § 7-9
  LIK
    alderspensjon etter ftl
    PLUSS
    ektefelletillegg etter ftl
    PLUSS
    barnetillegg etter ftl
    PLUSS
    kompensasjonstillegg etter lov av 19.12.1969 nr 8
    PLUSS
    særtillegg etter lov av 19.6.1969 nr 61

Ftl § 7-9 nr 5

51. HVIS
rett til alderspensjon etter ftl § 7-9
OG
rett til tjenestepensjon omfattet av lov om samordning av pensjons- og trygdeytelser
ELLER
rett til yrkesskadetrygd
ELLER
krigspensjon
OG
pensjon etter § 7-2 - 7-8
PLUSS
kompensasjonstillegg
PLUSS
særtillegg
PLUSS
tjenestepensjon
PLUSS
yrkesskadetrygd
PLUSS
krigspensjon
MINUS
forpleiningsutgifter
STØRRE ENN
0
SÅ
alderspensjon etter ftl § 7-9
PLUSS
tilsvarende beløp

Ftl § 7-9 nr 6

(Kompetanse for departementet til å gi forskrifter - ikke normalisert)

Ftl § 7-9 nr 7

52. HVIS
    trygdet under privat forpleining
    OG
    godgjøres etter ftl
    OG
        forpleining skjer hos familien
        ELLER
        forpleining skjer hos slektninger
        ELLER
        særlige grunner taler for det
    OG
    departementets forskrifter oppfylt
    OG
    trygdete anmoder om det
SÅ
    unntak fra lovens betalingsordning

Ftl § 7-10 nr 1

53. HVIS
    rett til alderspensjon
    OG
        alder
        MINDRE ENN
        70 år
SÅ
        grad
        LIK
        1/4
    ELLER
        grad
        LIK
        1/2
    ELLER
        grad
        LIK
        3/4
    ELLER
        grad
        LIK
        1
54. HVIS
    ervervsinntekt
    OG
        alder
        MINDRE ENN
        70 år
SÅ IKKE
        alderspensjon
        PLUSS
        ektefelletillegg
        PLUSS
        fremtidig ervervsinntekt
    STØRRE ENN
        0,8 tidligere ervervsinntekt

55. HVIS
sykepenger etter ftl kap 3
SÅ
sykepenger
LIK
medregnes i ervervsinntekt

Frl 7-10 nr 2

56. HVIS
rett til alderspensjon etter ftl § 7-4
ELLER
rett til alderspensjon etter ftl § 11-3
SÅ
alderspensjon
LIK
minst pensjon krav på ved fylte 67 år

Ftl § 7-10 nr 3

57. HVIS
mindre enn 1 år siden oppregulering av gradert alderspensjon
OG IKKE
vesentlige endringer i ervervsinntekt
SÅ
ikke krav på oppregulering

Ftl § 7-10 nr 4

58. HVIS
alderspensjon
OG
alder
MINDRE ENN
70 år
SÅ
beregning på grunnlag av opparbeidete rettigheter ved fylte 67 år

59. HVIS
alder
LIK
70 år
SÅ
omregning under hensyntagen til rettigheter opparbeidet etter det kalderår fylte 66 år

Ftl § 7-10 nr 5

60. HVIS
ikke tatt ut alderspensjon helt eller delvis for tidsrom for 1.4.1984 etter ftl § 7-10 nr 1
SÅ
rett til ventetillegg

61. HVIS
rett til ventetillegg
OG
tar ut 1/1 alderspensjon
ELLER
alder
LIK
70 år
SÅ
ytes ventetillegg

62. HVIS
ytes ventetillegg
SÅ
ventetillegg
LIK
0,00075 egenpensjon
MULTIPLISERT
hele kalendermåender ventet ta ut pensjon

63. HVIS
ventetillegg
OG
tatt ut gradert pensjon
SÅ
ventetillegg
MINUS
forholdsmessig for antall kalendermåneder tatt ut gradert pensjon

64. HVIS
opparbeidet ventetillegg etter det kalenderår fylt 66
SÅ IKKE
ventetillegg for denne del av egenpensjon

65. HVIS
ventetillegg
SÅ IKKE
etterbetaling av pensjon for tidsrom hvori opptjent ventetillegg

Ftl § 7-10 nr 6
(Kompetanse for Kongen til å gi utfyllende bestemmelser, ikke normalisert)

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Henning Herrestad

ALDERSTRYGDEN I ET NØTTESKALL - SKALL, SKAL IKKE

Denne rapporten er utviklet i forbindelse med Institutt for rettsinformatikks prosjekter knyttet til forvaltningsorienterte, kunnskapsbaserte systemer (font=4F*KUS). På markedet finnes det i dag flere såkalte «skall» som tillater konstruksjon av ekspertsystemer, dvs systemer hvor brukeren beskriver sitt problem gjennom en dialog med systemet, og hvor systemet til slutt gir råd om hvilken avgjørelse som bør eller kan treffes.

Rapporten beskriver et forsøk på å beskrive reglene i folketrygdlovens §§ 7-1 og 7-2 og grunnpensjon ved hjelp av et slikt program, Crystal. Dette sammenlignes med Thorne McCartys arbeid innenfor rammen av det kjente TAXMAN-prosjektet. Sammenligningen gir grunnlag for en kritikk av hvor egnet slike skall er til å lage ekspertsystemer eller kunnskapsbaserte systemer generelt innenfor det juridiske domenet. Man tar opp spørsmål omkring utforming og vedlikehold av slike programmer, brukergrensesnitt og hjelpefunksjoner, og om hvilket formål slike systemer kan tjene i juridisk arbeid.

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Ingvild Mestad

L'INFORMATIQUE, LA LIBERTE INDIVIDUELLE ET LA RECHERCHE EPIDEMIOLOGIQUE
Data Protection and Epidemiologic Research

The conflict between the needs of medical research and the data protection of individuals is one of the more acute problems with respect to individual privacy.

In this report, a comparative study of this issue is offered. The conflict is, of course, especially visible with respect to research relevant to the control of epidemics - an issue of international concern and emphasized by the current efforts to contain the spreading of the HIV-virus and the AIDS disease.

The study is divided into two parts. The first part examines the French data protection legislation of 1978, supplementing this with a discussion of confidentility within the health care system in France. The second part offers a similar discussion of the data protection legislation i Norway and Sweden. In this way, this the difficult balancing of different interests is illuminated by the law and practice from three different countries, offering a valuable contribution to the literature on data protection, and an addition to the all to few comparative studies within the area.

The study will be of interest to lawyers and medical doctors alike. The language of the reports is French, and the research basic to the report has been conducted at IRETIJ of the University of Montpellier.

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Johs Hansen

SAFE-P:

SIKRING AV FORETAK, EDB-ANLEGG OG PERSONVERNINTERESSER ETTER PERSONREGISTERLOVEN TERESA (50)

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Personregisterloven har i § 8b en generell hjemmel for utferdigelse av «regler for sikring av personopplysningen». I arpil 1986 nedsatte Justisdepartemetnet en arbeidsgruppe for å utforme sikkerhetsforskrifter. Forut for dette arbeidet hadde imidlertid Institutt for rettsinformatikk - under ledelse av Datatilsynets spesialrådgiver i edb, Johs Hansen - trukket i gang et prosjekt som tok sikte på å utforme prinsipper for sikring av personverninteresser, foretak og edb-anlegg. Den foreløpige rapporten ble lagt til grunn for arbeidsgruppens vurderinger, og danner på mange måter et forarbeid til det utkast til forskrifter som nå foreligger. Rapporten har en analytisk innfallsvinkel. Den omfatter bl a en diskusjon av risikoanalyse av anlegg og foretak som behandler personregistre, en sikkerhetsmodell bygd på ressursbegrepet, en vurdering av sensitivitet og sårbarhet som fører frem til en sensivitetsmodell, og en diskusjon av hva som ligger i «informasjonssikkerhet». I oppsummeringen drøftes sentrale spørsmål for utforming og administrasjon av sikkerhetsforskriften.
Rapporten fra Justisdepartementets arbeidsgruppe med utkast til forskrift for sikring av personregistre følger som vedlegg.

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This compendium comprises five articles on legal expert systems and artificial intelligence. The firts three articles present three different legal expert systems, demonstrating the wide range of different motives, research interests and approaches to making legal expert systems. The fourth article focuses on the question of how to make formal representations of law. The fifth article presents more visionary ideas concerning how artificial intelligence research could be used as an intrument in reducing international tension.

The compendium originates from a roundtrip made by the editors to six different institutes situated in the Netherlands, West-Germany and Austria. Three of the institutes are doing research especially on legal expert systems, the other three on various aspects within the field of artificial intelligence. In their introduction the editors have summed up their impressions and thoughts after these visits.

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Basic to the computer based legal information sevices prevailing in most Western countries – exemplified by the Lawdata foundation in Norway, the LEXIS and WESTLAW services of the US etc, is a text retrieval system, permitting fast access to the authentic text of legal sources like statutes, cases, regulations etc. The Norwegian Research Center for Computers and Law has worked with the design and analysis of such systems since 1970, and is pursuing this line of research into the next decade, currently evaluating methods liftet from the research in knowledge based systems (artificial intelligence) to enhance the traditional text retrieval systems.

This report contains the first evaluation of reported attempts to marry text retrieval and knowledge based methods – reporting on systems like Hafner's LIRS, the POLYTEXT sytem, the RUBRIC system of Advanced Decision Systems, and the connectionistic AIR system.

It also describes the design principles of the NRCCL suggested norm based thesaurus, the ARCTIS module, exemplifying this within the domain of old age pension (including a normalized version of the statute governing old age pension in Norwegian).

ISBN 82-518-2593-8

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