Phd Thesis – CIFRE funding

Improving assisted e-commerce through user interaction analysis

Keywords : time series mining, user behavior mining, deep-learning, statistical predictive models, large scale web logs

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Context
The Watcheezy Company offers a proactive solution to e-Commerce sites that enables an online sales consultant to identify and assist the visitors. This consultant should help and comfort the potential customer in the right moment through chat in order to facilitate a purchase on the site. The Watcheezy Company provides a pool of human salespersons who are solicited through a filtering mechanism. The current version of filtering relies on pre-defined rules and parameters.

Goal of research
The goal of the research is to develop user models that can be applied to adapt the filtering rules on demand, in real-time. The user models should rely on various data; in particular they should be derived from data analysis of user interaction traces of the e-commerce sites. Improved filtering is needed to better target the visitor, that is, we would like to target the cases where the interactions between the visitors and the consultants can most likely lead to a purchase. This automated and adaptive filtering mechanism should also assure a better and more efficient use of the pool of human salespersons.
Besides the improvements in filtering, we also would like to understand with the help of the developed models, which changes of the e-commerce site could improve the sales figures.

Challenges:
The solution should work in the context of Watcheezy: 18.000.000 page views a month, 1.500 sites assignments and up to 2000 concurrent connections in a human-sized computational environment. For the time being, the number of Internet users reached several million people, while the data to be taken into account are of various types (purchase history, social network, ad targeting...) and not limited.

Innovation:
We will develop predictive models that should automatically and adaptively select the site visitors where the involvement of the salespersons has the highest potential. Watcheezy application context requires particular predictive models, for various reasons: 1) while many techniques exists to analyze the user interaction data offline, we need a real-time on-the-fly prediction, 2) the involved e-Commerce sites as well as Watcheezy dispose a large body of marketing knowledge that they would like to include in the models. Specifically, if the would like to adjust the behavior of the filtering strategy based on their marketing strategies.

Methodology:
Traces of user behavior can be considered as time-series. Indeed, time series mining techniques can be used to analyze and predict user behavior [1]. Also, various techniques exist to adapt the ecommerce strategy based on user behavior and profiles [2], [3].
We will develop predictive models that can better orchestrate the interactions between the visitors and the agents. We will rely on machine learning techniques, such as deep learning [4], [5] and statistical predictive models [6]. We will then extend our models and include various contextual pieces of information, such as for example, e-commerce site content, user profiles, social networks, etc. In particular, we would like to enable that the filtering mechanism can be adjusted based on marketing knowledge or business strategies.

Candidate's profile:
- Master 2 or Engineer in Computer Science
- Advanced data management (SQL, NoSQL solutions)
- Introductory courses in machine learning

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