Sentiment Analysis in Portfolio Management

S2-22_MBAZG622T : PROJECT OUTLINE

Project Work Done by: K Pravin Kumar

BITS ID: 2021hb59011

Degree Program: MBA (Finance)

Research Area: Financial Analytics

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BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
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Contents

1. Broad Area of Work

Sentiment analysis, also known as opinion mining, is the process of using natural language processing (NLP) and text analysis techniques to identify and extract subjective information from source materials such as social media posts and news articles . The goal of sentiment analysis is to identify and manage risk factors that may affect a portfolio's performance.. The current project focus in the following application areas:

- Natural language processing: To identify public sentiment about a particular stock or market trend.
- Predictive modelling: using historical data and machine learning algorithms to predict future performance of assets and identify potential opportunities or risks.
- Risk management: using machine learning to identify and manage risk factors that may affect a portfolio's performance.
- Portfolio optimization: using machine learning to optimize the composition of a portfolio to maximize returns and minimize risk.

2. Background

Sentiment analysis in portfolio management arises from the fact that investors often base their investment decisions on their perceptions of the market and individual stocks, which can be influenced by public opinion and media coverage. Machine learning (ML) is becoming increasingly important in portfolio management . It helps with handling large mount of data and identify the patterns and trends. It also helps in automated decision making using predictive modelling . Machine learning can be used to analyze text data and determine the sentiment or emotion behind it. This can include analyzing news articles, social media posts, and other sources of information to gauge public sentiment about a particular stock or market trend.

Overall, sentiment analysis along with data analysis can provide portfolio managers with valuable insights into public opinion and market sentiment, which can be used to inform investment decisions and improve the performance of a portfolio. However, it's important to keep in mind that sentiment analysis should be used in combination with other techniques and factors, such as financial analysis and economic indicators, to make investment decisions.

3. Objectives

The main objectives of sentiment analysis in portfolio management are to use information about public opinion and market sentiment to inform investment decisions and improve the performance of a portfolio.

- Identify trends and patterns in public opinion: Sentiment analysis can be used to identify trends and patterns in public opinion about a particular stock or market trend, which can help portfolio managers to make more informed investment decisions.
- Measure and anticipate market reactions: Sentiment analysis can be used to measure and anticipate market reactions to news events, announcements, and other factors that may affect a stock's performance.
- Quantify and manage risk: Sentiment analysis can be used to quantify and manage risk by identifying negative sentiment that may indicate a stock is overvalued, or positive sentiment that may indicate a stock is undervalued.
- Monitor brand reputation: Sentiment analysis can also be used to monitor brand reputation by identifying and addressing negative sentiment before it becomes a major problem.
- Identify potential opportunities: Sentiment analysis can be used to identify potential investment opportunities by identifying positive sentiment about a particular stock or market trend that may indicate future growth.
- Enhance returns: Portfolio managers can use sentiment analysis to identify undervalued stocks and make a strategic investment decision, which can lead to higher returns.
- Improving portfolio performance: Sentiment analysis can be used to improve portfolio performance by identifying patterns and trends in market sentiment, and by making strategic investment decisions.

4. Scope of Work

The scope of this project is to design a portfolio management system with sentiment analysis using machine learning .

- Data collection
- Data processing (pre-processing , data labeling , feature extraction)
- Model selection and training
- Model evaluation
- Model deployment

The project will be designed and developed using python 3.8 . The IDE that will be used mostly is jupyter notebook and the models will be trained either in local laptop or in cloud based on the data size.

Sentiment analysis will be used in combination with other techniques and factors, such as financial analysis and economic indicators, to make investment decisions.
For technical analysis of portfolio management we will use techniques such sharpie ratio , treynor ratio , portfolio variance , portfolio returns , beta measure value-at-risk(VaR) etc . For sentiment analysis we will use nlp (natural language processing).

5. Plan of Work

Phases	**Start Date-End Date**	**Work to be done**
Abstract	11 Jan 2023 – 22 Jan 2023	Literature Review and prepare Dissertation abstract/outline
Design & Development	23 Jan 2023 – 28 Feb 2023	Design & Development Activity
Testing	01 Mar 2023 – 14 Mar 2023	Software Testing, User Evaluation & Conclusion
Mid Semester Report/Review	15 Mar 2023 - 22 Mar 2023	Submit Dissertation to Supervisor & Additional Examiner for review and feedback
Final Submission	16 Apr 2023 - 23 Apr 2023	Final Review and submission of Dissertation

6. Literature References

The state art is the base for any successful project. In current project, the literature inclined towards the new domain of conversational information retrieval is considered. The following are referred journals from the preliminary literature review.

1. *"Python Machine Learning" by Sebastian Raschka and Vahid Mirjalili - This book provides an introduction to machine learning using the Python programming language and covers a wide range of machine learning libraries, such as scikit-learn, TensorFlow, and Keras.*

2. *"Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow" by Aurélien Géron - This book is an practical guide to machine learning that covers the use of the most popular machine learning libraries, such as scikit-learn, Keras, and TensorFlow.*

3. *"The Intelligent Investor" by Benjamin Graham - This book is considered a classic in the field of value investing and provides a comprehensive guide to making sound investment decisions. It covers the principles of investment, risk management and valuation, and how to apply them in the stock market.*

4. *"Portfolio Theory and Capital Markets" by William Sharpe - This book is considered a classic in the field of portfolio management and is widely used as a textbook in finance courses. It covers the Capital Asset Pricing Model (CAPM) and Modern Portfolio Theory (MPT) in depth.*

5. *"Natural Language Processing with Python" by Steven Bird, Ewan Klein, and Edward Loper - This book provides a comprehensive introduction to natural language processing and covers a wide range of techniques and tools, including the use of the NLTK library in Python.*

6. *"Sentiment Analysis and Opinion Mining" by Bing Liu - This book provides a comprehensive introduction to sentiment analysis and opinion mining, including the use of natural language processing and machine learning techniques.*

7. Particulars of the Supervisor and Examiner

	Supervisor	**Additional Examiner**
Name	G . Ajex Rajadurai	Pradhi Suresh Mathialagan
Qualification	B.E , MBA	M.Com., P.G.D.C.M
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8. Remarks of the Supervisor

The study and project chosen by the student seem to very interesting. I was very impressed with the quality of research and analysis in the student's dissertation. He displayed a deep understanding of the subject matter and effectively used both theoretical and practical perspectives to support his argument. The student's plan for implementation is clear and well-organized, and he effectively uses data and evidence to back up his claims. Overall, it is a pleasure to work with the student on this project, and I am confident that their dissertation will make a valuable contribution to the field. This project holds the current domain of research and justified the level of dissertation for MBA. I approve the following project as the supervisor.

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
WORK INTEGRATED LEARNING PROGRAMMES (WILP) DIVISION
SECOND SEMESTER OF ACADEMIC YEAR 2022-2023

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DISSERTATION / PROJECT / PROJECT WORK TITLE	Sentiment Analysis in Portfolio Management