



Meet IB, the InvestoBot

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Why Chatbot?

Web development allows you to build beautiful websites that scale well on multiple devices. Whether you use Siri, rely on Alexa or have a Roomba, there's no escaping the fact that robots are part of our daily lives now. It's not a bad thing that we can automate some of life's most mundane, tedious tasks. Although Apps are everywhere, and people are sick of them: between 80-90% of apps are used once and then deleted. The one exception is messaging apps, which account for 91% of time spent on mobiles in the U.S. These messaging apps are of different and prove to be useful in a variety of aspects.

For example, the top Robo Investment Advisors like wealth front, Ellevest, Betterment etc. have been good news for consumers looking for low cost financial advice and looking forward to investing. These bots answer real-world questions about advising consumers regarding their investment portfolios serving as the best low-cost investment advisor. These bot services provide modern portfolio theory and the efficient market hypothesis. The bot plugs your answers into an algorithm that determines the kind of portfolio and asset allocation that's appropriate for your age, risk tolerance and time horizon. Hence, we chose to work on our own “The InvestoBot” to help you with your financial needs.

Motivation & Objectives

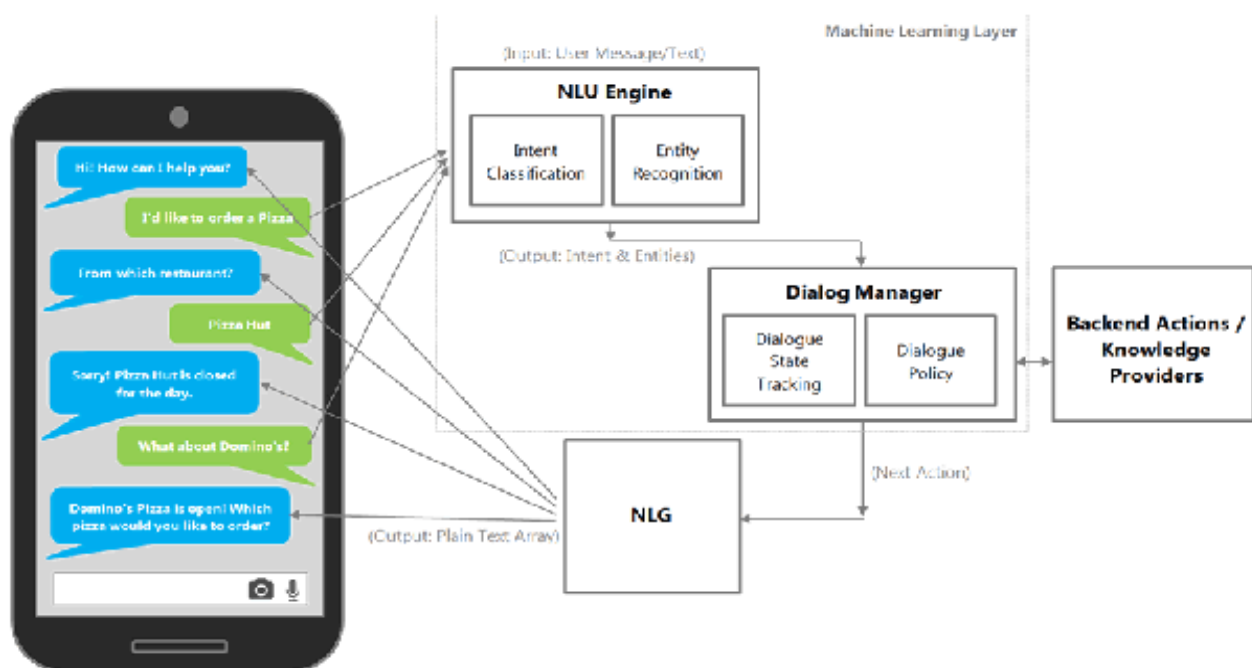
One way to stay competitive in modern business is to automate as many of your processes as possible. We can evidence this in our day to day lives. For example, say the self-checkout at grocery stores and ordering kiosks at restaurants. In fact, Amazon just opened a store without any cashiers or self-checkouts, limiting human interactions to those only absolutely necessary. The value in chatbots comes from their ability to automate conversations throughout your organization. Below are few benefits businesses realize when using chatbots.

- **Save Time and Money** By automating conversations that would otherwise require an employee to answer, organizations save both time and money that can then be allocated to other efforts. Sprout Social research shows the number of social messages requiring a response from a brand increased by 18% from 2015 to 2016, you save countless hours by automating responses with a chatbot.
- **Generate Leads & Revenue** Chatbots use direct messages to gather information necessary to provide effective support. For example, asking users why they're visiting your page is one question that is most likely to be asked in every engagement. Automating this initial interaction allows users to share the information needed for the agent to better serve them without requiring a human to ask for it.

- **Guide Users to Better Outcomes** Customers don't always know where to go to find the information they're interested in. In fact, your customers may not even know what it is they're interested in. By asking a series of qualifying questions, you route users to the best place for them to find the information they want.
- **Provide 'After Hours' Support** Drift data states about the most popular use of chatbots is to provide quick answers in an emergency. However, organizations that don't offer 24-hour support won't provide answers when the office is closed. By using a robust chatbot when your business is closed, customers still gain access to the information they need. Chatbots help you significantly decrease the average time to respond, bringing you closer to your customers' expectations.
- **Engage Users in a Unique Way** Traditionally, customer questions were routed to businesses via email or the telephone, which made user experiences fairly standard and non-customized. But chatbots offer a new, fun and interactive way to engage with brands.

Methodologies, Algorithms & Specification

The standard chatbot architecture is shown as below. It comprises of a Natural Language Understanding engine which, at first, processes the input message to remove all the stop words, punctuations and irrelevant parts of the sentence. Then it transforms the sentence into the sparse matrix and is inputted to the NLP model. The transformations will be done using libraries re, nltk, TF-IDF Vectorizer.



The machine learning algorithm will be used to, firstly, predict that the input data belongs to which category (also known as tag). The output of the algorithm helps understand the intent of the input sentence. The algorithm then finds an optimal output response for a list of possible responses attached to that tag/category. This is the generic chatbot flow. Different ML algorithms will be tried for classifying the sentence to proper tag, spanning from Logistic Regression to XGBoost to Artificial Neural Network to pretrained algorithms like Glove, BagOfWords, Seq2Seq. The models will be cross validated and evaluated for overfitting/underfitting and the best model will be implemented in the chatbot. What if when a sentence comes related to investment like, “I want the best portfolio allocation for my portfolio.”? We have got it covered. A mathematical function will be used to initialize the allocations and maximize the profits while constraining the sharpe ratio within appropriate risk boundaries as defined by the user.

Data Sources

The data for the twitter sentiment analysis will be fetched from the Tweepy API provided by twitter. The data to be used for the Question Answer conversation will be limited and custom created by us based on the possible questions expected and supported by the chatbot. The data for the stock prediction model will be fetched from the QuandlAPI.

Future Scope

We can possibly integrate our chatbot with Google Dialog Flow/AWS Lex/Slack. We resolve to use Google Dialog Flow, a fantastic natural language understanding (NLU) framework, to make our bots smarter at handling reasonable natural language queries entered at any point in the conversation. A well-designed Dialog Flow agent can understand user queries and connect them to the right answers (called intents). Machine learning (ML) scores the likelihood that a given user query correlates with a given intent.

1. The chatbot can be hosted on EC2 instance with exposed REST APIs to send questions and get response from the chat bot.
2. Dialog Flow, etc. Once integrated, your users can chat with your bot using a beautiful and customizable chat-widget.
3. Possible improvements - proper machine learning model with a proper data set and try to integrate it with slack bot.

References

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