AN ARTIFICIAL CHATBOT

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APPROVAL

This Project titled **"An Artificial Chatbot"**, submitted by Jahintaqi Chisty, Rathin Halder and Md Kamal Parvez Rabbi to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering (BSc) and approved as to its style and contents. The presentation has been held on December 2018.

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DECLARATION

We hereby declare that, this project has been done by us under the supervision **Rezwana Sultana, Lecturer, Department of CSE,** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

A chatbot is a program that can proudly communicate with any human being by taking the help of interactive conversion skill. Now-a-days, chatbot is widely popular and spreading rapidly as an application to communicate with computer. Some of them are so intelligent that they can even response like a human being. We have tried to find out different types of chatbots available around the world and looked for the betterment of them. And finally we have proposed a Chatbot called EME which will be the extended version of existing hybrid model. Finally, we have proposed to build a system where it will be able to generate automatic responses from their experiences. We have discussed their technical background and how they generate smart and relative responses. We have also tried to hunt out the reaction of them considering some similar questions.

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1
Introduction

1.1 Introduction

The presentation of chatbots into society has conveyed us to the start of another time in innovation: the era of the conversational interface. Over the last few years, Chatbots have played a prominent role as human-computer interfaces. Chatbots are generally composed of three modules: the user interface, an interpreter, and a knowledge base. Laven[1] defines chatbot as a program that attempts to simulate typed conversation, with the aim of at least temporarily fooling the human into thinking they were talking to another person. Basically, chatbot is a conversational agent that can interact with a user in a given subject using the natural language. Many chatbots have been deployed on the internet for the purpose of education, customer service site, guidance, entertainment. Existing famous chatbots are ALICE, SimSimi, Cleverbot, SIRI. Nowadays SOFIA (artificial human robot with chatbot) in 2017 is most popular for its automated conversational system. In this paper we have tried to propose a system which will be able to build up a conversational agent artificially. The hybrid model is already implemented in AliMe chatbot built by Alibaba group, difficult to configure as well as at the complex database system. The hybrid model used generation model and the IR model to collaborate with each other with the help of seq2seq model which joins the result of them then brings out the output. It is an interpreter for the human scripts of the chatbot. It uses own database to store the chatbot details by using IR mdel.[1] Also, we are storing all the dataset for training the module. When the user sends the message to the chatbot program, then according to matched reply from the algorithms, the answer is formulated and sent back to the user. It can bidirectional installed on a web server under the GPL (General Public License). The chatbots that have been deployed on the internet uses text, voice as well as sentiments as the input. In this paper, we have used the text as user input. A text I/O is relatively effective as a user can review for the input so that it can be rechecked if there are any mistakes. However, giving text input consumes time. So, the solution is for introducing a

text interface. By these methods, this chatbot application is very able to make conversation with the user.

1.2 Motivation

Nowadays a lot of websites are built with an auto messaging system. Which inspires us a lot? We just want to know how they create it for themselves. A chatting system, which knocks us at a certain time. Tell us about what is our routine or we should prefer this than that, through our regular using messenger software. This kind of regular queries can be fulfilled through our chatbot. It's like our better friend who can suggest us the best for which the best way or product to choose at that certain time. Sometimes we are facing a solitary period at that moment; it will tell us some entertaining topics at that unwilling time. It will talk with me and focus to my text at every moment. It will remove our boring time and can talk to us. Every moment, I knock him will not require your friend while he is busy. At that consequence, this project will help other to make that person entertained and make happy.

1.3 Rationale of Study

As chatbot will be as good as its knowledge base which matches the user's input with the best-matched response in its database, due to lack of quality of data set, the job becomes even more complicated. So for any researchers who want to build an extended version of hybrid model, his/her first job will be to build something which will be able to distinguish the lacking in existing hybrid model. [2] The main challenges of this research are finding an appropriate dataset to use as a knowledge base, dealing with misspelled inputs or grammatically incorrect sentences and being able to have an engaging human-like conversation. Since we were looking for a suitable addition removing the lacking for this purpose we added AIML along with the existing hybrid model. In this work, for the implementation, we need to implement generation based model with IR model, which will join them by seq2seq model and after that the final result will come through matching the threshold values of all. Since it is the first attempt so we are using the retrieval based system based on a pattern matching mechanism between the inputs and

the hand crafted rules predetermined in the their makers to provide natural language interfaces.” . So all the above mentioned reasons are the factors that played an influential role which motivates us to build a chatbot.

1.4 Research Questions

This thesis tends to the proposed a chatbot model system. We want to find out the characteristics of chatbots that are running at the time and also these coming near future. We found numbers of chatbots, some uses AIML and some uses algorithmic application. But in this proposed methodology we have focused on those chatbots that uses machine learning technique and coming up with new technique and tactics. Finally this paper tries to define that which type of chatbot at present ruling the world and proposed a chatbot model and system for better response.

1.5 Expected Outcome

The expected outcome of our research is to provide with a chatbot model which will be able to communicate with human on various purpose. We hope to build a chatbot which will be able to communicate just like a human being. Here is an example image provided for the expected outcome result.

Figure 1.5.1: expected Output

1.6 Report Layout

Chapter 1: Introduction

In this chapter we have analyzed the motivation behind choosing this project. We have also discussed about some literature review & expected outcome from the research work.

Chapter 2: Background

In this chapter we have discussed about the related works, limitations & challenges we faced.

Chapter 3: Research Methodology

The research methodology chapter includes all the basic needs to acquire final outcome of our project. This one is the most important chapter of this report where every step is discussed broadly. The data collection procedure & implementation is also analyzed here in this chapter.

Chapter 4: Experiment Result & Discussion

In this chapter we have analyzed the actual outcome we got from this thesis work. We also compared our result with existing system & found out error rate of our project.

Chapter 5: Summary, Conclusion & Implication for Future Research

Throughout the whole project what we have learnt out, the conclusion & our future plan is discussed in this chapter. This chapter will also include the surrounding to avoid the challenges of our project.

CHAPTER 2
Background

2.1 Introduction

Being a very popular topic in artificial intelligence, we can see a lot of project has been done regarding chatbots. Some of them are related with basic chatbot system like ALICE, and some of them are algorithmic like AliMe. In this chapter we have studied the history and their related works.

2.2 Related Works

1966 ELIZA: Mimicked human conversation by matching user prompts to scripted responses—it was able, at least for a time, to pass the Turing artificial intelligence test [13].

1972 PARRY: Inexplicably simulated a person with paranoid schizophrenia. PARRY was more serious and advanced than ELIZA—it was described as "ELIZA with attitude" [14].

1995 ALICE: "Artificial Linguistic Internet Computer Entity," ALICE was a natural language processing bot. She could apply heuristic pattern matching rules to human input—in other words; have a conversation [3].

2001 SMARTER CHILD: An intelligent bot widely distributed across SMS networks. With features such as quick data access and fun personalized conversation, it was considered a precursor to Apple's Siri and Samsung's S Voice.

2010 SIRI: An intelligent (and cheeky) personal assistant, part of Apple's iOS which features a natural language UI to answer questions and perform Web service requests. Siri would pave the way for all later AI bots and PAS.

2012 GOOGLE NOW: Developed by Google for the Google Search mobile app, it employs a natural language user interface to answer questions, makes recommendations, and performs actions by delegating requests to a set of web services.

2015 Alexa: A voice service inhabiting the Amazon Echo device, Alexa's capable of voice interaction —she uses natural language processing algorithms to receive, recognize, and respond to voice commands .

2.2.1 Siri

A ‘mother’ of self-learning chatbots, Apple’s Siri was launched in 2011. It was the first scalable assistant with recognition of speech and ability to learn by observing users. It was quite a challenge to bring together several technologies:

- Local search engine;
- AI technologies;
- Special data processing and storage systems

2.2.2 Google Assistant

Just like Siri, Google Assistant has its own unique personality. The team admits that Google Assistant is learning to function without human help. The algorithm collects human requests and reacts accordingly. Machine learning is one of the latest AI chatbot trends, and Google seems to follow suit.

2.2.3 Alexa

Alexa is a smart home virtual agent. Unlike other voice recognition solutions, this one is only available through Amazon devices such as Echo. Amazon lets third-party developers add ‘skills’ (services that work with the platform).

2.2.4 Luvo

This artificial intelligence chatbot was launched in December 2016 to help the clients of Royal Bank of Scotland (RBS). Nexus team is reported to have been creating Luvo's personality for nearly half a year. A big amount of this work related to language processing the appropriate formulas and empathy. All of this has been done before they started the actual coding. Paying attention to the bot's personality is one of the main company's tips for anyone willing to create AI-based tech.

2.2.5 Lark

Lark is a personal fitness tracker and healthcare coach available for iOS and Android [35]. The bot handles several tasks:

- Asks users about their daily habits;
- Gets data from fitness trackers;
- Gives them custom answers from the database of expert advices.

2.3 Research Summary

From the knowledge of all study & related work it is seen that most of the chatbots have used build in API and the most famous chatbots like Google Assistant and Siri have used self-learning algorithms. Chatbots like Alice which is made of AIML is a traditional chatbot system. Using AIML file some other chatbots are created. But now most of the chatbots use artificial intelligence and machine learning algorithms to develop themselves. Some of them only used for a specific purpose. AliMe chatbot mainly works for product related conversation although the developer said that it is an open domain chatbot. So we have tried to build an extended version of the AliMe's hybrid model which will remove the context problem of that model. Adding AIML with the existing model we can reduce the problem as AIML pattern matching works well in context issues.

2.4 Scope of the Problem

In this work we have shown a methodology to determine chatbot system and there building process. The expected outcome is able to communicate with human on various purposes and also can reply some general questions.

2.5 Challenges

As in our work we have tried to propose a system which will be able to communicate with human on some specific situations by using the hybrid model. Building this type of system mainly known as chatbot system is very difficult to establish. There are some build in API available which can be used, but we have tried to make it in our way, mainly using traditional coding system. So connecting with the user interface and back end coding was very hard. Collecting data and processing those needs good analysis.

CHAPTER 3

Proposed System Description

3.1 Introduction

We proposed a simple Chabot model which is discussed on extended version of hybrid model. EME is an artificial chatbot is an implementation of AIML based python chatbot using conventional agent which is done on a retrieval base model. The main success of response in accurately matches input massages with a dynamic database by an actual and proper response. Our main approach response according to the QA pair where we can calculate better result by combining Generation seq2seq model, IR model, AIML using sequence re-ranking model. Where we can calculate QA answer based on mathematical analysis and give the best response and also overcomes the context problem of the present hybrid model.

3.2 Research Subject & Instrumentation

The region requires a considerable measure of essential knowledge and strategy to accomplish the objective of this research. We have attempted to clarify all of them in this area.

3.2.1 Proposed Methodology

If the input to this retrieval based model the input text is q, the potential response is r, the output of the model is C. C is a function that has a confidence value (q,r). The highest value of C will be enter into the re rank model. For chose the multiple relative based response. It will calculate with one with highest score. On the other side there is also create a generation based by using generation model and Correspondingly AIML QA matched answer ready on rerank model[4]. Confidence value of Generation and IR based model confidence result will compare after that best confidence result will response will compared with AIML response based on Post re-ranking and gives the outcome. “Selecting a potential response from a set of candidates is an important and challenging

task for open-domain human computer conversation, especially for the retrieval-based human-computer conversation". Since there are many difficulties to build, so we want to propose an extended hybrid model [5].

1. We will get input from the Chatbot framework.

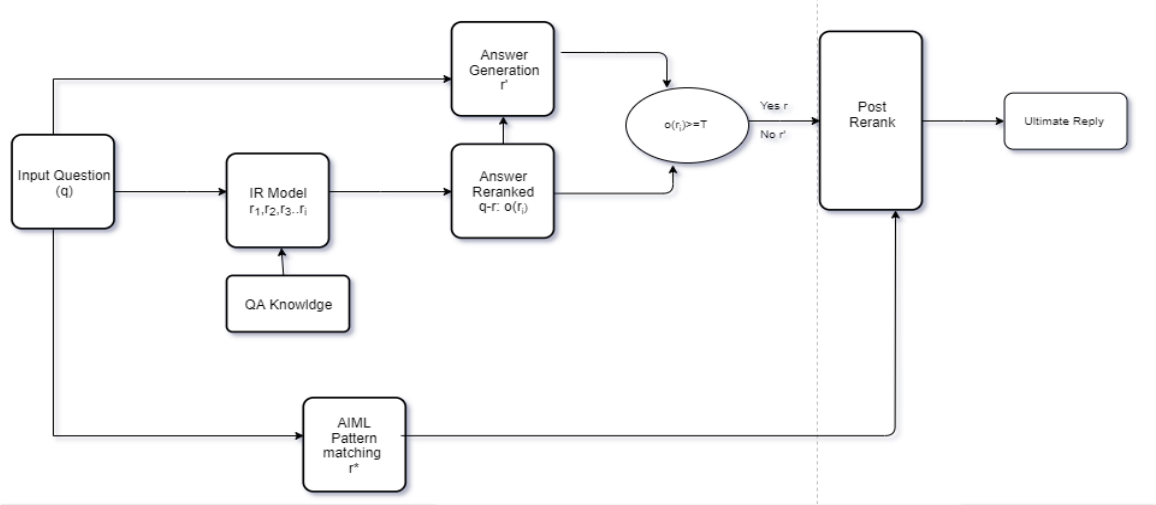

Figure 3.2.1: Flowchart of the Proposed System

2. We will conduct the received input. The input query will be processed by an algorithm which will find the nearest value of response query. The algorithm will match the closely matches of the input statement or query. The return responses to the selected matches. Here text of the input and the response of the selected matches calculated the confidence value of response and return the response with the highest confidence value
3. On the other side received input will create a generation based answer. And determine confidence score.
4. By re ranking confidence score get from 2 and 3 we compare with a predefined threshold value T. By our proposed algorithm we get a hybrid result.
5. At last QA matching response confidence score will compare with the response get from 4 by Post re ranking.
6. From 5 we get the final result.

3.2.2 Chatbot

Automatic dialog/conversation systems have served humans for a long time in various fields. In light of machine learning, Chatbot is a conversational exchange model fueled by Python which is fit for giving reactions dependent on knowledge base information. We pick this agent EME: Implementation of an English Chatbot. For EME in light of the fact that it is dialect autonomous. Since Chatbot has no dialect reliance in its structure, so it is permitted to be prepared to talk any dialect. It is a Python library that makes it simple to produce computerized reactions to a client's contribution for the making of chatbot in any dialect. To create diverse kinds of reactions, Chatbot applies a determination of machine learning calculations. This very component makes it simple for engineers to make chatbots and robotize discussions with clients [6]. The fundamental class of the chatbot is an associating point between every one of chatbots connectors. When a user issues an utterance (called a query), retrieval systems search for a most similar query in a massive database (which consists of large numbers of query-reply pairs). In this class, an information proclamation is come back from the information connector, prepared and put away by the rationale and capacity connectors, and after that go to the yield connector to be come back to the client. Furthermore, the machine-learning nature of Chatbot permits an operator occurrence to enhance its very own insight into conceivable reactions as it cooperates with people and different wellsprings of instructive information. An untrained occasion of Chatbot begins off with no learning of how to convey. Each time a client enters an announcement, the library spares the content that they entered and the content that the announcement was because of. As Chatbot gets more info the quantity of reactions that it can answer and the precision of every reaction in connection to the information explanation increment. The program chooses the nearest coordinating reaction via looking for the nearest 5 coordinating known proclamation that coordinates the info, the chatbot at that point picks a reaction from the choice of known reactions to that announcement.

3.2.3 Algorithm and Flowchart

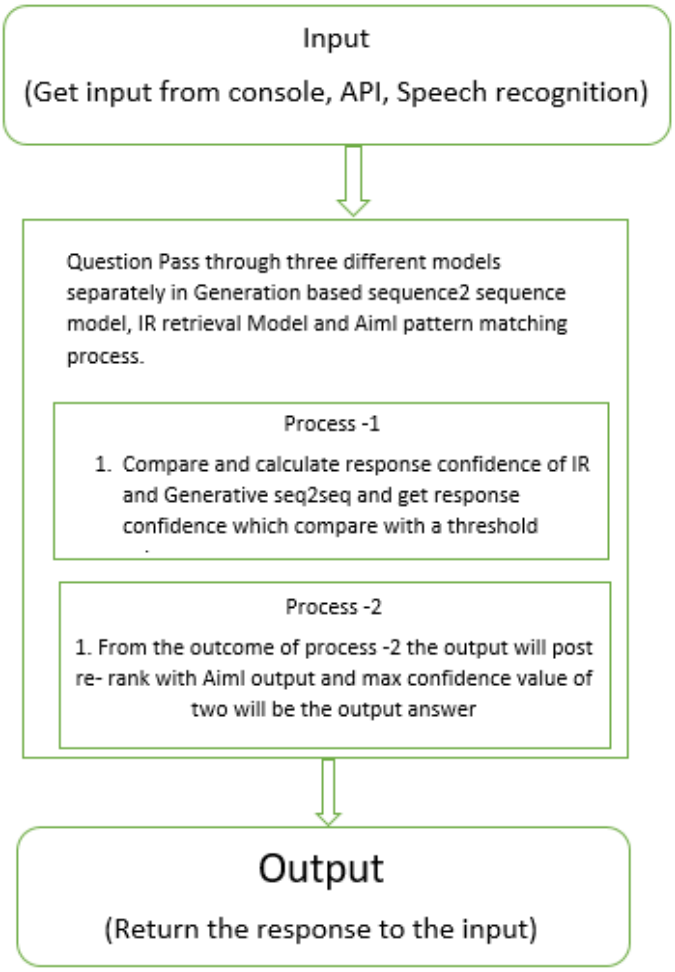

Figure 3.2.2: Process Flow Diagram of Chatbot

Since EME is retrieval based closed domain chatbot its prosperity lies on the pattern matching calculation. The calculation of our framework is as per the following:

1. Our framework takes input from the console or any Programming interface, in the wake of taking information it sends it to the processing unit.

2. Question Pass through three different models separately in Generation based sequence2 sequence model, IR retrieval Model and AIML pattern matching process.

3. Compare and calculate response confidence of IR and Generative seq2seq and get response confidence which compare with a threshold value.

4. From the outcome of process -2 the output will be post re- ranked with AIML output and max confidence value from two will be the output answer.

5. For more questions and answer step 2, 3, 4 will follow.

3.2.4 Environmental Setup

Natural Language Processing (NLP) procedures, for example, Natural Language Toolkit (NLTK) for Python can be connected to dissect speech, and insightful responses can be found by structuring an agent to give proper human-like reactions. For the setup of English chatbot, we installed Python 3.6 in our Engine. Python is a high level language which is appropriate for logical and scientific research. Python 3.6 is prescribed for the execution of English chatbot in light of the fact that some other form underneath 3.6 of Python causes "Unicode Decode Error". Unicode Decode Error is a runtime error caused by non-English dialect with an expansive number of letters in the letters in order. The Unicode range of English is 65– 90(A-Z) and 97-122(a-z) [7]. It has 5 vowels and 19 consonants. In contrast to English, it has consonant conjuncts, modifier, and different graphemes. For simple establishment of Chatbot, it is prescribed to install Anaconda for the setup. Anaconda c is an open source data science stage fueled by Python. Just Python 3.6 and Anaconda 3 under pins taking the input to English from a database. So it is prudent to utilize Python 3.6 and Anaconda 3 for this reason. There is expected programming to run Chatbot in any engine.. It is eminent to make reference to that after implementation of EME we add the English corpus to the chatbot corpus. However, given that we primarily work in a .NET environment and on Windows systems, my teammates sometimes get stuck figuring out how to get Python set up properly. There were a large number of breaking changes introduced to the Python core language runtime in 3.0 and as such it’s taken the community years to catch up. For all intents and purposes, I usually stick with Python 2.7 in all of my projects that depend on it and have never run into any issues.

Figure 3.2.3: Required Tools for Environmental Setup of EME

These were the necessities for the setup of chatbot. After every single required device are introduced; we introduced Chatbot in our Engine. We utilize Pycharm Education Edition as an IDE for composing, incorporating and running project. In this way, the natural setup for EME has been finished [16].

3.2.5 Training

Since our system comprises of learnable however free parts (Post Rerank Re-ranker), the model preparing is developed for every segment independently. The training data set in Machine Learning is the actual dataset used to train the model for performing various actions. This is the actual data the ongoing development process models learn with various API and algorithm to train the machine to work automatically.

In seq2seq, we utilize human-human articulation sets h_q, r_i as information tests. k recovered competitors r^* are additionally given as the info when we train the neural system. Standard cross-entropy loss of all words in the answer is connected as the

preparation objective. In the re-ranker part, the preparation samples are either hq, ri matches or created by negative examining [8].

3.2.6 Retrieval Based Model

The data recovery put together discussion is based with respect to the presumption that the fitting answer to the client's inquiry is contained by the pre-built discussion datasets. We gather gigantic measures of conversational corpora from on-line talking stages, whose subtleties will be depicted in the segment of assessment. Every expression and its comparing answer frame a couple, meant as h_{q^*} , r^* I. In view of the pre-developed dataset, the recovery procedure can be performed utilizing the condition of-the-practice data recovery framework. We utilize a Lucene 3 fueled framework for the recovery usage. We develop the upset records for all the conversational sets at the disconnected stages. At the point when an inquiry q is issued, watchwords removed from q and their confidence values are detailed as the recovery pattern and feed into the recovery framework to look through the most important $q*$ in database [15]. At that point, the related $r*$ of $q*$ will be returned as the yield, bringing about an aberrant coordinating between the client's question q and the recovered answer $r*$. The recovery frameworks would give in excess of one answers and score them as per the semantic coordinating degree, which is a customary method in data recovery. As the best positioned one may not impeccably coordinate the inquiry, we keep the best k answers for further process. The data recovery is a generally develop procedure, so the recovery structure can be rotated by any frameworks fabricated keep to the above standards.

3.2.7 Generation Based Model

An age based discussion framework can integrate new articulations, which is corresponding to recovery based techniques. The seq2seq demonstrate, thinking about the Recurrent Neural Network (RNNs) as the encoder and decoder to exchange source sentence to target sentence, has for some time been utilized for age errands[14]. The target capacity of the seq2seq display in our situation is the log-probability of the created answer r^+ given the inquiry q. Since the answer is produced on the restrictive

probabilities given the question, the all-inclusive answers which have moderately higher probabilities accomplish higher rankings. In any case, these all inclusive sentences contain less data, which weakens the execution of generative systems. Also see that in open-space discussion frameworks, if the question does not convey adequate data, seq2seq will in general produce short and insignificant sentences [9].

Let i = {y_1, y_2, · · ·, y_{i-1}, c_i}, the probability of generating a word y_i at position i is given by Eqn. 1, where f is a nonlinear function that computes the probability, s^{i-1} is the hidden state of the output at position i − 1, c^i is a context vector that depends on (h_1, h_2, · · · , h_m), the hidden states of the input sequence is given by an alignment model that scores how well the input at position j matches to the output at i−1. An example is shown in Fig. 2, where i = 3 and m = 4.

$p(y_i = w_i|i) = p(y_i = w_i|y_1, y_2, \ldots, y_i-1, c_i) = f(y_i-1, s_i-1, c_i)$ …….(1)

We pick Gated Recurrent Units (GRU) as our Recurrent Neural Network (RNN) unit. A couple of imperative usages are examined beneath. Bucketing and cushioning. To deal with inquiries and answers of various lengths, we utilize the container instrument proposed in Tensorflow 1. We utilize five cans (5, 5), (5, 10), (10, 15), (20, 30), (45, 60) to suit QA sets of various length, e.g., an issue of length 4 and an answer of length 8 will be placed in can (5, 10), and cushion questions and replies with an extraordinary image " PAD" when required. Softmax over inspected words. To accelerate the preparation procedure, we apply softmax to an arrangement of inspected vocabulary words (the objective word and 512 arbitrary ones) as opposed to the entire set. The thought is comparable with the significance inspecting system in Beam seek decoder. In the translate stage, we utilize bar seek, which keeps up best (k = 10) yield groupings at every minute t, rather than eager inquiry, which keeps just a single at each time t, to make our age progressively sensible.

3.2.6 Seq2seq ReRank Model

Our rerank model uses the same attentive Seq2Seq model to score candidate answers with regarding to an input question. Specifically, we choose mean probability, denoted as $s_{Mean\text{-}Prob}$ in Eqn. 2, as our scoring function (a candidate answer is treated as a word

sequence $w_1, w_2, \cdots, w_n$). We have also tried inverse of averaged cross-entropy and harmonic mean, but they had a poorer performance [10].

$$s_{\text{Mean-Prob}} = 1\ n\ Xn\ i=1\ p(y_i = w_i|\_i) \quad \text{.....(2)}$$

3.2.7 Post Reranked

Now that we have a retrieved candidate reply r as well as a generated one r+, we select one as the final reply by the q-r scorer in the retrieval-based dialog system (described in previous sections and not repeated here). Using manually engineered features, this step can eliminate either meaningless short replies that are unfortunately generated by biseq2seq or less relevant replies given by the retrieval system. We call this post-reranker in our model ensemble.

3.3 Data Collection Procedure

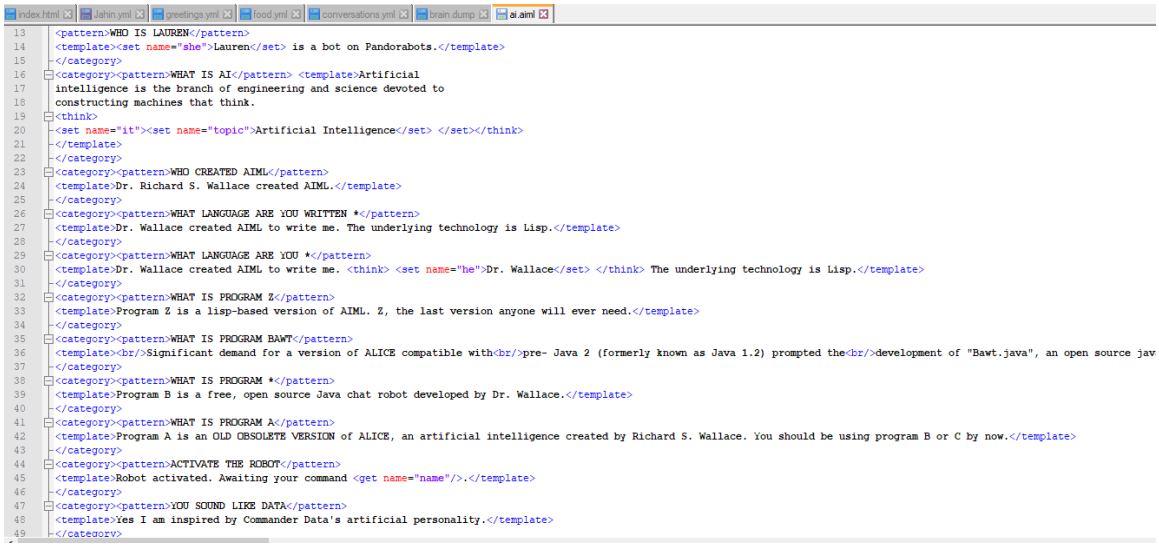

Figure 3.3.1: Format for Creating the Corpus for AIML

This format must be followed for the manual creation of any corpus. It is to be noted that the generated corpus from EME will be in the same format.

3.4 Statistical Analysis

It's the science of collecting, exploring and presenting large amounts of data to discover underlying patterns and trends. Statistics are applied every day – in research, industry and government – to become more scientific about decisions that need to be made.

We first compared two Seq2Seq models (the basic one proposed in the attentive one presented in Section 2.4), on three scoring criteria (mean probability, inverse of averaged cross-entropy and harmonic mean) using a set of randomly sampled 500 questions. We show the Ptop1 result in Table 1, which suggests that the attentive Seq2Seq model with sMean-Prob has the best performance. We use it in our rerank model [11].

Table: Comparison of different rerank models.

	IR+Reank(Hybrid Model)	IR	Extended Hybrid Model(Expected)
Basic	0.48		
Attentive	0.54	0.47	0.58

We then evaluated the effectiveness of the following four approaches with another set of 600 questions: IR, Generation, IR + Rerank, IR + Rerank + Generation. We present the result in Fig. 3. Clearly the proposed approach (IR + Rerank + Generation+AIML) has the best top-1 accuracy: with a confidence score threshold T = 0.19, Ptop1 = 60.01%. Here, questions with a score higher than 0.19 (the left of the dashed line, 535 out of 600), are answered using rerank, and the rest is handled by generation. The Ptop1 for the other three alternatives are 47.11%, 52.02%, and 56.23%, respectively. Note that a narrowly higher Ptop1 can be achieved if a higher threshold is used (e.g., 0.48), or, put differently, rerank less and generate more. We use the lower threshold because of the uncontrollability and poor interpretability of Seq2Seq generation: with an elegant decrease at the Ptop1, we gain more controllability and interpretability.

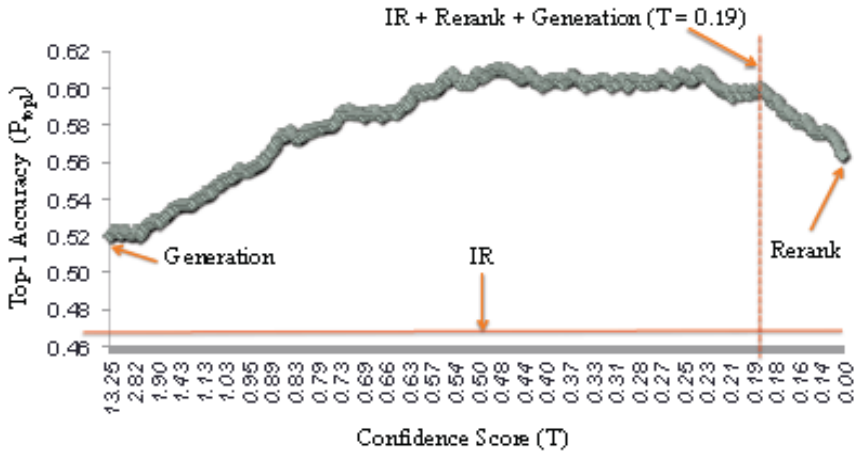

Figure 3.4.1: Accuracy of candidate Approaches

And finally considering the AIML confidence with the hybrid model confidence we will get the final confidence. From them we will generate the final output. The context problem of hybrid model will reduce after attaching the AIML pattern matching [12]. As far we consider the model. Some mathematical issues will be clear after implementation, like the complexity and efficiency because those values won't come without implementation.

3.5.1 Software Specification

- Pycharm
- Python 3
- Anaconda 3

3.5.2 Package List

- AIML
- Tenserflow
- Scikit
- Webserversocket

CHAPTER 4

Experimental Results and Discussion

4.1 Introduction

The difficulty of evaluation is intrinsic as each conversation is interactive, and the same conversation will not occur more than once; one slightly different answer will lead to a completely different conversation; moreover, there is no clear sense of when such a conversation is "complete" (Yu, 2016). So for the evaluation, we decided to compare our system with previous existing chatbots.

4.2 Experiment Result

As a result we build an automatic chatting system combining hybrid model with AIML pattern matching which will be able to produce relative answers of questions. The result will perform better the existing hybrid model, that why we calling it the extended version of hybrid model.

4.3 Descriptive Analysis

Since we do not find a suitable database for this purpose so we the AIML pattern matching dataset and converted it into text for further use in English. Our work addresses the problem of developing an English chatbot in spite of required language processing tools like Parts Speech Tagger, Tokenizer etc. We solve the problem of lack of required tools by selecting a language independent platform and choosing a retrieval based model to serve the purpose. In the case of the evaluation, we face the same problem since this work is the pioneering work in the English Conversational Agent there is no benchmark for the evaluation of the chatbot in English. So we are left with an option of comparing it with any English chatbot. Therefore, we compare EME with two popular chatbots which are Neural Conversational Model (NCM) and the Cleverbot. To ensure a fair comparison, the questions asked in English is an exact translation of the questions asked in English. NCM is a neural based open domain generative based chatbot where ours is a retrieval

based closed domain one. In the experiments, our chatbot gives the similar response as the NCM. Cleverbot is a chatbot hosted on a website that learns from the user and answers based on the conversation history which is quite similar to our work. It is interesting to observe that our system outwitted Cleverbot in many cases[13]. We examine EME by inputting unknown sentences as a test case and find EME to produce random answers to the questions. But it stores the reply given by the user to the unknown sentences and later on replies the same.

EME is able to reply in real time like others. Since it can take input in English and can give a response in English so we can say that the pattern matching algorithm is functioning well. Our chatbot replies in syntactically correct English and it is free from spelling mistakes and any sort of grammatical mistakes. It makes some punctuation mistake which can be improved in future. From the samples, we can see our English chatbot EME gives a similar reply like Neural Conversational Machine (NCM) whereas in comparison with a related work Cleverbot our EME has outwitted it in most of the instance. Amongst the many limitations, the lack of a coherent personality makes it difficult for our system to pass the Turing test.

4.4 Summary

Our work provides us with a conversation corpus in English. This generation of the corpus has many advantages. Corpus is considered as a basic resource for language analysis and research for many foreign languages. This reflects both ideological and technological change in the area of language research. This change is probably caused due to the introduction of computer and corpus in linguistic research which, as a result, have paved out many new applications of language (and linguistics) in the fields of communication and information exchange. The use of English language corpus for various technological developments as well as for various linguistic studies in the English language can open up many new avenues for us. This corpus can be useful for producing many sophisticated automatic tools and systems, besides being good resources for language description and theory making.

CHAPTER 5
Conclusion

5.1 Summary of the Study

After the finishing of this project we are able to come on some epilogues. First of all we are now aware of the limitations. The data analysis of the system is a very crucial one. On the other hand, this research also provides us the current condition of chatbots all over the world. This chatbot may be used in various fields.

5.2 Conclusion

A chatbot is a virtual assistant which is a rudimentary form of artificial intelligence software that can mimic human conversation. Users can easily type their query and retrieve information. From ALICE and AliMe we can gain information and they can also be used for industrial purpose. In ALICE it uses simple and powerful technique as well as it can store large amount of QA pair. On the other hand AliMe has the ability to use existing dataset and by using three different models which makes a hybrid model it generates best possible answers, but AliMe uses more complex way than ALICE. Near future this could be the revolutionary way for creating an AI open domain chatbot where machine learning algorithms can easily be implemented for best and generous outcome. The extended version can bring the revolution in the world of chatbot. Though we think that this will be able to remove the context problem of the existing hybrid model but still there are some places where we can work or we can call it as lacking. Personification is one of these problems where we can work more. We hope near future we will find a way to solve it.

5.3 Recommendations

We complementing and helping each other from the beginning of the work and continued the same work till the end of the project. That was an amazing experience for the group member's. It was a great experience work in a team like this. The team work helps us to

learn so many things that teach us how to divide the work in a team to build up a complete project or work.

5.4 Implication of Further Study

The obtain result of this research on chat bot is carried out in this paper. This experience of our learning led us to some suggestions for the following future research:

I. In this paper, we have introduced a text based chatbot application in able to interact with users. This chatbot can answer for queries in the textual form of user input. For this purpose, Api.ai has been used. The chatbot can answer only those questions which have the answer in its dataset. So, to increase the knowledge of the chatbot, we can add the AIML, Weather Forecasting Department, Sports, News, Government Services and a lot more. In such cases, the user will be able to talk and interact with the chatbot in any domain. Using the AIML like Weather, Sports, News and Government Services. The chatbot will be able to answer the questions outside of its dataset and which are currently happening in the real world.

II. Chatbots on social media offer a new opportunity to provide individualized attention to users at scale and encourage interactions between users and brands, which cannot only enhance brand performance but also help users gain social information and economic benefits. Future studies can be designed to understand how chatbots affect the relationship between users and brands in a long term.

III. Our future work will be targeted primarily towards more up gradation of the models and introducing more automated features for sensor based message automation system.

APENDICES:

Part A: Reflection of Research

This appendix described the whole project reflection. We are getting a little time for working with any other project but in this project we got a lot of time to do so unique. We think a lot about this project, this thinking need more time to grow this idea. This is a unique idea which got some new and interesting features. We complementing and helping each other from the beginning of the work and continued the same work till the end of the project. That was an amazing experience for the group member's. It was a great experience work in a team like this. The team work helps us to learn so many things that teach us how to divide the work in a team to build up a complete project or work. We meet together on meeting discussed about the project sitting together and also discussed new ideas of every person to make this thing better.

Part B: Related Issues

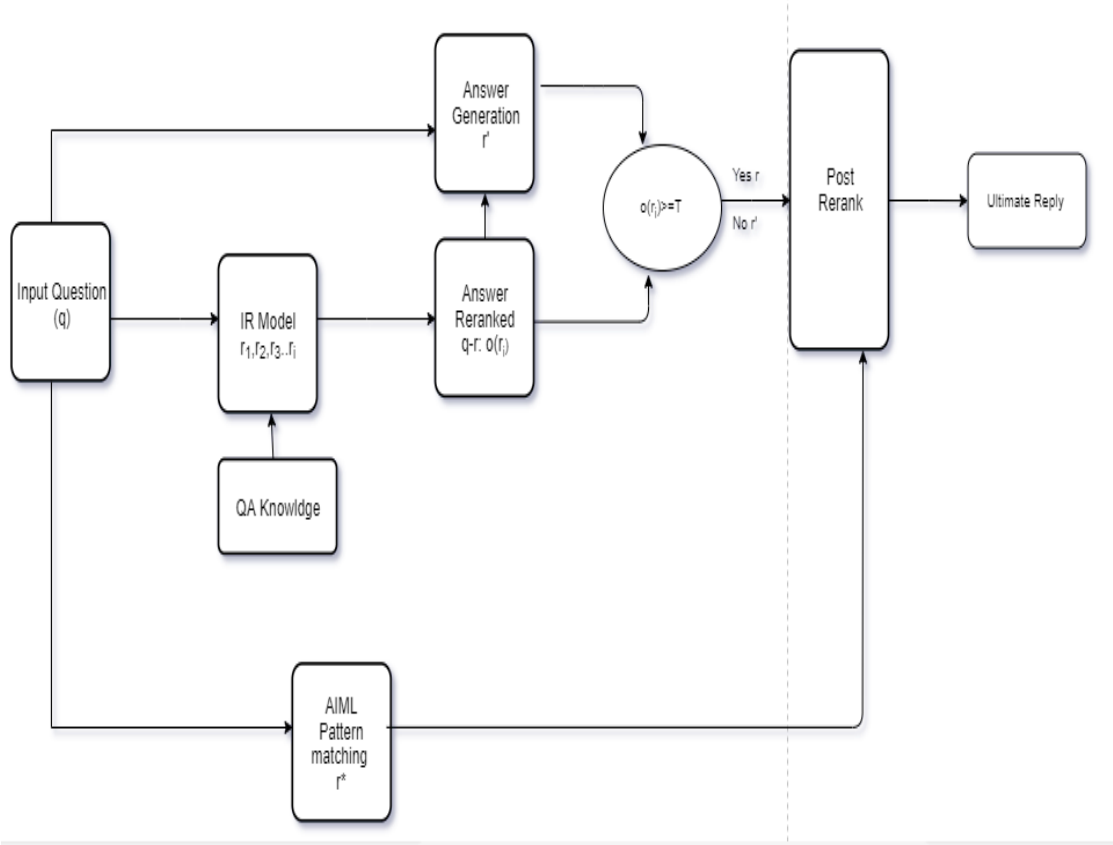

Figure 3.2.1: Flowchart of the Proposed System

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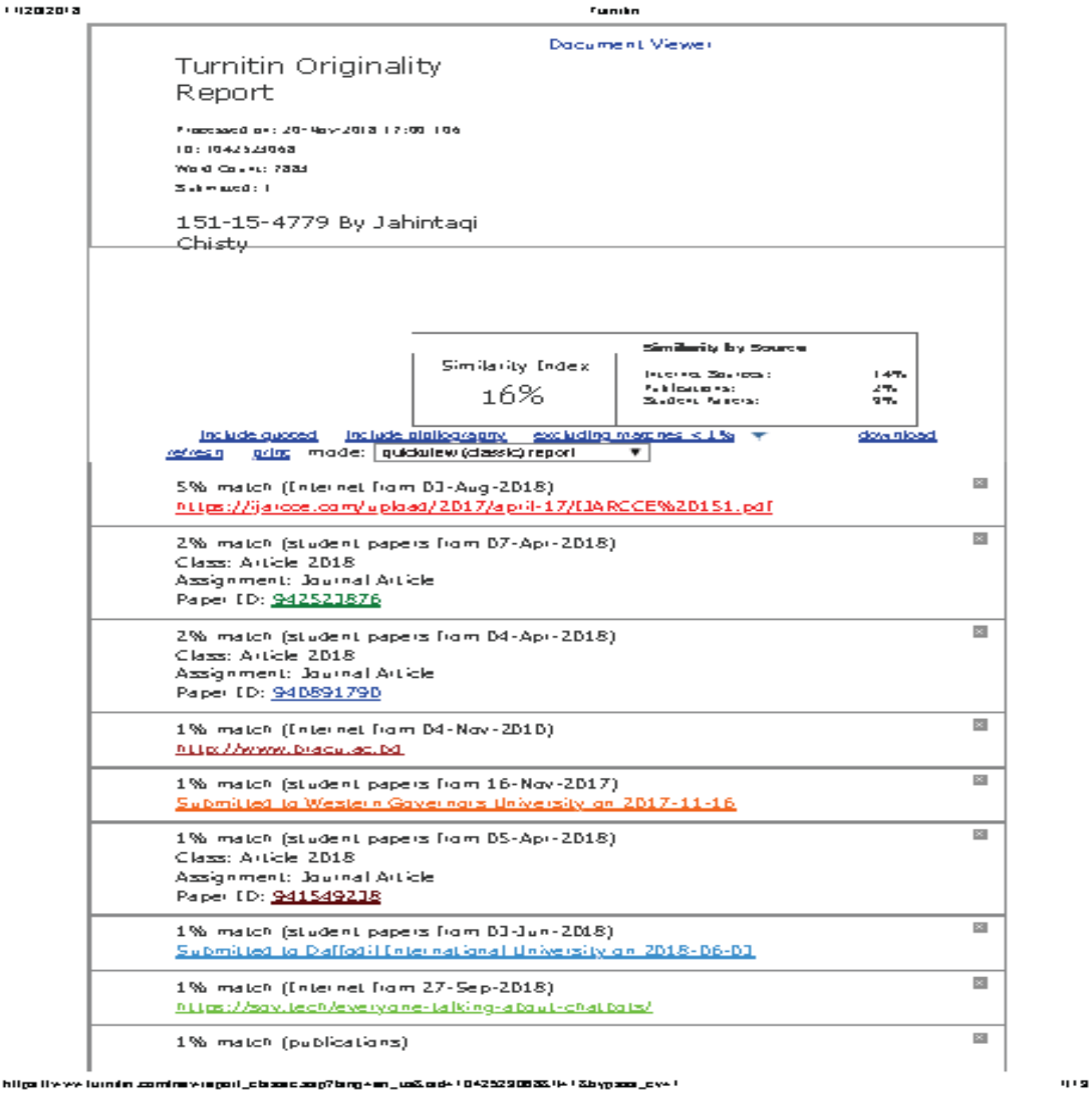

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