InvestiMate using LSTM model in Machine Learning

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ABSTRACT

In an ever-evolving global financial market, selecting the most suitable investment avenues is crucial for investors. This research aims to provide valuable insights into the world of investments by examining various asset classes, risk factors, and emerging trends.

This project uses Long Short-Term Memory (LSTM) model which is a type of recurrent neural network (RNN) architecture designed to overcome the limitations of traditional RNNs in capturing and learning long-term dependencies in sequential data. It has become a fundamental component in various applications of deep learning, particularly in tasks involving sequences such as natural language processing, speech recognition, and time series prediction.

"InvestiMate", aims to provide a comprehensive solution for individuals and professionals seeking to make informed investment decisions and manage their stock portfolios efficiently. The platform offers technical analysis tools, such as charts to help users visualise stock price trends and make informed decisions.

Keywords – *Neural Network, Long Short-Term Memory, Machine Learning, Data set processing, Recurrent Neural Network, Stock price trends, Investment analysis.*

I. INTRODUCTION

In the dynamic world of financial markets, stock investment remains a popular choice for

individuals seeking to grow their wealth. The project is designed to provide a powerful and comprehensive tool for investors to make informed stock investment decisions and optimize their portfolios.

This project explores the intricate landscape of investment strategies with a focus on

achieving sustainable growth and financial stability

Key Objectives of the Project:

1. Data Integration and Aggregation:
The project focuses on integrating and aggregating real-time and historical data from various financial sources, including stock exchanges, financial news outlets, and economic indicators. This ensures that users have access to up-to-date and accurate information.

2. Stock Screening and Selection:
The system offers screening and filtering capabilities that assist users in identifying potential investment opportunities. Users can set specific criteria and parameters to screen stocks based on their investment goals and risk tolerance.

3. Risk Assessment and Management:
It includes tools for assessing the risk associated with each investment, helping users

understand their exposure and enabling them to manage risk effectively.

4. Machine Learning and Predictive Analytics:
The project employs machine learning algorithms to make predictions, such as stock price movements and portfolio performance.

5. Reporting and Visualization:
Users can generate detailed reports and visualize data through graphs and charts, allowing for a clear and concise understanding of investment performance.
It stands as a significant contribution to the field of stock investment, assisting users in their pursuit of financial success.

Long Short-Term Memory (LSTM) networks are commonly used in stock price prediction and other financial time series forecasting tasks due to their ability to capture long-term dependencies and patterns in sequential data.

1. Sequential Modeling:

Stock prices exhibit sequential dependencies over time. LSTMs are well-suited for capturing these dependencies by processing historical stock price data sequentially.

2. Normalization and Preprocessing:

Data preprocessing is crucial in financial forecasting. Normalization of input data helps in stabilizing training and allows the model to learn more effectively. Additionally, data may be split into training, validation, and test sets to evaluate the model's performance.

3. Training:

The LSTM model is trained using historical data, with the objective of minimizing the difference between predicted and actual stock prices.

4. Prediction:

Once trained, the LSTM model can be used to make predictions on new, unseen data. The model takes historical input sequences and generates predictions for future stock prices. The predicted values can be compared to actual prices to assess the model's accuracy.

5. Evaluation and Fine-Tuning:

The performance of the LSTM model is evaluated using metrics such as Mean Squared Error (MSE), Mean Absolute Error (MAE), or others depending on the specific goals. Fine-tuning may be performed by adjusting hyperparameters or retraining the model with updated data.

II. LITERATURE SURVEY

People invest for a variety of reasons, and their motivations can be influenced by personal financial goals, risk tolerance, and individual circumstances. Here are some common reasons why people choose to invest:

1. Wealth Accumulation:

Capital Growth: Investors seek to increase their wealth over time by earning returns on their invested capital. The goal is to achieve a higher value for their investments than the initial amount invested.

2. Retirement Planning:

Building a Nest Egg: Many individuals invest with the aim of building a financial cushion for retirement. Investments in retirement accounts, such as 401(k)s or IRAs, help ensure financial security during retirement years.

3. Passive Income Generation:

Dividends and Interest: Investments like stocks, bonds, and real estate can generate passive income through dividends, interest, or rental income. This income stream can supplement earned income or provide financial independence.

4. Education Funding:

Future Expenses: Parents often invest to save for their children's education expenses. Investments made in education funds or other vehicles help cover the costs of tuition and related expenses.

5. Achieving Financial Goals:

Short-Term and Long-Term Goals: Investors may have specific financial goals, such as buying a home, starting a business, or funding

a major purchase. Investing is a means to accumulate the necessary funds to achieve these objectives.

6. Inflation Hedge:

Preserving Purchasing Power: Investing provides a way to potentially outpace inflation. As the cost-of-living increases over time, investments can help preserve the purchasing power of money.

7. Tax Efficiency:

Tax Advantages: Certain investment vehicles, such as retirement accounts or tax-efficient funds, offer tax advantages. Investors may choose to optimize their tax situation through strategic investment planning.

8. Diversification and Risk Management:

Portfolio Protection: Investors diversify their portfolios to spread risk and reduce the impact of poor performance in any single investment. This risk management strategy is essential for protecting capital.

9. Interest in Financial Markets:

Learning and Engagement: Some individuals invest out of interest in financial markets and a desire to learn about investing. They may actively manage their portfolios or invest in specific sectors they find appealing.

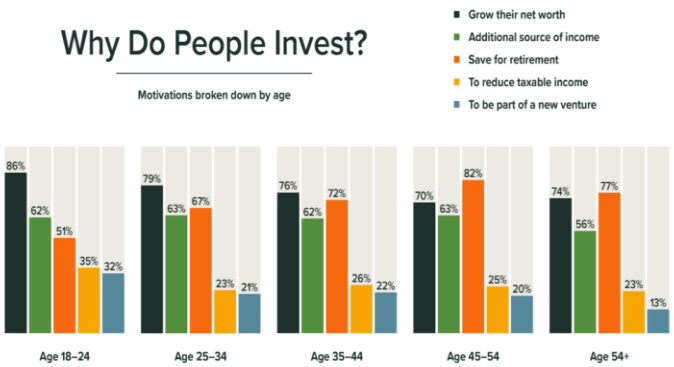
10. Socially Responsible Investing (SRI):

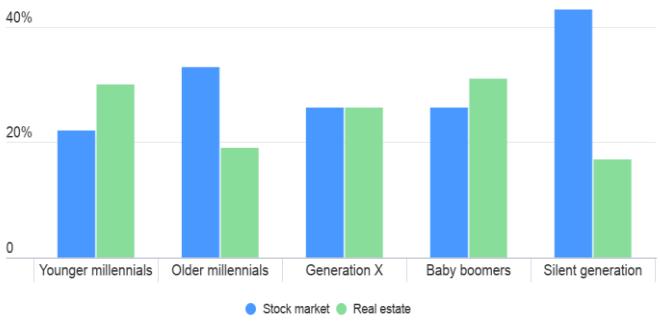
Ethical Considerations: A growing number of investors choose to align their investments with their values. Socially responsible investing involves considering environmental, social, and governance (ESG) factors in investment decisions.

11. Entrepreneurship and Business Growth:

Capital for Ventures: Entrepreneurs and businesses seek investment to fund new ventures, expand operations, or innovate. Investors contribute to economic growth by providing capital for business development.

Understanding individual motivations for investing is crucial, as it informs the choice of investment vehicles, risk tolerance, and overall financial strategy. Different investors may prioritize different goals, and their investment strategies will reflect their unique circumstances and objectives.



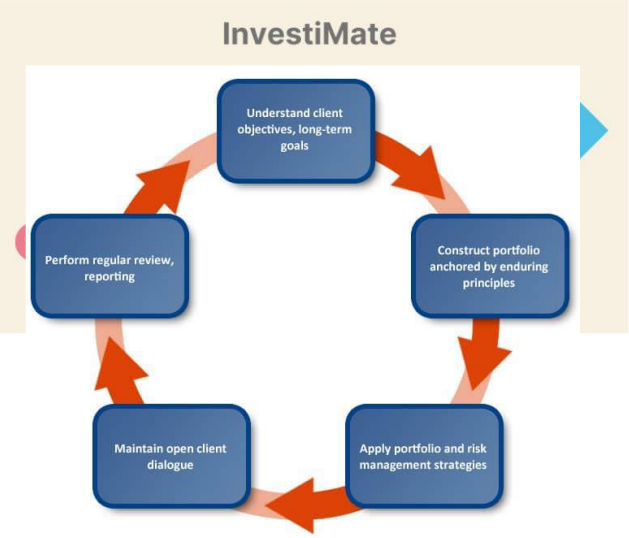


III. PROPOSED PRODUCT

The act of investing has the goal of generating income and increasing value over time. An investment can refer to any mechanism used for generating future income.

InvestiMate is a Python programmed product, which will give you an idea of the percentage and amount of your salary that you can invest in various fields.

This includes the purchase of bonds, stocks, or real estate property, among other examples. Additionally, purchasing a property that can be used to produce goods can be considered an investment.



This includes the purchase of bonds, stocks, or real estate property, among other examples. Additionally, purchasing a property that can be used to produce goods can be considered an investment.

It will show the graph of leading companies in stocks for referencewhich will an idea to the user on investments in stocks.

This project gives the user a gist of the fields where the user can invest.

It accepts the salary/income of the individual. It will also accept the risktolerance and based on these factors, it will calculate the percentage and amount to be invested in those fields proposed earlier.

It further uses the Long short-term memory (LSTM) model to predict thestock investments as well.

This is based on the concept of BMI calculator.(BMI – body mass index). The BMI takes in the inputs, height and weight from the user with which it categorises the person as underweight, fit or overweight, according tothe age group.

Similarly, this InvestiMate will take in your salary, risk appetite and savings percentage to calculate the amount you could possibly invest in certain fields. The percentages are just a recommendation based on certain studies.

The various stages on which this product is based on are: Splitting the data for training and testing, Fitting the LSTM model on the training data. Learning the features using LSTM: Working of LSTM- Using adam optimiser and mean_squared_error, plotting predicted values, The user's details are taken along with the risk tolerance. The percentage and amount of investment from the salary is calculated and presented to the user. Sample of the stock prediction is done using the LSTM model.

IV. RESULTS

There are financial advisors, who guide each individual personally about the investments based on their income and the source of income. There are also separate courses available which people join and learn aboutinvestments.

This will avoid **Conflicts of Interest:** Some financial helpers, especially those who work on commission, may have conflicts of interest that could lead them to recommend financial products orstrategies that benefit them more than you.

Potential for bad advice, even the well-intentioned financial helpers, can provide advice that doesn't align with your financial goals or risk tolerance. Following poor advice can lead to financial losses or missed opportunities.

Thus this will provide as a safe platform that gives the output purely based on the user's input.

DATA SETS:

National Stock exchange data set is used.

1. Series change dataset:

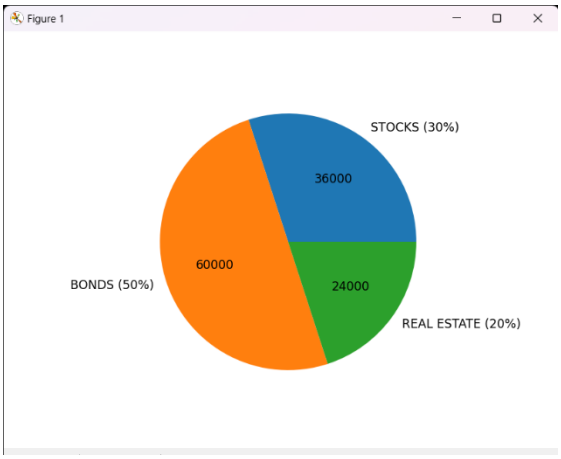
Symbol	Security	From Serie	To Series	Change Da	Remarks
ATLANTA	ATLANTA	BE	EQ	########	GSM Stage - 0
AXITA	AXITA COT	BE	EQ	########	-
CAREERP	CAREER P(	BE	EQ	########	-
COMPINF(	COMPUAC	EQ	BZ	########	-
DUCON	DUCON IN	BE	EQ	########	-
GAYAPROJ	GAYATRI P	BE	BZ	########	-
GINNIFILA	GINNI FILA	BE	EQ	########	-
IVC	IL&FS INV(	BE	EQ	########	-
JETFREIGH	JET FREIGI	BE	EQ	########	-
KAVVERIT(	KAVVERI T	BE	EQ	########	-
LAGNAM	LAGNAM S	BE	EQ	########	-
LOTUSEYE	LOTUS EYE	BE	EQ	########	-
MAANALU	MAAN ALU	BE	EQ	########	-
MMP	MMP INDU	BE	EQ	########	-
NAGREEK(	NAGREEKA	BE	EQ	########	GSM STAGE - 0
NIBL	NRB INDU	BE	EQ	########	-
NILASPACI	NILA SPAC	BE	EQ	########	-
PLADAINF(	PLADA INF	ST	SM	########	-
PODDARH(	PODDAR H	EQ	BZ	########	-
RANEENGI	RANE ENG	BE	EQ	########	-
SAMPANN	SAMPANN	BE	EQ	########	-
SILGO	SILGO RET	BE	EQ	########	-
STARTECK	STARTECK	BE	EQ	########	-
SUPREMEI	SUPREME	BE	BZ	########	-
SURANASC	SURANA SI	BE	EQ	########	-

2. Stock exchange data:

Date	Open	High	Low	Close	Volume	OpenInt	Stock
########	0.42388	0.42902	0.41874	0.42388	23220030	0	AAPL
########	0.42388	0.42516	0.41366	0.42134	18022532	0	AAPL
########	0.42516	0.43668	0.42516	0.42902	42498199	0	AAPL
########	0.42902	0.43157	0.41618	0.41618	37125801	0	AAPL
########	0.43927	0.44052	0.43927	0.43927	57822062	0	AAPL
########	0.44052	0.45589	0.44052	0.44566	68847968	0	AAPL
########	0.45718	0.46357	0.45718	0.45718	53755262	0	AAPL
########	0.45718	0.46103	0.44052	0.44052	27136886	0	AAPL
########	0.44052	0.44566	0.43157	0.43157	29641922	0	AAPL
########	0.43286	0.43668	0.43286	0.43286	18453585	0	AAPL
########	0.43286	0.44566	0.42388	0.42902	27842780	0	AAPL
########	0.42902	0.43157	0.42516	0.42516	22033109	0	AAPL
########	0.42388	0.42388	0.41618	0.41618	46515020	0	AAPL
########	0.41618	0.4354	0.41111	0.41111	30947546	0	AAPL
########	0.41111	0.41366	0.41111	0.41111	29541971	0	AAPL
########	0.41111	0.41111	0.39316	0.40081	65093531	0	AAPL
########	0.39956	0.39956	0.39186	0.39186	27268068	0	AAPL
########	0.39443	0.40853	0.39443	0.39443	32977801	0	AAPL
########	0.40081	0.40724	0.40081	0.40081	33583772	0	AAPL
########	0.40593	0.40853	0.40593	0.40593	34995586	0	AAPL
########	0.40593	0.40593	0.39443	0.39699	27211851	0	AAPL
########	0.39699	0.39956	0.39699	0.39699	13099922	0	AAPL
########	0.39699	0.39956	0.39316	0.39316	34933112	0	AAPL
########	0.39316	0.39316	0.38164	0.38164	1.02E+08	0	AAPL
########	0.38164	0.39186	0.37906	0.37906	50969114	0	AAPL
########	0.37906	0.38164	0.35985	0.36241	74126674	0	AAPL
########	0.38289	0.38674	0.38289	0.38289	67842205	0	AAPL
########	0.38289	0.38419	0.38164	0.38164	32915346	0	AAPL

After the input from the user, a chart would be provided with the amount and percentage calculated for each investment.

Sample:



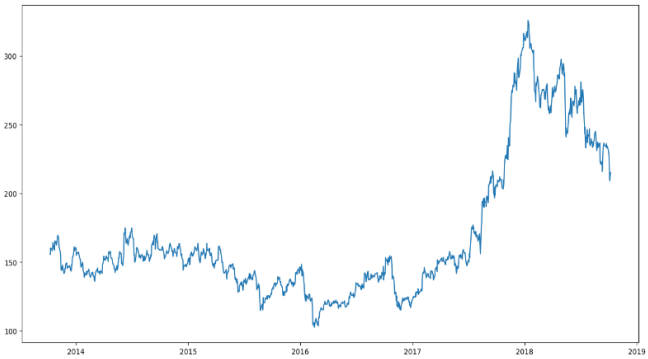
STOCKS	30%	7500
BONDS	50%	12500
REAL ESTATE	20%	5000

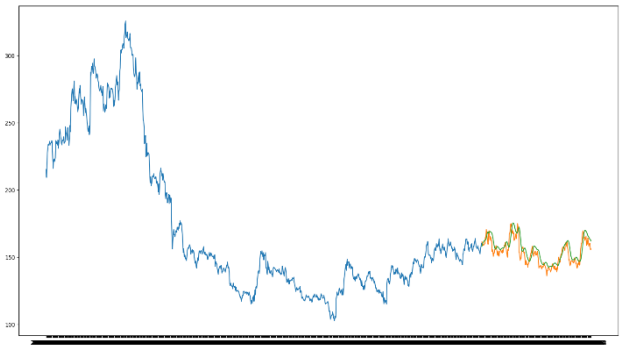
THANKS FOR USING INVESTIMATE. HAVE A NICE DAY!

Now using the LSTM it predicts the stock data with the provided information.

	Date	Open	High	Low	Last	Close	Total Trade Quantity	Turnover (Lacs)
0	2018-10-08	208.00	222.25	206.85	216.00	215.15	4642146.0	10062.83
1	2018-10-05	217.00	218.60	205.90	210.25	209.20	3519515.0	7407.06
2	2018-10-04	223.50	227.80	216.15	217.25	218.20	1728786.0	3815.79
3	2018-10-03	230.00	237.50	225.75	226.45	227.60	1708590.0	3960.27
4	2018-10-01	234.55	234.60	221.05	230.30	230.90	1534749.0	3486.05

Finally provides graph of various companies and stock details.





V. CONCLUSION

In conclusion, this project has illuminated essential aspects of Investments.

As the financial landscape continues to evolve, investment-related projects willneed to stay at the forefront of emerging trends, such as automation, artificial intelligence, blockchain, and sustainable investing. This adaptability and responsiveness to market developments are key to the success of such projects.

“InvestiMate” represents a dynamic and evolving field that plays a crucial role in the financial well-being of individuals, organizations, and economies. This will serve as vehicles for individuals to achieve their financial goals, grow wealth, and secure their financial future.

First and foremost, we have shown that investment in predominant in today’sworld. This discovery is significant because it most of them focus in investing and saving money. It underlines the value of same. Additionally, our investigation into stocks has shed light on its significance or implications.

As we look forward, it is clear that summarize the future outlook or potential implications. The lessons learned from this project can inform potential futureactions, research, or decisions in relevant fields or contexts.

VI. REFERENCES

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