

How a Canadian bank personalized its collections strategy using machine learning

Using historical data and a customer feedback loop to optimize long-term return on collections

The challenge

Traditional collections strategies are devised based on the basis of broad customer risk exposure segments customers are assigned to. This generalized approach ignores the outcomes of previous treatment attempts and only maximizes immediate (one-step) repayments.

The challenge for the EY team was to build an intelligent and adaptive platform that has the capability to assess each client's individual risk, and develop a personalized collections strategy that can lead to a focused use of resources and potentially lower credit losses.

The solution

Our platform is based on the science of reinforcement learning to optimize collections strategy over time by learning from past experiences and continually adapting to customers' evolving situations.

Our approach

- ▶ A personalized collections strategy is generated for each delinquent borrower.

- ▶ Collections process is modeled as Markov decision process and Deep Q-Network is used as part of the reinforcement learning modeling framework.
- ▶ Strategy is continuously updated on the basis of the outcome of previous treatments.
- ▶ The platform adapts to changing macroeconomic conditions and changing business policies.
- ▶ The model was operationalized by deploying onto client's on-premise production server as a Flask application using Docker.

Value provided

- ▶ Loss reduction: optimizes the timing, type, and sequence of treatments to maximize overall repayment and reduce loss across the portfolio.
- ▶ Improved resource allocation: considers the cost and impact of competing treatments to optimize use of resources and increase net returns.
- ▶ Continuous learning: incorporates new information gained from each treatment attempt to continuously refine future treatment strategies.

Outcome

The model generates adaptive collections strategies that recommend a cost-effective series of treatments to help maximize total repayment.

Why we succeeded

- ▶ Multidisciplinary team with a strong quantitative background and technological knowledge, including model development and model validation experience.
- ▶ Developed a proprietary Deep Q-Learning framework for collections treatment strategy optimization.
- ▶ Developed a robust toolkit for customizing and implementing adaptive collections models, providing a significant acceleration of the execution timeline.

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