Chatbot for Portfolio Selection

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***Abstract*- A chatbot is a computer program to stimulate human response and there by facilitates communication with clients with the support of rule based or machine learning tools. A portfolio is a group of financial assets. It includes stocks, bonds, cash equivalents and their fund counterparts, including mutual funds, exchange-traded funds and closed end funds. In this paper it is attempted to suggest a suitable portfolio to an investor based on his age, investable amount, investment tenure and expected returns.**

Keywords: **Chabot, portfolio, investment tenure, exchange traded funds, closed end funds.**

I. INTRODUCTION

Portfolio is a collection of financial assets. An individual selects portfolio based on his risk tolerance, duration of investment and his investment objectives. The investors will focus on investing in a portfolio which will give maximum return with minimum risk. Investing in a portfolio can deliver better returns compared to specific asset counterparts and is because of the diversification of risks among various available investment avenues.

To achieve a positive, long-term goal, the investor should select a portfolio based on his objectives and formulate a suitable investment strategy. The future portfolio performance depends on investment policy. The selected portfolio should be well diversified to ensure that losses from one security are compensated by gains from other asset classes in the portfolio.

There are two forms of portfolio management. Passive management which tracks a market index (indexing or index investing) and active management with a single or a team of managers attempting to beat the market by actively managing a fund's portfolio. The investment decisions are based on research and decisions on individual holdings. Closed-end funds are examples of actively managed funds.

Analysing a portfolio starts with the information concerning individual securities. The past performance of individual securities is given as inputs to the chatbot. The most noticeable feature of investing in a security is the uncertainty. The economic forces such as inflation rate and unemployment level etc. will have effect on predictions. Apart from economic considerations factors like political stability, national and international events and extreme weather conditions and natural calamities affect the performance of investment portfolio.

The objective of this paper is to suggest suitable portfolio to an investor based on his/her age, investment tenure, investable amount and risk return trade off, considering the past performance of various investment avenues. This paper is arranged as follows: the literature relating to the work is briefly dealt with followed by methodology, data being used, results, limitations of current work, scope for future work and concluding remarks.

A. Literature review

In 2015 Mr. Aniket Dole1 et al. designed a bot for banks where the users can ask questions related to the bank. The first famous chatbot was Eliza and then was Alice. The bot first takes the queries in text format and tries to identify an answer from the database. The data thus retrieved is displayed in the text format which forms the output. From the vast pool of investment avenues, mutual funds are selected to form the bots' database because of its simplicity and diversification.

Mutual funds are well diversified investment avenues managed by sophisticated professionals. Since 1989 mutual funds have been growing at an average annual rate of 14.4 percent, which is higher than the rate of growth in equities and bank deposits. In 1990 there was a major growth of mutual fund industry which suffered a setback in 1997 because of the Asian financial crises. The financial advisors tend to prefer mutual fund because of low cost of transaction, size of funds which causes consistent behaviour over a long period of time.

Various factors such as past performance, style of management, tenure of managers and age of fund has to be considered by the investors to make the best investment choice. Bala Ramasamy and Matthew C.H.Yeung (2003), concentrating their study on emerging market, Malaysia, finds that market volatility, extend of market regulations and government involvement affects the performance of mutual funds.

Ms. S. Neelima and Dr. D.Surya Chandra Rao (2016) conducted a study to identify the factors that influence the investors their objective of investment and the investment avenues preferred by them. The survey based research they conducted shows the prior performance of the funds, reputation of the firm, liquidity, tax benefits etc. are the major factors that influence the investors. The mutual funds are managed by competent professionals so the will be diversified and have a low risk profile so that investors going for long term investment can get a better return. The investment

decisions of individuals are affected by demographic variables such as gender, income, occupation and age etc. An investor stays invested in a particular mutual fund mainly because of fund's performance. From a set of structured questionnaire Inderjit Kaur K. P. Kauhisk (2016) finds that gender, income, age, marital status, education etc. are the characteristics that affect the investment behaviour of individuals investing in a fund.

Before making an investment decision the individual should make a detailed analysis of the investment avenue with respect to flexibility, return, risk, liquidity, safety, capital appreciation etc. Mutual funds provide the investors a smart product that pools their resources in diversified portfolio at lower cost. Risk aversion forces investors' to stay invested in fixed deposits and real estate. Lack of awareness also keeps the individuals from exploring more prospective investment avenue.

A study was conducted by Muralidhar Prasad Ayaluru (2016) by taking ten schemes of Reliance mutual fund. He collected the daily net asset value for a period of five years to analysed the risk- return behaviour and evaluated past performance of these schemes. Return, Jenson ratio, R square, standard deviation, beta, Sharpe ratio, Treynor ratio is the ratios taken by him to analyse the past performance of these schemes. The scheme with highest value of standard deviation is the most volatile fund and the risk level of that scheme will be high. Out of the ten schemes only four schemes have the beta value greater than one which indicates that those schemes are risky. The remaining schemes have beta value less than one indicating that they belong to low risk category. When the value of Sharpe ratio is high the fund is performing well in respect to the risk associated with it. When the value of Sharpe ratio is low then the fund is not performing well. For a common man it is more suitable to invest in mutual funds because it provides the opportunity to invest in well diversified and professionally managed securities at a relatively low cost.

The portfolio selection is a decision making process under risk and uncertainty. Proper analysis of available information is essential in optimize the choices. To pick the vital information from the pool of big data cause a great problem even to financial professionals. So an interactive system that can chat with the individuals and suggest an optimal investment choice would help them in effectively utilizing their resources.

B. Data

The data of various mutual fund schemes in State Bank of India are collected. The data includes the alpha, beta, Sharpe ratio, standard deviation and return of these schemes in 3 year, 5 year and 10 year.

C. Methodology

Python programming is used to create the chatbot. The input is collected from the customer. The fields required are the age, investment tenure, mode of investment (SIP/ Lumpsum) and amount to be invested. The chatbot categorizes the individual based on the age and assigns the risk profile. It calculates the expected future returns based on the past performance of various schemes and the investment tenure of the investor. Based on these calculations it suggests the best suited investment strategy for the customer based on his risk profile, investment tenure and the fund performance.

D. Results and Discussions

This paper introduces a chatbot that interacts with the client and suggests a portfolio that is best suited for him. The table 1 shows an example of how the bot performs based on the input received.

Among the ocean of investment avenues only a few schemes in the SBI mutual funds were included for analysis. Also the risk profiling of investors were done based on age and other factors which may affect the risk appetite like gender, income, level of education etc were not considered. By incorporating the information relating to the other investment avenues with varying risk return patterns the scope of service of the bot can be enhanced.

The investment avenues considered for analysis is mutual funds and in most of the cases there will be a lock up period. For ease of analysis the lockup period of three years is taken and the cases like premature closure and extended lock up periods are not considered. As the investment avenues are vast and the information processing abilities of unsophisticated individuals are limited. The bot provides a smart solution to the decision problem, portfolio selection, involving risk and uncertainty.

AGE	INVESTMENT TENURE	INVESTMENT TYPE	FUNDS SUGGESTED
Below 35	Below 5	SIP	SBI blue chip fund
			SBI small cap and mid cap fund
			SBI short term debt fund
		Lumpsum	SBI short term debt fund
	5-10	SIP	SBI magnum children's benefit plan
		Lumpsum	SBI blue chip fund
			SBI small cap and mid cap fund

			SBI short term debt fund
	Above 10	SIP	SBI magnum equity fund
			SBI magnum global fund
			SBI corporate bond fund
		` Lumpsum	SBI magnum equity fund
			SBI magnum global fund
			SBI corporate bond fund
35-50	Below 5	SIP	SBI blue chip fund
			SBI magnum global fund
			SBI short term debt fund
		Lumpsum	SBI magnum gilt fund-Short term plan
	5-10	SIP	SBI magnum balanced fund
		Lumpsum	SBI blue chip fund
			SBI magnum global fund
			SBI corporate bond fund
	Above 10	SIP	SBI blue chip fund
			SBI magnum global fund
			SBI corporate bond fund
		Lumpsum	SBI blue chip fund
			SBI magnum global fund
			SBI corporate bond fund
Above 50	Below 5	SIP	SBI short term debt fund
		Lumpsum	SBI magnum gilt fund-Short term plan
	5-10	SIP	SBI magnum monthly income plan
		Lumpsum	SBI short term debt fund
	Above 10	SIP	SBI corporate bond fund
		Lumpsum	SBI corporate bond fund

Table 1- Working of chatbot based on input

II. CONCLUSION

In the era of information revolution portfolio selection involves segregation of vital information from the pool of big data. This is a challenge for individuals including sophisticated professionals in the field. An interactive agent to suggest the optimal portfolio choice can help the unsophisticated investor to optimally allocate his resources. This also reduces the risk as the bot is designed based on research and expertise of pool of highly qualified professionals

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