Report on the INEX 2006 Heterogeneous Collection Track

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Abstract

XML collections that consist of subcollections from different sources pose a challenge with respect to syntactic, semantic and genre heterogeneity, because they are based on different DTDs or schemas, cover various topics and consist of diverse document types. This led to the establishment of the Heterogeneous Track at INEX 2006. The goal of the track was to set up a testbed consisting of several different and diverse collections and defining retrieval tasks and appropriate topics. These are the foundations for the Heterogeneous Track at INEX 2007, where the focus is on run submissions, relevance assessments and proper evaluation of the proposed methods dealing with a heterogeneous collection.

1 Introduction

The various tracks within the Initiative for the Evaluation of XML Retrieval (INEX) have always dealt with homogeneous collections based on a single DTD or XML schema. With the advent of distributed systems (federations or peer-to-peer systems), we also need to cope with the situation where every node manages its own distinct subcollection. So most realistic XML collections will consist of documents from different sources, and thus be heterogeneous w.r.t.

- syntactic diversity: documents are validated against different DTDs or schemas;
- semantic diversity: subcollections cover different topics;
- genre diversity: we may find various document types in subcollections, e.g. original articles, comments, metadata records, scientific papers, etc.

Dealing with a set of heterogeneous collections poses a number of challenges for structured document retrieval with XML. For content-oriented queries, where no structural conditions on the returned elements are requested, most current approaches use the DTD or XML Schema for defining elements that would form reasonable answers. In a heterogeneous environment, DTD- and Schema-independent methods need to be developed. For content and
structure queries, there is the added problem of mapping structural conditions from one DTD or Schema onto other (possibly unknown) DTDs and Schemas (for instance, if documents from a specific author are requested and the author of a document might be called “author” in one subcollection and “creator” in another one). Overcoming this syntactic diversity means finding equivalent structural elements. Methods from federated databases could be applied here, where schema mappings between the different DTDs are defined manually. However, for a larger number of DTDs, automatic methods must be developed, e.g. based on ontologies. Due to semantic and genre diversity, not every subcollection will be relevant for a given user’s information need. Since querying each subcollection separately is expensive w.r.t. communication costs and result post-processing, it has been suggested in the distributed IR literature that preselection of appropriate collections should be performed.

The considerations above led to the establishment of a Heterogeneous Track at INEX. On the long run, the Heterogeneous Track at INEX aims to answer, among others, the following research questions:

- For content-oriented queries, what methods are possible for determining which elements contain reasonable answers? Are pure statistical methods appropriate, or are ontology-based approaches also helpful?
- What methods can be used to map structural criteria onto other DTDs?
- Should mappings focus on element names only, or also deal with element content or semantics?
- How can suitable collections be preselected in order to improve retrieval efficiency and without corrupting retrieval effectiveness?
- What are appropriate evaluation criteria for heterogeneous collections?

In order to cope with above questions, we need test collections which are heterogeneous syntactically, semantically and by genre. Since such collections had not been set up previously, the main focus of effort for the track in 2006 was on the construction of an appropriate testbed, consisting of different individual collections, and on the identification of reasonable tasks and topics. The resulting testbed provides a basis for the future exploration of the research questions outlined above.

## 2 Collection and Topic Creation

We set up subcollections which constitute our heterogeneous collection by partly reusing collections offered in previous INEX runs and by preparing new collections. A specific DTD was defined for every subcollection, if not already available, ensuring syntactic heterogeneity. Table 1 shows some statistics about the subcollections.

The subcollections serve different domains, ranging from computer science (e.g. bibdb Duisburg, IEEE, DBLP) through technology news (ZDNet) to travel advice (Lonely Planet) and general purpose information (Wikipedia). We find several document genres ranging from simple metadata records to the full texts of scientific papers, articles and web sites as well as textual annotations forming discussion threads. Therefore, we have subcollections which differ with respect to their syntax (DTD), semantic (domains served) and document genre.

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1See also http://inex.is.inf.uni-due.de/2006/het.html
<table>
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<tr>
<th>Collection</th>
<th>Size</th>
<th>SubColl.</th>
<th>Documents</th>
<th>Elements</th>
<th>Mean Elements per Document</th>
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</table>

Table 1: Components of the heterogeneous collection. *Element counts estimated for large collections.*

We developed 61 topics during the topic creation phase, some of which were derived from previous and current topics used in the main INEX Adhoc retrieval tasks, and some created specifically for collections in the Heterogeneous track. Topics are formatted in XML using a topic DTD which allows specification of both content-only queries and also permits specification of structural criteria, such as requesting only abstracts, titles or comments. This makes the topics suitable for content-and-structure (CAS) tasks used in the INEX Adhoc tasks. Some topics also contain a hint about the collection used to identify the topic (called “scope” here). Figure 1 shows an example of a topic definition.

## 3 Tasks and Run Submissions

The following tasks were proposed for the Heterogeneous Track at INEX 2006:

**Adhoc Content-only Task** Here, content-oriented queries are applied without any structural constraints. The systems return a ranked list of documents from all collections.

**Content-and-Structure Task 1** The system should return only elements specified in structural constraints. For example, if only an abstract or a title of a document is explicitly requested.

**Content-and-Structure Task 2** The system should basically return the elements specified in certain structural constraints, but also similar elements. As an example, `<doctitle>` in one collection and `<title>` in other collections are most probably equivalent.

**Resource Selection** The goal here is to select the most relevant resources (i.e., collections) for a given topic. The system should return a ranked list of collections for this task.

For future run submissions we defined a DTD which covers rankings of elements as well as rankings of subcollections. This DTD allows those submitting runs to specify the collections...
Desktop search is concerned with searching the items on your local computer (in contrast to web search like Google, where you search information on the web). Several companies offer tools for desktop search.

I want to inform myself about desktop search. What tools exist (standalone, browser-based) and what are their advantages and disadvantages?

4 The Heterogeneous Track at INEX 2007

In the 2006 Heterogeneous Track, we managed to set up a collection whose subcollections are heterogeneous w.r.t. syntax, semantics and document genre. We also defined a number of tasks and created test topics for evaluation. Thus, the foundations have been laid for the new Heterogeneous Track at INEX 2007. For this year we will concentrate on receiving run submissions, creating a pooled test set and providing relevance assessments which are in turn used for evaluation. But there are further questions to be examined and discussed for 2007. If we want to use structural constraints, should we be defining some notion of structural relevance to measure how well a system has met the structural constraints, regardless of matching topicality? Another question is whether pooling for evaluation should be by collection, or should we perform a cross-collection pooling? Many other issues and questions are sure to arise as the Heterogeneous Track for INEX 2007 gets under way.

We invite researchers interested in distributed IR to participate in the Heterogeneous Track at INEX 2007.