Reinforcement Learning Framework

Problem
What is Recommendation Engine?
Comcast delivers approximately 400 million product recommendations annually to its customers through the Xfinity Mobile App channel, with the product recommendation engine called Nexus.

What is the current method?
The existing approach utilized by Nexus system relies on micro-segmentation, a clustering-based technique, which primarily depends on static data.

Objective
Goals: The project aims to improve the Nexus recommendation engine with the following goals:
• Improve success rate by developing a personalized and interactive approach.
• Use Reinforcement Learning to drive this improvement.

Modelling Approach

Reinforcement Learning Framework

We use contextual multi-armed bandits model which

• uses the customer and product information to make recommendations
• compares its recommendations with historical data
• learns and adjusts its future choices and continually evolves

Counterfactual Reward Estimation

Understanding feedback on recommended products is straightforward, but how about unseen ones? We group customers into segments, estimate product preferences for each group, and use these estimates to predict satisfaction. By using these predictions, we create a ‘what-if’ scenario to understand how well different, untested recommendations might have performed.

Key Takeaway:
Both models are able to outperform the current baseline, and we will adopt the model with alpha=0.01 because it encourages more exploration.

Results and Impact

Comparing Difference in Success Counts between Our Model and Baseline Model

Future Work

• Conduct A/B test to compare the performance with old model
• Put model in production to get customer’s real-time feedbacks
• More advanced model for estimating counterfactual rewards, e.g., Tensor Completion