Project Proposal

Project Information

Project:	ChatBot
Project Time-frame:	2019/10/10 to 2019/12/06
Summary:	A chatbot is a messenger like program which provides a conversation/ discussion interface to a human. By learning through artificial intelligence it replicates the patterns of human interactions in machine learning allows computers to learn by themselves without programming natural language processing. When it is asked a question, the chatbot will respond based on the knowledge database available to it at that point in time. A chatbot is able to translate human-level language into the information which a combination of text and patterns, and can be used as a response to the questions asked.

Process impact: This proposal, along with drafts of related documents, will be used by professor to determine whether or not to approve work on this project. A clear and precise project plan helps set expectations that will be used later to evaluate the success of the project.

Background and Motivation

What is the setting and history behind this project?

For a long time chatbots were mostly toy examples created by bored engineers for their entertainment. One of the oldest, and definitely the most popular example of such a system, is ELIZA, created in the 1960s (https://en.wikipedia.org/wiki/ELIZA). Despite the fact that ELIZA was quite successful at mimicking a psychotherapist, it had zero understanding of the user's phrases and just included a small set of manually created patterns and typical replies given to the user's input. This approach was a major way forward in implementing such systems in a pre-DL era, when it was a common belief that we just needed to add more patterns capturing the real language corner cases and after some time, computers would be able to understand the human language.

What is the problem to be addressed?

In everyday life, humans do communicate with each other or call customer services to seek information and to clarify their doubts. Communication is one of the essential things in day-to-day tasks. Simulating this process through the use of Reinforcement Learning, Deep Learning, and Machine learning technologies will provide a non-expensive and easy-to-approach solution. A chatbot is one of the examples of such simulations.

What are some current approaches to this problem?

The recent advances in Machine Learning (ML) and Deep Learning (DL), with all its applications, is the first real step in the direction of breaking this strictness in computer programming by replacing it with a different idea: letting computers find patterns in data by themselves.

- DBpedia
- Link to powerful chatbot platforms

Why is this problem worth solving or worth solving better?

The project aims to design a chatbot that will be trained on a data to replicate the general human to human conversation through the use of deep learning and reinforcement learning technologies. This will help reduce the manual task and save resources. It will automate the process /task through pre trained chatbot.

How will this product be better than previous approaches?

Our system will have similar functionality as used with deep learning models , but it will also use reinforcement learning to self train and become better with time.

The outcome expected from this project is learning and understanding how reinforcement learning works with deep neural networks. We may extend it further given time and scope of our next project.

Where is there more information on this problem?

The following pages provide additional background and motivation:

- Goal oriented Chatbot using Deep reinforcement learning
- Chatbots Training with RL
- Conversational AI Chatbot using Deep Learning

Goal

The goal is to design a chatbot that will be trained on a data to replicate the general human to human conversation through the use of deep learning and reinforcement learning technologies. This will help reduce the manual task and save resources. It will automate the process /task through pre trained chatbot.

Scope

We want to focus on creating a solution oriented chat bot based application , created out of Reinforcemnet and Deep Learning Techniques. The features of the chat bot will help to resolve some quick and easy questions to save effort and time.

- Work with common python based Reinforcement Learning modules
- The chat bot can be trained on more diverse data set as per the problem scope
- It will expolit important concpets of Natural language Processing with RL

In Scope	Out of Scope
Building a python based Chat Bot System based out of Reinforcement Techniques	Building a new python library that suports chat bot functionality
Working the most popular IDEs and environments like- Anaconda for development phase	Working with uncommon or complicated IDEs and environments for development
Data trained on open sourse data set and self analyzed common questions	Paid dataset dervied from APIs and other services
Chat Bot Application runnng on systems enabled with GPUs	Application running on large scale mult node, multi cloud infrastructure platforms
User enters the question to chatbot for Query.	Queries ingested via API calls on time to time basis

Deliverables

- The python script implementing Chatbot with the prime focus on Reinforcement Learning elements - Agent, Environment, Action, Policy and Reward

Risks and Rewards

What are the main risks of this project?

1. There are significant technical difficulties in building chatbot using Reinforcement learning. The expectation is to create a natural chatbot that could learn from human feedback and develop its own control system.
2. Using RL for chat bot creation needs time and so many interactions until the agent is trained which could be restricting.

3. The schedule for this project is very short. Including all the Reinforcement learning elements could be a challenge.

What are the main rewards if this project succeeds?

If we accomplish all the elements of our chatbot, using reinforcement learning, the chatbot would interact with the end-users and observe the results of its actions. It would receive a reward each time which can be positive or negative. Throughout the conversations, the chatbot becomes increasingly efficient. Eventually, the conversations with chatbot becomes more natural and human like.