# Framework for Multi-Agent Simulation of User Behavior in E-Commerce Sites

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## Dissertation Summary

Customers interact with e-commerce websites in multiple ways and the companies operating them rely on optimizing success metrics such as CTR (Click through Rate), CPC (Cost per Conversion), Basket and Lifetime Value and User Engagement for profit. Changing what, how and when content such as product recommendations and ads are displayed can influence customers' actions.

Multiple algorithms and techniques in data mining and machine learning have been applied in this context. Summarizing and analyzing user behaviour can be expensive and tricky since it's hard to extrapolate patterns that never occurred before and the causality aspects of the system are not usually taken into consideration. Commonly used online techniques such as A/B testing and multi-armed bandit optimization have the down side of having a high operational cost (including time e.g if a data scientist is evaluating the impact of a new recommendation engine after one month, she would need to wait an actual month to have results). However, there has been studies about characterizing user behaviour and interactions in e-commerce websites that could be used to improve this process.

The goal of this dissertation is to create a framework capable of running a multi-agent simulation, by regarding users in an e-commerce website and react to stimuli that influence their actions. Furthermore, some statistical constructs such as Baysian networks, Markov chains or probability distributions can be used to guide how these agents interact with the system. By taking input from web mining (*Web structure mining* (WSM), *Web usage mining* (WUM) and *Web content mining* (WCM)), which includes both static and dynamic content of websites as well as user personas, the simulation should collect success metrics so that the experimentation being run can be evaluated. For example, this framework could be used to try different approaches to product recommendation and estimate the impact of it.

# References

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