

Financial applications of Machine Learning: A summary

Machine Learning algorithms find patterns within the data which is a way to solve complex problem statements. Machine learning has progressed a lot since the 20th century when Alan Turing first proposed the idea of machines learning to make decisions autonomously. Finance is a field where Machine Learning can be applied extensively.

Black swans- which are unexpected, unfortunate events in the market such as the flash crash of 2010 are often argued to be predicted by theories and not algorithms, and these theories can be developed using ML.

Let's look at some financial ML applications:

- Predictions in Prices:
Economic factors affecting prices can be modelled by ML algorithms. Econometric methods, on the other hand, may fail to recognize complex relations between them.
- Hedging
Hedging is basically minimising risk from investing in financial assets by the use of various instruments such as derivatives. In presence of various external factors, analytical hedging may turn out to be problematic. Whereas reinforcement learning methods are totally empirical and model free, these methods can generate more accurate hedges
- Portfolio construction and risk analysis
Mean variance optimization is the process of measuring an asset's risk against its likely return and investing based on that risk/return ratio.
ML algorithms outperform MVO and give better results
- Outlier detection
A small number of outliers can also cause huge differences in the results. ML methods can help here.
- Bet Sizing
Size of the bets on the buy or sell decision can be modelled by ML too.
- Feature Importance
Using ML models, we can determine which features are more important than the others. This feature importance can then determine the theory according to which these features work.
- Credit Ratings
Credit rating models aren't random and correspond to a complex logic. ML algorithms have been successful at replicating these models well too.
- Unstructured data
ML algorithms can work with unstructured data and generate accurate results and can classify/structure it efficiently.
- Execution
Kernel based ML methods can identify trades of credit instruments that are similar. This can then affect the rebalancing of portfolios.
- Detection of false Investment strategies is possible through ML.

Perils of Financial ML:

Labels in Financial ML usually are determined by outcomes which overlap in time and hence it is very tough to understand what features actually cause an effect.

Still, ML models are able to find patterns even with inconsistent properties.

Hence, ML in finance has many important applications and can be used in many areas of working.