Capital One
Machine Learning Research

Abstract
Capital One's online loan application currently encounters errors during client site exploration. These errors yield inefficiencies for Capital One clients and employees. The project goal is to utilize reinforcement learning algorithms to discover the minimum chain of actions that result in errors and discover the applicability of machine learning for a desired use-case.

Implementation Method
- Utilized Pandas for dynamic log parsing and reconstruction of user paths.
- Imported matplotlib for graphical visualization of reconstructed user data.
- Developed a reinforcement reward function framework for discovery of minimum error chains.
- Established dynamic probability statistic output for further sponsor usage.

Impact
The automated error detection program assists Capital One to further understand the use of machine learning for their data heavy business models. Processing the log data led to the suggestion of a maintenance development focus on error avoidance instead of error mitigation. The minimum chain site paths and error behaviors detected highlight an opportunity for application maintenance that will increase error avoidance. Further employment of the error detection program will increase Capital One's maintenance proficiency.

Results
The Capital One Senior Design Team has planned, designed, and implemented an application that seeks common site behaviors leading to errors within Capital One's online loan application. The creation of a site map that graphically revealed precise behaviors illuminated relational errors to further understand methods needed to develop error mitigation. Using this information, the application utilizes machine learning concepts to assist the site in recognition of approaching behavioral errors.

Visualization of Sample Log Data

Probability of Error
- Error
- High
- Low

Weekly progress evaluation and story point allocation meetings were held to ensure project advancement. Weekly mentor meetings were held at Capital One’s campus to demonstrate development progression.