PROJECT FACTSHEET

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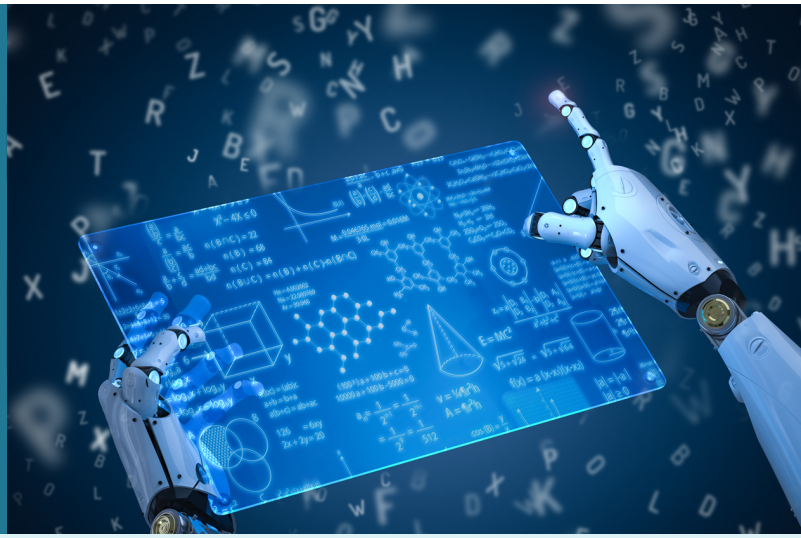
BRAIDS

The BRAIDS project aims at new efficient and privacy-preserving recommender systems



Inspiration

Recommender systems are a subclass of information filtering system that seeks to predict the rating that a user would give to an item that he has not yet considered, using a model built from the characteristics of items and/or users. Nowadays, recommender systems play an important role in highly rated commercial websites such as Amazon and Netflix. Besides, recommender systems or personalization techniques at large have been adopted in a wide range of applications, from entertainment to precision medicine.

In order to compute recommendations for users, a recommendation service provider needs to collect a lot of personal data from its customers, such as ratings, transaction history, and location. This makes recommender systems a double-edged sword. On one side users get better recommendations when they reveal more personal data, but on the flip side they sacrifice more privacy if they do so. With the ever stricter privacy regulations such as GDPR, how to benefit from aggregated personal data while complying to the laws has become an urgent issue for the researchers and the whole society.

BRAIDS is designed to study the utility-privacy dilemma. The utility means the quality of recommendations received by the end users, while privacy means the information disclosure to the service provider and the users involved in the underlying recommender system.

Innovation

The project team had the ambition to protect users' privacy to the maximal extent while still enabling them to receive very accurate/satisfactory recommendations. To this end, they have planned to investigate the realistic privacy notions for recommender systems, and invent privacy-enhancing technologies that allow recommendations to be generated in a privacy-preserving manner (e.g. generated on encrypted data).

During the research, BRAIDS researchers have identified two major findings, which not only apply to recommender systems but also may apply to machine learning and data mining in general:

- The first major finding is that, due to the tremendous scale of the recommender systems, standard way of applying privacy preserving technologies will not result in realistic solutions. To this end, the project team has adopted the approach of tailoring the recommender algorithms, in order to efficiently deploy privacypreserving mechanisms. Basically, it addresses the privacy issues by simultaneously adapting recommender algorithms and privacy enhancing technologies.
- The second major finding is that privacy is not the only concern that is of interest to the players in a recommender system. System robustness and algorithm transparency are also important requirements. In fact, the recommender service provider cares more about the robustness aspect. The ultimate difficulty of addressing the privacy concerns in recommender systems comes from the entanglements among different requirements. Most of existing solutions have ignored this fact and are regarded unrealistic by the practitioners. To this end, BRAIDS has tried to investigate new practice-oriented models such as recommendation as a service, where privacy-aware users' privacy is guaranteed by cryptographic techniques in a very efficient manner while other users can contribute their data to the business and get a monetary reward.

Impact

Besides theoretical results, BRAIDS researchers have also planned to closely study the performances of the proposed system and perform some case studies. Even though this project focuses on recommender systems, they have expected the resulting technologies (e.g. building blocks) can be applied to other related services.

Moreover, they wish to figure out the interaction of privacy issues and other issues recommender system, and to lay the knowledge background for further research projects.

Partners

University of South Australia (AU) , University of Luxembourg (LU)

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