Fair Machine Learning for Search and Recommendation Systems
PhD in Computing Science

There is full funding for a PhD position at the University of Glasgow to work on developing new ranking strategies ensuring fairness in search and recommendation systems.

Information retrieval (IR) systems, such as search engines and recommender systems, are ubiquitous technologies for generating knowledge and assisting decision making within today’s societies. However, IR systems can reflect and amplify biases that are encoded in, for example, the document collections that are indexed or behavioral data used to train machine learned retrieval models. Such bias can lead to unfairness and discrimination in how certain individuals or demographic groups are represented within the ranked search results, and therefore within society. Developing fair ranking strategies to mitigate such unfairness is an increasingly important area of IR and ML research. In this project you will investigate novel approaches for generating fair ranking algorithms to maximise the relevance of search and recommendation results while providing a fair exposure to relevant information producers throughout the lifetime of a search session. Moreover, you will investigate informative and robust methods of evaluating fairness in search and recommendation, using the ongoing TREC Fair Ranking Track evaluation benchmark dataset.

The successful candidate will build on the previous IR and ML literature to develop, for example:

- Dual optimisation strategies, including multi-objective learning, to maximise the usefulness of search results while minimising any unfairness in the amount of exposure that relevant information resources receive.
- An extensible retrieval model that can incorporate particular fairness constraints dependent on the context of the information seeking scenario.
- Methods of explaining results and/or any identified biases or unfairness in document collections and/or search results.
- An evaluation framework for quantifying (un)fairness in IR systems.

The successful candidate will be based within the IR Group in the University of Glasgow. The Glasgow IR Group is often considered one of the founders of modern IR. From its outset, the Glasgow IR group has focused on improving the effectiveness of IR systems, such as inventing new logic & probabilistic retrieval models, the development of adaptive query expansion techniques, interactive multimedia models and the Divergence From Randomness framework, as well as leading research into quantum, expertise search and search result diversification models. In recent years, the IR group has been at the forefront of the research, development and application of emerging machine learning and deep learning technologies for very large corpora and data streams in search and recommendation use-cases.

In the first instance, interested candidates should contact Dr. Graham McDonald (graham.mcdonald@glasgow.ac.uk) with a current CV and a motivating paragraph outlining why you would like to undertake this project. In the second instance, as part of the application process, the applicant will submit a formal application including a research proposal of 3-4 pages.
Information about the PhD application process can be found here: https://www.gla.ac.uk/schools/computing/postgraduateresearch/prospectivestudents

Application Deadline: 29th June 2020

Funding is available to cover tuition fees for UK/EU applicants for three years, as well as paying a stipend at the Research Council rates.