Predicting the future is a difficult task. Despite the significant advancements in computer power and data collection, the forecast precision has improved only moderately. This is the case with weekend's weather forecast as well as prediction of the next economic meltdown. In financial markets prediction problems are as evident as anywhere else. This has been attributed to the Efficient Markets Hypotheses (EMH). The EMH states that the asset prices incorporate all available data, and hence it is impossible to consistently beat the market. There is no uniform stance of the science and practitioners' community towards Efficient Market Hypothesis. It is refuted and criticised as often as it is adopted.

The main objective of the proposed research is to take advantage of recent advancements made in the fields of data mining and neural networks and put them to use in analysing financial data. We want to test the Efficient Markets Hypothesis by building event prediction algorithms and models. The particular emphasis will be on predicting qualitative events observed in time series in quantitative way. The focus will be on qualitative events such as trend reversals, periods of high volatility, etc. as opposed to predicting raw prices.

The project comprises two main tasks. The first task is concerned with knowledge representation of time series. Financial data is often chaotic, noisy and nonstationary. That is why researchers have presented a number of representations techniques which allow smoothing the data. The experiments on choosing best set of data representations techniques will be conducted.

The second task is concerned directly with prediction of events occurring in time series. Recent years has seen rapid advancement of predictive machine learning techniques. However, they were used more often for static data. This task is concentrated on tailoring prediction techniques such as e.g. recurrent neural networks to time series data and conducting experiments in event prediction. The results of the experiments will be an argument in the discussion regarding the EMH.