Improving Search Quality using Thesauri for Query Specification and the Presentation of Search Results

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Abstract: This paper presents a description and initial results of an evaluation of EuroMenUSE for the Mac, a system which offers an alternative mode of access to EPOQUE, the document database of the European Parliament. Subjects with a professional interest in European Parliament business, but with no prior knowledge of information retrieval systems, were able to search EPOQUE using EuroMenUSE for the Mac. These end-users achieved better retrieval results than similar subjects using the current Guided Search mode in use at the Parliament. They also performed better than subjects knowledgeable in information retrieval, but who had less subject knowledge, using the SIMBAD Common Command Language interface, the mode of access used by professional documentalists in the Parliament and other European Union Institutions.

1. Introduction

The development of the Multilingual MenUSE (Menu-based User Search Engine) series of user interfaces to online databases has focused on the thesauri as the key feature for enhancing the quality of end-user searching and improving access to databases. The first MenUSE system was designed and developed at the National Library of Medicine in the USA, to search the MEDLINE database (Pollitt 1988) and shown to be applicable across different subject areas and to facilitate multilingual access to databases through the provision of translations of thesauri. Development has continued in the Centre for Database Access Research (CeDAR) at the University of Huddersfield, with increased searching functionality across databases in different subject areas. An application of MenUSE was demonstrated at the SIGIR '92 conference in Copenhagen where queries were expressed in Japanese to search the English language INSPEC database on the DataStar host in Switzerland (see Li et al 1992, Pollitt et al 1993a).

Prototype systems have now been built to demonstrate improved access to EPOQUE, the European Parliament Online Query System. These prototypes (EuroMenUSE) serve as exemplars for the MenUSE approach. The EPOQUE database is indexed using the EUROVOC vocabulary, developed by the European Parliament and Commission for indexing and searching document databases of the European Institutions, and is translated into all nine official languages of the European Union (OOPEC 1992). EuroMenUSE for the PC has been installed in the offices of several UK MEPs and in the European Parliament Library in Brussels (Pollitt et al 1993b). A more developed version of EuroMenUSE on the Apple Macintosh has undergone an evaluation in collaboration with the University of Konstanz in Gennany. It is this version of EuroMenUSE and the initial results of the evaluation, which are presented in this paper.
2. EuroMenUSE for the Mac

EuroMenUSE interface developments on the Apple Macintosh have taken advantage of a rich environment for the use of icons, multiple windows, mouse pointing and different font characteristics. The design of the PC version has been constrained to using the ubiquitous character-based DOS environment of the current user community in the European Parliament and the European Institutions.

EuroMenUSE did not incorporate the full EUROVOC thesaurus containing related terms and scope notes until the complete EUROVOC tapes were provided by the Office for Official Publications. The Macintosh version progressed in the provision of additional features to facilitate the planned user evaluation at the University of Konstanz with provisional testing at the end of 1993 and formal evaluations which were completed in March 1994. Both English and German language versions were subject to an evaluation to establish usability and effectiveness. The evaluation is described in section 3. What follows is a presentation of selected screens which feature the enhancements made the versions described elsewhere (Pollitt 1993b).

User interaction is principally via a hierarchically organised suite of screens (menus), and utilises the ability of users to recognise and select, rather than explicitly state the query. The introductory screen gives a complete overview of the database and the user can select to see more specific presentations of the summarised attributes for all the documentary records. These screens present to the user the numbers of documents against each attribute, such as document type e.g. Questions or year of publication. For this paper the description of EuroMenUSE will focus on access to the subject descriptors in the EUROVOC thesaurus.

![Figure 1 Top Level of the EUROVOC Thesaurus](image-url)
The EUROVOC thesaurus has been pre-processed using the MenUSE tool kit (Pollitt et al. 1993b) so the user is presented with descriptors which have been grouped automatically into menu screens. Fig. 1 shows the top level screen with the 21 fields, leading to what are described as microthesauri at the next level of detail. EuroMenUSE provides additional information to the user for each term, namely the number of documents in the database indexed by at least one of the terms in the hierarchy of terms under the term presented, the number of more specific descriptors used to index documents on this subject, the number of related terms (the r column) and the existence of a scope note (the s column).

Relevant subject screens can be accessed by browsing the thesaurus through the selection of high level terms or directly by selecting from a list of synonyms and terms containing text input by the user. Selecting education and communications for example, presents the user with an expanded view of this subject (Fig. 2). Navigation to a higher level, to the top thesaurus level or the EuroMenUSE top menu is provided by buttons or menu options. Navigation across the hierarchy is made possible by selecting from related terms.

![Figure 2 EUROVOC Descriptors on Education and communications](image)

An example of navigating using related terms is shown in Fig. 3, which shows the result of selecting the related terms for documentary system from the r column on the left. Selecting information storage and retrieval from the given list takes the user to the relevant section of the thesaurus. It is important that the user sees the context of the selected term as this provides vital information on the use of the term and the number of documents indexed by this term. It is likely that the user will be interested in adjacent terms and this rich, thesaurus-based, presentation, provides valuable information without additional user effort. Another example of navigating using related terms is shown in Fig. 5.
Direct access to a thesaurus screen is provided using FIND, where the user is prompted to enter their own search word and the descriptors and synonyms containing this word are presented in a list. An example of this is given in Fig. 6; the user has entered the word "library". Notice that the synonym *International Federation of Library Associations and Institutions* points to the preferred thesaurus term *IFLA*. Upon selecting a term, the user is presented with the relevant section of the thesaurus.

Figure 3 Navigation to a term related to documentary system

Figure 4 Finding descriptors and synonyms for "library"
Two modes of selection are provided. In normal mode, the user selects distinct concepts/terms; in term store mode the user can assemble terms into sets. Fig.5 shows the contents of the second set, which in this example comprises terms from different sections of the thesaurus on the subject of *information and the law*. The user can choose either to use the search sets to 'filter' a section of the thesaurus or undertake a Boolean combination search. Fig.6 shows the results of combining the sets; notice that the user has limited the documents to reports. Selecting the 6 documents resulting from combining all 3 search sets retrieves summaries of the documents, as shown in Fig.7.
3. Evaluating EuroMenUSE for the Mac

The difficulties in evaluating information retrieval systems are considerable. Fortunately much has been written to guide the evaluator in the design of experiments and advise on the problems and pitfalls to avoid (Sparck-Jones K. 1981, Information Processing and Management Special Issue on Evaluation 1992). Unfortunately the pragmatics of information retrieval evaluation mean that experiments involving end-users may have to compromise some of the niceties of experimental design to accommodate the availability of suitable subjects and their willingness to participate without the benefit of payment or the direction of a concerned employer, such as could be the case in the European Parliament Secretariat. Nevertheless an experiment has been carried out with a significant number of subjects which has demonstrated the applicability and potential of the approach for both naive and experienced end-users which should lead to further improvements in system design and hopefully the adoption of these techniques for improved effectiveness in access to EPOQUE and other databases.

Suitable subjects, who were either taking a course on European Policy or who had worked at the European Parliament, were recruited into test groups along with experienced searchers, students in the Department of Information Science. A total of 40 subjects were divided into groups of 5 to search EPOQUE using EuroMenUSE, SIMBAD (Common Command Language) and the Guided Search mode to examine the following hypotheses.

i) That users without any prior experience of retrieval systems can use EuroMenUSE to achieve a better retrieval performance than when using the Guided Search Mode, and as well as or better than retrieval experts using Common Command Language.
ii) Querying in the user's native vocabulary (German) achieves better performance than queries in English.

A total of 8 groups with 5 users per group, all native German speakers, participated. Training on each system was carried out using the same example query:

"Find documents created by the European Parliament, European Commission or the European Council regarding the recognition of diplomas and the length of studies. Limit these documents to those concerning resolutions and then limit this by terms in the title."

This query was devised to exercise the functionality of each mode of access. The time taken in training is listed in the table below. As could be expected, the time required for introduction to the Guided Search mode was lower than for other modes mainly due to the limited functionality provided.

Given that the objective was to examine whether the system supported the user's needs, a single test question was devised which required them to express at least two concepts in some detail so as to explore the vocabulary provision in EUROVOC where this was possible using the SIMBAD and EuroMenUSE searching modes.

Each group searched only the system to which they had been introduced in either German or English and were encouraged to carry out an exhaustive search given the following scenario:

"Find documents on the legal and organisational issues regarding European co-operation in the fight against crime where border checks have been removed. Given the example of the "Gladbeck Affair" in Germany some years ago where bank robbers crossed the border from Hessen to Bavaria and highlighted the problems of responsibility of police in the different countries."

The following table summarises the findings:

<table>
<thead>
<tr>
<th>Group</th>
<th>Experience</th>
<th>Subject Knowledge</th>
<th>System</th>
<th>Language</th>
<th>Avge Number of Rel Docs</th>
<th>Avge Number of Irrel Docs</th>
<th>Avge Time Intro</th>
<th>Avge Time Search</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>N</td>
<td>Y</td>
<td>Guided Search</td>
<td>German</td>
<td>24.2</td>
<td>1.2</td>
<td>15</td>
<td>39</td>
</tr>
<tr>
<td>2</td>
<td>N</td>
<td>Y</td>
<td>Guided Search</td>
<td>English</td>
<td>19.6</td>
<td>3.8</td>
<td>17</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>N</td>
<td>Y</td>
<td>EuroMenUSE</td>
<td>German</td>
<td>74.2</td>
<td>14.6</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>4</td>
<td>N</td>
<td>Y</td>
<td>EuroMenUSE</td>
<td>English</td>
<td>50.8</td>
<td>8.8</td>
<td>41</td>
<td>41</td>
</tr>
<tr>
<td>5</td>
<td>Y</td>
<td>N</td>
<td>SIMBAD</td>
<td>German</td>
<td>39.2</td>
<td>5</td>
<td>31</td>
<td>42</td>
</tr>
<tr>
<td>6</td>
<td>Y</td>
<td>N</td>
<td>SIMBAD</td>
<td>English</td>
<td>32</td>
<td>6</td>
<td>32</td>
<td>49</td>
</tr>
<tr>
<td>7</td>
<td>Y</td>
<td>N</td>
<td>EuroMenUSE</td>
<td>German</td>
<td>48.6</td>
<td>17.4</td>
<td>36</td>
<td>52</td>
</tr>
<tr>
<td>8</td>
<td>Y</td>
<td>N</td>
<td>EuroMenUSE</td>
<td>English</td>
<td>42.6</td>
<td>26.4</td>
<td>36</td>
<td>36</td>
</tr>
</tbody>
</table>

The time taken to search reflects the instruction to exhaustively search the database and reflects the high number of documents seen by the user during the session. Some prompting and instruction was also necessary.

Users also completed an extensive questionnaire to examine issues of usability in considerable detail. This data will be analysed and presented elsewhere with a full description of the experiment.
4. Conclusion

Subjects with no previous searching experience can use the EuroMenUSE interface to achieve a retrieval performance better than experienced searchers who are not as familiar with the subject matter of the database. It is clear that the use of thesaurus access in both EuroMenUSE and SIMBAD has a marked effect on retrieval performance over the Guided Search mode. It is inappropriate to make a simplistic extrapolation of these findings to the current and future EPOQUE users, given the nature of the experiment, using a single query and the instruction to exhaustively search the database. A future evaluation involving a range of query types would seek to examine particular performance parameters of concern to the Documentary Database Division of the European Parliament Secretariat. Additional searching functionality provided through filtering promises to further enhance the EuroMenUSE interface.

References


