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Advances in Information Retrieval

39th European Conference on IR Research, ECIR 2017
Aberdeen, UK, April 8–13, 2017
Proceedings

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Preface

These proceedings contain the full papers, short papers, and demonstrations selected for presentation at the 39th European Conference on Information Retrieval (ECIR 2017). The event was organized by the School of Computing Science and Digital Media, Robert Gordon University, Aberdeen, Scotland. The conference was held during April 8–13, 2017, in Aberdeen, Scotland, UK.

ECIR 2017 received a total of 248 submissions in three categories: 135 full papers, 101 short papers, and 12 demonstrations. The geographical distribution of the authors was as follows: 53% were from Europe, 33% from Asia, 11% from North and South America, 1% from Australia, and 2% from Africa. All submissions were reviewed by at least three members of an international two-tier Program Committee. Of the full papers submitted to the conference, 36 were accepted for oral presentation (27% of the submitted ones). Of the short papers submitted to the conference, 35 were accepted for poster presentation (35% of the submitted ones). In addition, seven demonstrations (58% of the submitted ones) were accepted. The accepted contributions represent the state of the art in information retrieval, cover a diverse range of topics, propose novel applications, and indicate promising directions for future research. We thank all Program Committee members for their time and effort in ensuring the high quality of the ECIR 2017 program.

ECIR 2017 included a panel on “Information Retrieval” organized by Maarten DeRijke. The panel stems from the fact that information retrieval (IR) has always been concerned with retrieving the most relevant information from huge amounts of data including user interaction data. IR is in the midst of a radical paradigm shift, common also to many other research fields, in becoming an increasing data-driven science due to, for example, recent developments in deep learning, crowdsourcing, user interaction analysis, and so on. The goal of the panel was to discuss the emergent trends in this area, their advantages, their pitfalls, and their implications for the future of our field.

ECIR 2017 hosted one half-day tutorial: “Efficient Query Processing Infrastructure” by Nicola Tonellotto (Istituto di Scienza e Tecnologie dell’Informazione, Italy) and Craig Macdonald (University of Glasgow, UK). In addition, ECIR 2017 hosted four workshops covering a range of IR topics. These workshops were:

- The Fifth International Workshop on Bibliometric-Enhanced Information Retrieval (BIR2017)
- Exploitation of Social Media for Emergency Relief and Preparedness (SMERP)
- The Second International Workshop on Online Safety, Trust and Fraud Prevention (OnST’2017)
- Social Media for Personalization and Search (SoMePeAS)

Short descriptions of these workshops and tutorial are included in the proceedings. In addition, a doctoral consortium was organized on the first day of the conference.

We would like to thank our invited speakers for their contributions to the program: Laura Dietz (University of New Hampshire, USA), Jaime Teevan (Microsoft Research), and Alexander Hauptmann (CMU). We are grateful to the panel led by Stefan Rüger for selecting the recipient of the 2016 Microsoft BCS/BCS IRSG Karen Spärck Jones Award, and we congratulate Jaime Teevan on receiving this award. In addition, we are continuing with the Test of Time Award, to recognize research that had long-standing influence. We thank Norbert Fuhr for chairing this committee.

The final day of the conference was dedicated to the Industry Day; it brought together academic researchers and industry by offering a mix of invited talks by industry leaders and presentations of novel and innovative ideas from research. Finally, ECIR 2017 would not have been possible without the generous financial support from our sponsors. We thank all of these sponsors.

February 2017

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**Abstracts of Doctoral Consortium
Papers and Tutorial**

Interactive Technology Trend Detection

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Industrial companies and research institutes constantly seek trends and analyze them in order to find new technologies or detect transforming or improving industries. Patent databases are natural candidates to extract this information from, as they collect recent activities of major research and development departments. However, semantic analysis of patents can be quite challenging for NLP tools using available resources, as they are mostly built upon newspaper corpora [3]; while containing professional terms, patents do not follow a standard form of wordings and instead of the usual concepts, an uncommon abbreviation, explanation or unregulated breaking of the components might appear in the text. General and commercial titles also influence the task of assigning the patents to categories. Defining the keywords of the patents as well as their possible paraphrases demands professional knowledge which can be provided by an expert user in an interactive approach. The interactive system can also benefit from the experts knowledge in order to adapt the quantities of a defined uptrend.

In this work, we propose a relevance feedback system which aims to provide users with suggestions on new trends and critical topics of the desired domain or theme, while allowing them to adjust the procedure for better results. Clustering and trend detection are of main components of this system. Patent clustering demands soft clustering techniques as patents share various technologies, uses or materials [2]. Using the clusters, a time-series chart is produced for each topic by means of the application dates of the patents included. The system is then detects the uptrends through these charts. In this work, we also build a benchmark using the World Intellectual Property Organization (WIPO) reports [1] which contain expert queries for categories of a theme. The same queries can be used on our database to achieve gold standard classes.

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Right to Information Query Analysis for Predicting Amendments

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The constitution of India has undergone 101 amendments from 1950 to September 2016 (almost two per year). Compared to the other democracies, amendments in India are a frequent process. There are no specific rules that states what exactly qualifies for an amendment. As of today, the amendment process in India is completely manual. The process is triggered by observing the effects/execution of a particular law of our country and taking feedback from the citizens. One way to observe citizens' emotions and collect feedback is to look at the interactions between the citizens and the government. The Right to Information Act (RTI) 2005 allows Indian citizens to access governmental information, records etc. by posting RTI queries/application. Such queries are present in every public institution, and these queries are laden with the citizens' concerns, issues and emotions. The aim of this work is to collect RTI queries from institutions across India and analyse them. The objective of such analysis is to uncover underlying patterns in the RTI query-reply process that are indicators of potential amendments to Indian laws. We want to find latent patterns such as 'transparency' of institutions and 'effectiveness of implementation' of the RTI act across India. Both of these parameters can identify issues in the working of public institutions, and are suggestive of amendments. In this regard, the following research questions are addressed:

1. What constitutes a potential amendment?
2. How to model transparency of an institution?
3. How to model effectiveness of implementation of an act?
4. Can transparency and/or implementation effectiveness be used as cues for tentative amendments?
5. What learning algorithms can be used for finding such patterns?

We choose psychometric modelling to identify the above two parameters. A synthetic matrix of reply statistics that resembles our collected RTI data has been constructed, and analysed via Graded Response Model. The experimental outcomes are two-fold:

1. Each institution is assigned a transparency value, and indicates that not all institutions are equally transparent in replying to RTI queries.
2. There is variation in the difficulties in acquiring RTI replies across India based on the query category. This is a characteristic of the department/section which contains the information required in the RTI queries, indicating that the RTI rules are non-uniform and ineffective in its implementation across India.

Efficient Query Processing Infrastructures

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Abstract. Typically, techniques that benefit effectiveness of information retrieval (IR) systems have a negative impact on efficiency. Yet, with the large scale of Web search engines, there is a need to deploy efficient query processing techniques to reduce the cost of the infrastructure required. The proposed tutorial aims to provide a detailed overview of the infrastructure of an IR system devoted to the *efficient yet effective processing of user queries*. This tutorial will guide the attendees through the main ideas, approaches and algorithms developed in the last 30 years in query processing. In particular, we will illustrate, with detailed examples and simplified pseudo-code, the most important dynamic pruning techniques adopted in major search engines, as well as the state-of-the-art innovations in query processing, such as impact-sorted and blockmax indexes. We will also describe how modern search engines exploit such algorithms with learning-to-rank (LtR) models to produce effective results, exploiting new approaches in LtR query processing. Finally, this tutorial will introduce query efficiency predictors for dynamic pruning, and discuss their main applications to scheduling, routing, selective processing and parallelisation of query processing, as deployed by a major search engine.

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