Innopolis
University 2022

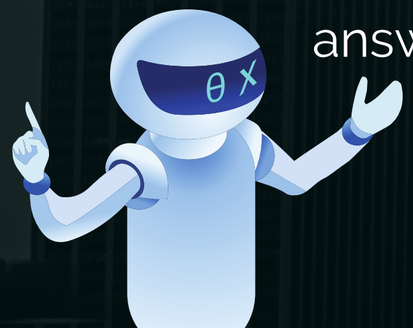
AI Agent Assistant

Telegram Chatbot

Reinforcement Learning &
Intellignent Agents

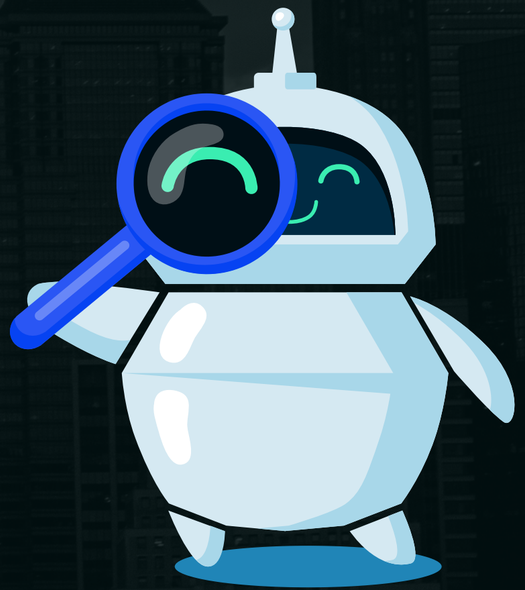
Introduction

In this project we have built an “AI agent assistant bot” using Deep Reinforcement Learning and Natural Language Processing(NLP) techniques. The bot helps to answer for students questions instantly. The data is taken from “Frequently Asked Question” section in the university website. Since the data was not enough to get a satisfied result, we have used Reinforcement Learning and NLP techniques to improve the results and to learn from student questions. This is a convenient bot which learns from questions and answers in case if this question is already asked and answered by “StudentAffairs”, if user who asked the question does not satisfied for given respond, the user can “like” and “dislike” the answer and it is going to be a reward. By this reward the bot learns if this answer “acceptable” or not.



Problem Formulation

Our goal is to make a Telegram Chatbot which helps to momentarily get an answer for any question about Innopolis University.



Literature Review

1. Deep Reinforcement Learning for Dialogue Generation

   Jiwei Li, Will Monroe, Alan Ritter, Michel Galley, Jianfeng Gao and Dan Jurafsky

2. Dialogue Generation using RL and NL models

   Marcella Cindy Prasetio , Mustafa Abdool, Carson Lam

3. Generative Deep Neural Networks for Dialogue

   Iulian Vlad Serban, Ryan Lowe,Laurent Charlin, Joelle Pineau

4. End-to-End Task-Completion Neural Dialogue Systems

   Xiujun Li† Yun-Nung Chen? Lihong Li† Jianfeng Gao† Asli Celikyilmaz†

Methodology

1st slide

Tools and Info:

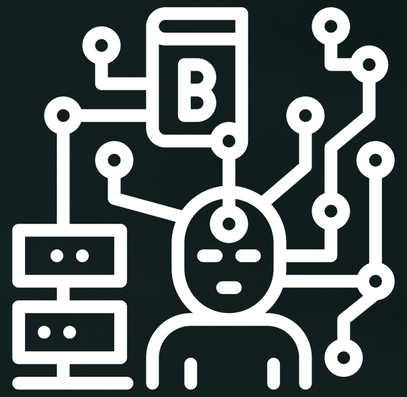
1) Programming Language: Python, version 3.9

2) Data: The data is collected from Innopolis University website. From section "Frequently Asked Questions", all the data was scrapped using Beautiful Soup which is a Python library for pulling data out of HTML and XML files.

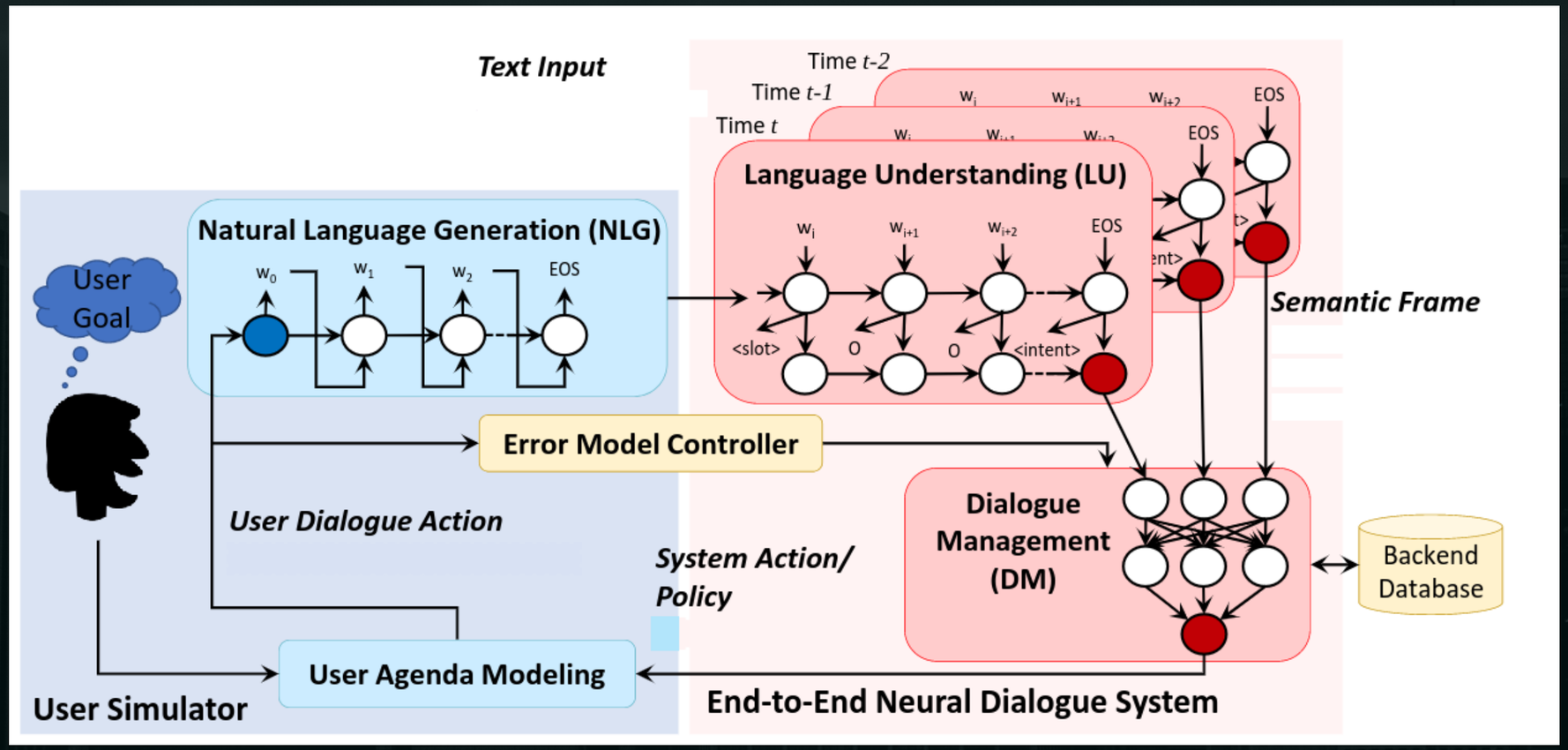
3) Database: We used MongoDB database to store the data. MongoDB is NoSQL database which is used to build highly available and scalable internet applications.

Methodology

2nd slide



Project Framework:



Methodology

3rd slide

Dialogue system:

The schema of Dialogue system project divides into two parts. The first part is user simulator, and another part is a neural dialogue system. To ensure that the user behaves consistently and goal-oriented, "User Agenda Modeling" is applied in the first part to regulate the dialogue exchange conditioned on the generated user goal. Natural language texts are produced by a Natural Language Generation(NLG) module in accordance with user dialogue actions.

Methodology

4th slide

Language Understanding (LU):

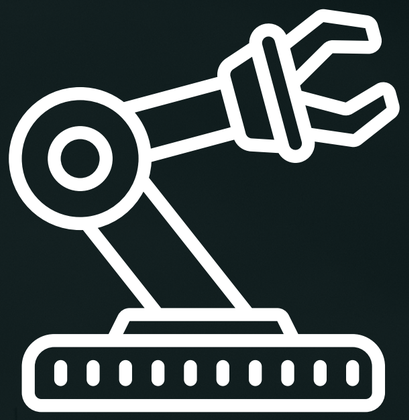
As part of its function, LU automatically classifies domains and intents of user queries and fills in slots to form a semantic frame

Dialogue Management (DM):

It is a classic DM framework that includes two stages, dialogue state tracking and policy learning, in which the symbolic LU output passed into dialogue act(or semantic frame).

Methodology

5th slide



User Agenda Modeling:

In User Agenda the user state which is defined as s u is factored into Agenda and goal. Goal consists constraints and reward. Based on the current state and the last agent action, the user simulator generates the next user action a u,t at each time step.

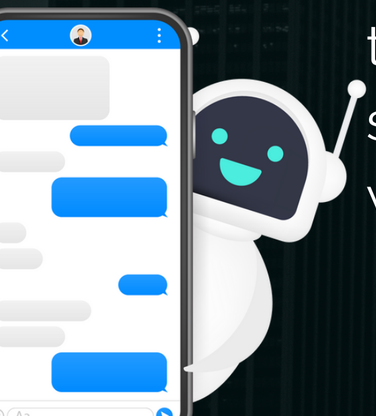
Natural Language Generation (NLG):

As a result of the user's dialogue actions, the NLG module generates natural language text.

Results and Discussions

5th slide

In this project we used end-to-end learning for dialog state tracking and management using deep reinforcement learning. We also build telegram bot to use this model in real world and this is originality of our project. As the bot is used, the more data will be collected from users and our bot will be improved based on user rewards and admin answers which are responded manually. One of the main advantages of our project is that the model can be improved in server automatically without any supervisor. The approaches that we used in this project are the latest researches and more improved solutions for dialog systems. Telegram bot is tested by real users. As a result the drawbacks that we mentioned in above sections is solved and performs better.



CONCLUSION

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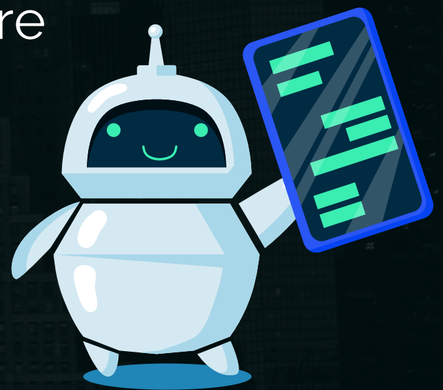
Our goal was to make a Telegram Chatbot which helps to momentarily get an answer for any question about Innopolis University. It was really interesting to use for dialog systems with not only deep learning models but reinforcement learning as well. With the help of Reinforcement Learning the model is really improved and gets more exiting. We will share this bot with others to get feedbacks and solve drawbacks if any. We also uploaded this project to github. You can check it by clicking this link. As a feature work we are planning to build to this type of Telegram bots to make the students life more easier and upgrade our skills.



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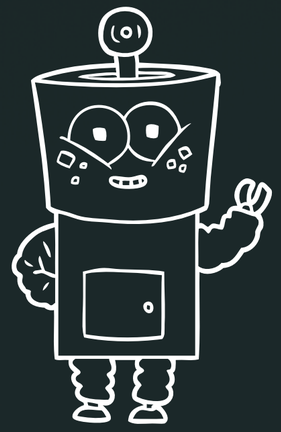
Thanks For Attention



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