

DATA ANALYSIS: MACHINE LEARNING

Providing meaningful insights



INTRODUCTION

Machine learning builds on the knowledge of a firm's data, adding value to the ever-increasing stores of electronic data that firms have today. The goal of machine learning is to derive meaningful insights and knowledge from data and apply it to benefit a business. Building models is the way to discover this potentially useful information, machine learning can help to build more accurate models.

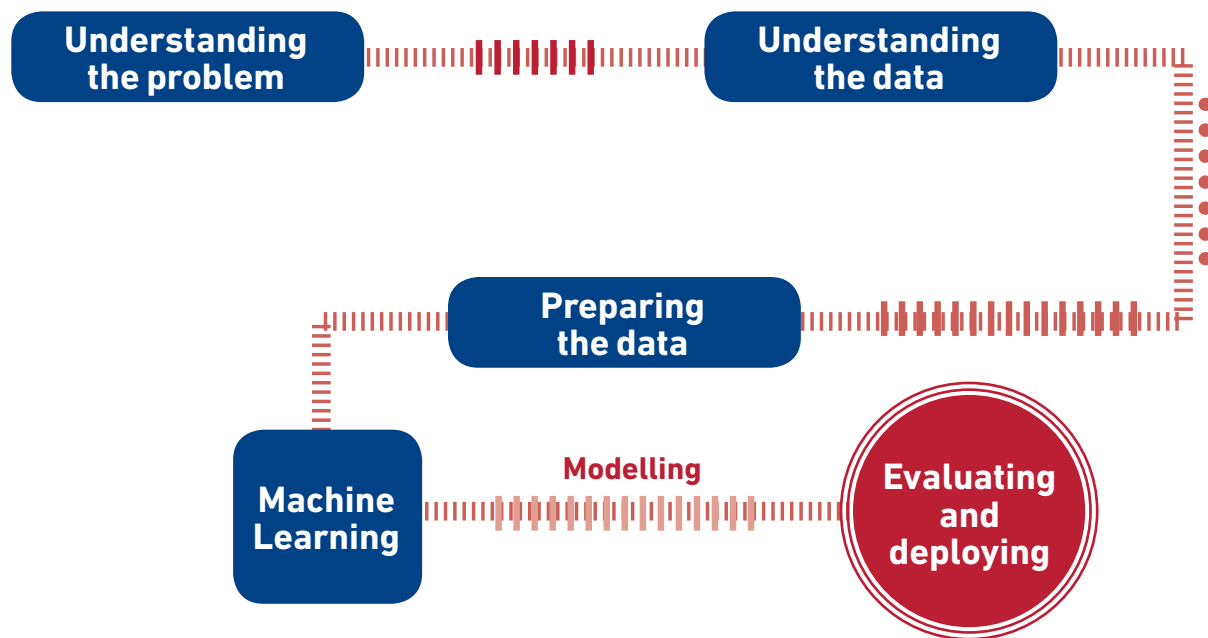
The benefits of models:

- Capturing new insight and knowledge not previously quantified;
- Understanding your firm better; and
- Being able to make better informed business decisions.

Machine learning can analyse huge amounts data enabling businesses to improve their risk assessment, better understand their clients' behaviours, help detect potential risks and identify profitable opportunities.

Mazars' in-house teams consist of actuaries, statisticians and IT quantitative experts who work together seamlessly to help businesses transition and implement machine learning algorithms and provide valuable information to benefit businesses.

The machine learning process



Steps to machine learning

Data analytics

Modelling

Machine learning

The machine learning process

Data analysis

Prior to implementing machine learning, data must be analysed. Through this we inspect, cleanse and transform data with the goal of discovering useful information to be in a position of better decision making. We would address both quantitative and qualitative elements to ensure a complete understanding of the available data and the challenges and opportunities related to it.

Key quantitative analysis elements include:

- **Principal component analysis (PCA)** to emphasise variation, bring out strong patterns in a data set and help make data easy to explore and visualise;
- **A raw data plot** to anticipate future modelling results based on studying each variable related to the objective separately; and
- **Analysis**, which is a method of regrouping a set of observations in such a way that observations in the same cluster can be used to gain consumer insight and knowledge.

Key qualitative analysis elements include:

- **Data cleaning** to prevent and correct the data during the data storage process; and
- **Exploratory data analysis** to begin to understand the messages contained within the data.

Modelling

Modelling enables us to extract useful information from the data to understand a firm's current and past results and apply its future predictions of what a firm wants to understand and achieve. Modelling enables businesses to:

Identify patterns

- To be able to forecast on new data;
- To enhance knowledge of the current situation; and
- To measure the on-site assignment progress through dedicated dashboards and KPIs.

Forecasting

- To anticipate future business requirements and opportunities; and
- Help make the appropriate business decisions based on findings.

Machine learning

Machine learning is a subsection of modelling that automates model building and optimises result accuracy. It also reduces model building constraints that currently exist in econometric models. It permits computers to find hidden insights without being explicitly programmed for where to look, whilst using algorithms that learn from data. When comparing machine learning to what firms would traditionally do in econometrics, machine learning outperforms econometrics by making predictions that are more efficient, accurate and applicable to a firm's operations. Benefits include:

- Practically no theoretical hypothesis to check on the data. A statistician's work is mainly focused on which algorithm to choose and its parameters; and
- A wider range of applications as even unsupervised machine learning can lead to useful conclusions for companies.

As data accumulates over time, the power to predict more accurate outcomes increases. Through improving both computing capacity and memory, statisticians are able to tackle computationally demanding models more accurately.

Why is machine learning more applicable than econometrics?

Econometric models emphasise formal statistical inference (such as confidence intervals, hypothesis tests and optimal estimators) which are low dimensional problems. These models have high assumptions and therefore reduce the scope of applications. Econometric outcomes are easily interpretable for businesses to comprehend, which is why they are traditionally used. Additionally econometric modelling enables businesses to write a direct and clear equation between the response variables and the features.

Econometrics is a scientific discipline that explores the construction and study of algorithms that can explore and learn from the data set. Machine learning on the other hand is more focused on making accurate predictions than catching pure interpretable causal effects, enabling business to make better informed and accurate decisions.

Econometrics vs. machine learning

Econometrics

Machine learning

Approach

Uses statistical models which has many constraints.

Uses algorithmic models which can be used flexibly.

Focus

The data needs to fit a predetermined theory.

The data is not constrained to any theory, no assumptions are made and generating data is not as crucial.

Driver

To perform hypothesis testing and interpretability.

To be able to predict outcomes more accurately.

Model choice

Uses parameter significance and in-sample goodness of fit.

Uses cross-validation of predictive accuracy.

Strength

Used to understand causal relationships and behaviour.

Can determine relationships and behaviour and also predict potential outcomes.

Benefits of machine learning

Improve your firm's operational efficiency and the detect potential risks such as client fraud detection:

- Credit card or check fraud in banking institutions; and
- Fraudulent claims for insurance companies.

Improve your firm's quick estimation of:

- The initial claim assessment calculation for insurance companies such as immediate future cost estimations and deductible impacts; and
- The initial loss estimation calculation for banks to adapt a provision level.

Optimise your marketing activities and enhance you understanding of consumer behaviour through:

- Developing targeted marketing campaigns for specific client segments that have been detected potentially interested in specific offerings:
 - Customised channel selection; and
 - Targeted messaging for each client.

- Implementation of an automatic client satisfaction monitoring processes:

- Automatic analysis of client feedback (such as text mining for specific sentences or words can be linked to future actions taken by the clients that can be anticipated); and
- Analysis of client utilisation of services (determined statistically to be customised to individual clients).

Improve your risk assessment for financial institutions

For banks

- Machine learning can develop an automatic credit risk degradation detection processes; and
- Can improve credit scoring models for subscription and pricing.

For insurers

- Dramatically improved pricing, underwriting and targeted marketing;
- Continuously improving exposure measures and capital modelling; and
- Ability to start 'granular' claims reserving.

Please get in touch...

For more information on how Mazars can support you through machine learning, please get in touch.

Gregory Marchat

Partner

Head of Financial Services Consulting

T: +44 (0)20 7063 4486

E: gregory.marchat@mazars.co.uk

Xavier Larrieu

Senior Manager

Head of Mazars Quantitative Solutions

T: +44 (0)20 7063 4502

E: xavier.larrieu@mazars.co.uk

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