



VIRTUAL ASSISTANT FOR SCTCE



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INTRODUCTION

- A chatbot is an instant messaging account that is able to provide services using instant messaging frameworks with the aim of providing conversational services to users in an efficient manner.
- Before starting to work on such services, the fundamental points to be kept in mind are:
 - Domain Knowledge - What does a user expect this bot to understand?
 - Personality - What tone or vocabulary does the bot employ?

DOMAIN: College related queries

PERSONALITY: Assistant bot

- Chatbots are currently used to answer financial queries, provide customer support, diagnose healthcare issues, and even offer counseling. They're already starting to make an impact on education and corporate learning.

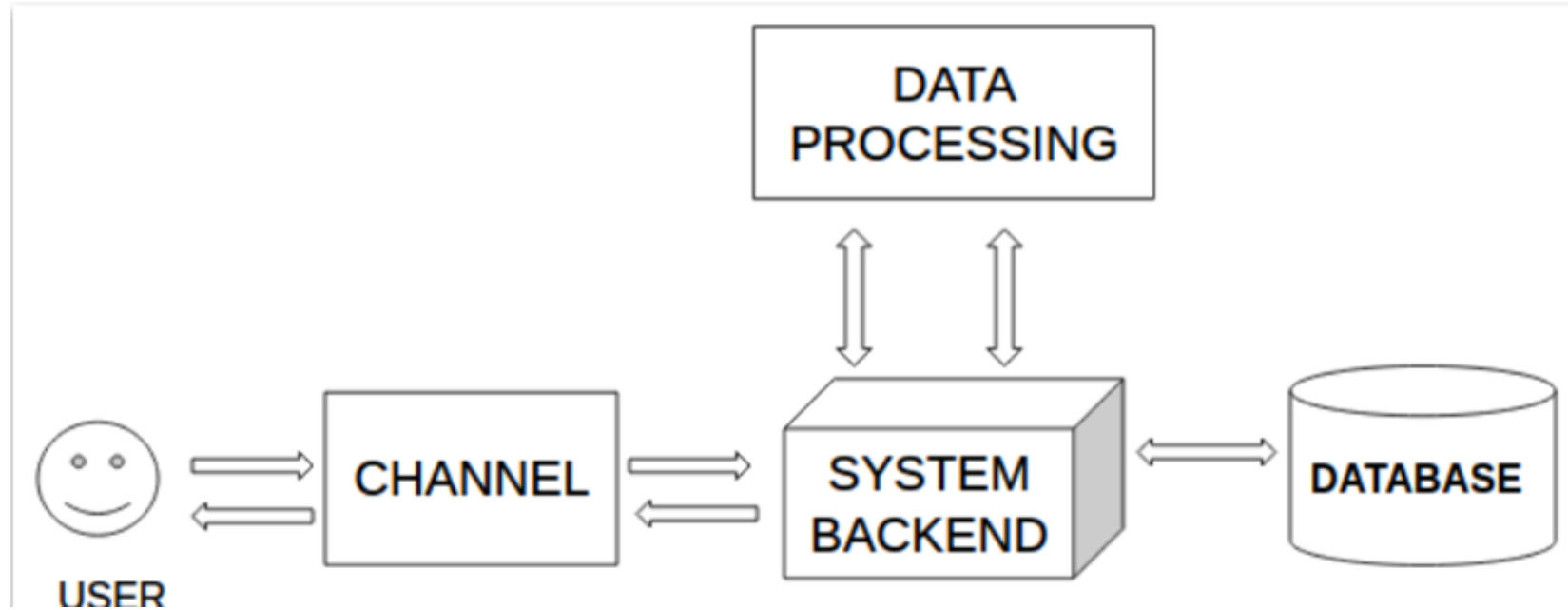
NEED FOR PROJECT

- Lack of information to students who reside outside the city regarding the college
- Lack of proper communication system to clear doubts and queries
- Need to read through the entire website content to get the required information
- Lack of knowledge regarding in campus programs and things.

PROBLEM STATEMENT

To create a virtual assistant to guide students who wish to take admission in the college.

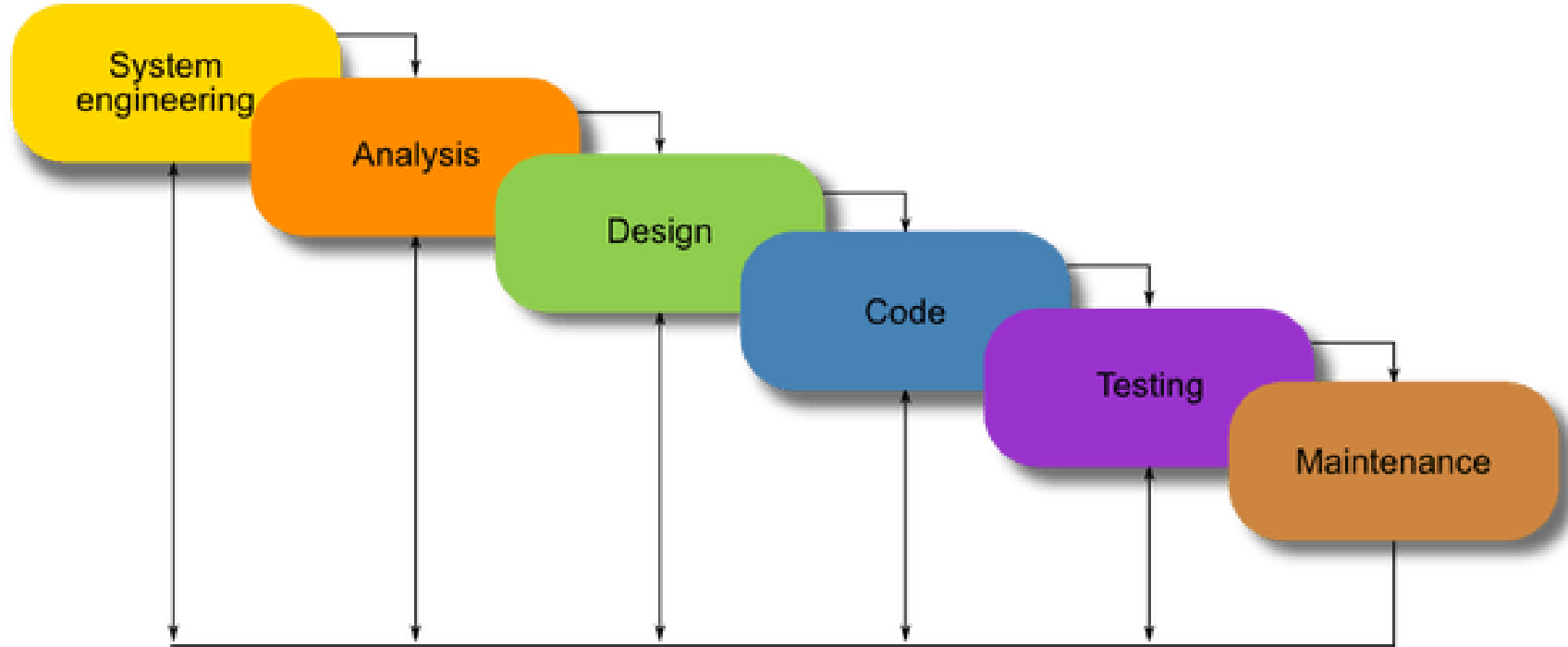
ARCHITECTURE



METHODOLOGIES

Waterfall Model

- Each phase of the model has specific deliverables and a review process
- Phases are completed one at a time
- Works well for projects where requirements are very well understood
- Clearly defined stages
- Easy documentation
- Technology can be well understood



DEVELOPMENT CYCLE

Requirement Analysis Phase

- 1) Survey carried out with in which students from different departments of different years were asked about the kind of questions they had in mind before joining the college.
- 2) Manipal University project was roughly studied.
- 3) For data collection, a Google forms link was distributed amongst all years asking them to fill the possible query questions.

Design Phase

- 1) Architecture of the bot was constructed and the required components decided upon
- 2) Required resources/software chosen as per the requirements from the previous phase
- 3) Data model representation chosen

Implementation Phase

- 1) Tasks assigned to both group members and strategy of work devised
- 2) Application implementation carried out in parts

ALGORITHM

Semantic similarity between two sentences is carried out as below,

- Each sentence is divided into a list of tokens
- The divided sentence can implement bigram set
- After getting the divided sentence, it is counted
- Choose the pattern with the highest sentence similarity measure

$$\frac{\zeta(s_1 \in s_2) \cup \zeta(s_2 \in s_1)}{\zeta(s_1) \cup \zeta(s_2)} \quad (8)$$

The symbol of ζ is count of the sentence or string that is symbolized as s . The used method to compute the semantic similarity between two sentences could be written as bellow,

- Each sentence is divided into a list of tokens
- The divided sentence can implement bigram set [11]
- After getting the divided sentence, it is counted and applied the equation (8)

For example this method can be written as bellow,

$s_1 = \text{"burung"}$

$s_2 = \text{"burrungg"}$

so s_1 and s_2 can be divided into bigram set as

$s_1 = \{\text{"bu"}, \text{"ur"}, \text{"ru"}, \text{"un"}, \text{"ng"}\} \approx 5$

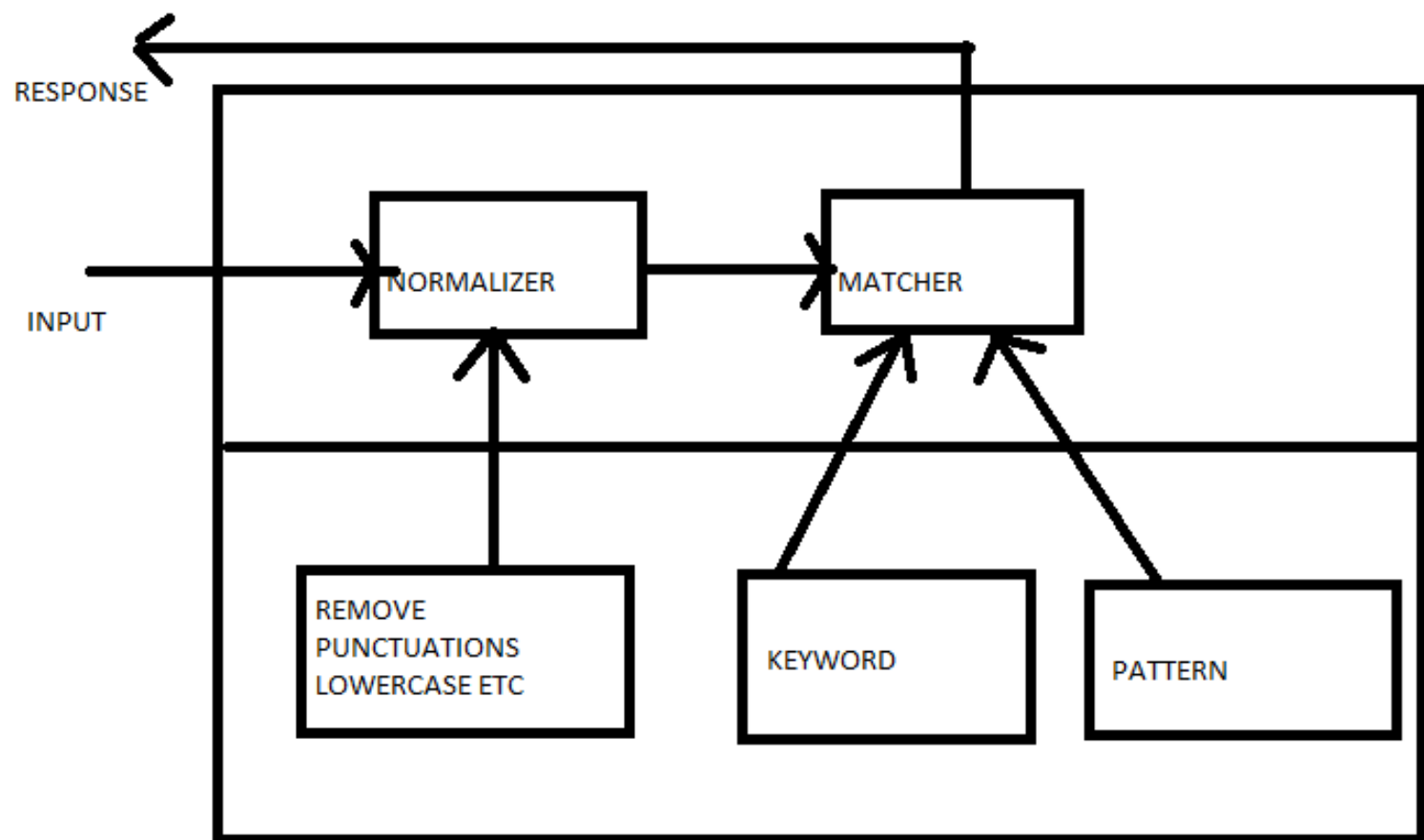
$s_2 = \{\text{"bu"}, \text{"ur"}, \text{"rr"}, \text{"ru"}, \text{"un"}, \text{"ng"}, \text{"gg"}\} \approx 7$

$s_1 \in s_2 = \{\text{"bu"}, \text{"ur"}, \text{"ru"}, \text{"un"}, \text{"ng"}\} \approx 5$

$s_2 \in s_1 = \{\text{"bu"}, \text{"ur"}, \text{"ru"}, \text{"un"}, \text{"ng"}\} \approx 5$

Thus the similarity score for these sentences is obtained as follow,

$$\frac{5 \cup 5}{5 \cup 7} \approx \frac{10}{12} \approx 0,83333$$



We use NLTK (natural language toolkit) for 2 things:

- breaking up sentences into words (**tokenization**): “have a nice day” tokenizes to a list of individual words: “have”, “a”, “nice”, “day”
- reducing words to their stem (**stemming**): “have” stems to “hav” which allows it to be matched with “having” (same stem)

There are various stemmers that we can use, for today we’ll use the Snowball stemmer.

Each word from the given sentence is tokenized, stemmed, and lower cased, this is consistent with the transforms we applied to the corpus data. In other words: *our input data is transformed consistently with our training data.*

BAG OF WORDS

- A bag-of-words model, or BoW for short, is a way of extracting features from text for use in modeling,
- The approach is very simple and flexible, and can be used in a myriad of ways for extracting features from documents.
- A bag-of-words is a representation of text that describes the occurrence of words within a document. It involves two things:
 1. A vocabulary of known words.
 2. A measure of the presence of known words.
- The model is only concerned with whether known words occur in the document, not where in the document.

User Interface

- Chatbot to be embedded onto the website of the college
- Official website of SCTCE : www.sctce.ac.in
- HTML and CSS used to build the interface model
- Embed into website in such a way that as soon as the home page opens up the bot button is visible and accessible to the users
- User can ask the required query in the text box provided and press the Send button

DATASET

- Google forms created and distributed amongst students to obtain queries from them
- Queries and responses held in a single file
- JSON format used to store data
- Tags and contexts used to differentiate queries related to different subjects



Google Forms



TECHNOLOGY STACK



FRONT END

HTML and CSS used to build the front end



BACK END

Python 3 used to build the back end



Flask

WEB INTEGRATION

To connect front end to the back end

RESULT

- Chatbot is implemented to solve the academic related queries of the users.
- The chatbot is based on sentence similarity algorithm for SCTCE.
- It helps the student to get information regarding college without going through the website content and thus making human work less.
- Information regarding activities happening inside campus and other academic information provided.

CONCLUSION

- Chatbots are capable of accessing a broad array of information which can be made use of in the education domain to provide students with the necessary information.
- Help students to fetch information like availability of services, college environment, updates regarding activities happening inside the campus and other academic information
- Our chatbot has a general processing structure to adapt to the variable environment.
- Makes use of sentence similarity algorithm

REFERENCES

1. Chatbot for University Related FAQs Bhavika R. Ranoliya Nidhi Raghuwanshi and Sanjay Singh Department of Information and Communication Technology Manipal University Published in 2017 International Conference on Advances in Computing, Communications and Informatics
2. Chatbots and Conversational Agents: A Bibliometric Analysis by H.N.Io, C.B.Lee Published in 2017 IEEE International Conference on Industrial Engineering and Engineering Management
3. An E-business Chatbot using AIML and LSA Thomas N T Amrita Vishwa Vidyapeetham University published in 2016 Intl. Conference on Advances in Computing, Communications and Informatics (ICACCI),
4. B A Shawar and E. Atwell, “Chatbots. Are they really useful?” LDV Forum, vol., 22,pp 29-49 2007



THANKYOU



Example of the Bag-of-Words Model

Let's make the bag-of-words model concrete with a worked example.

Step 1: Collect Data

Below is a snippet of the first few lines of text from the book "[A Tale of Two Cities](#)" by Charles Dickens, taken from Project Gutenberg.

“ *It was the best of times,
it was the worst of times,
it was the age of wisdom,
it was the age of foolishness,*

For this small example, let's treat each line as a separate "document" and the 4 lines as our entire corpus of documents.

Step 2: Design the Vocabulary

Now we can make a list of all of the words in our model vocabulary.

The unique words here (ignoring case and punctuation) are:

- “it”
- “was”
- “the”
- “best”
- “of”
- “times”
- “worst”
- “age”
- “wisdom”
- “foolishness”

That is a vocabulary of 10 words from a corpus containing 24 words.

Step 3: Create Document Vectors

The next step is to score the words in each document.

The objective is to turn each document of free text into a vector that we can use as input or output for a machine learning model.

Because we know the vocabulary has 10 words, we can use a fixed-length document representation of 10, with one position in the vector to score each word.

The simplest scoring method is to mark the presence of words as a boolean value, 0 for absent, 1 for present.

Using the arbitrary ordering of words listed above in our vocabulary, we can step through the first document ("*It was the best of times*") and convert it into a binary vector.

The scoring of the document would look as follows:

- "it" = 1
- "was" = 1
- "the" = 1
- "best" = 1
- "of" = 1
- "times" = 1
- "worst" = 0
- "age" = 0
- "wisdom" = 0
- "foolishness" = 0

As a binary vector, this would look as follows:

```
1 [1, 1, 1, 1, 1, 1, 0, 0, 0, 0]
```

The other three documents would look as follows:

```
1 "it was the worst of times" = [1, 1, 1, 0, 1, 1, 1, 0, 0, 0]  
2 "it was the age of wisdom" = [1, 1, 1, 0, 1, 0, 0, 1, 1, 0]  
3 "it was the age of foolishness" = [1, 1, 1, 0, 1, 0, 0, 1, 0, 1]
```

All ordering of the words is nominally discarded and we have a consistent way of extracting features from any document in our corpus, ready for use in modeling.

Managing Vocabulary

As the vocabulary size increases, so does the vector representation of documents.

In the previous example, the length of the document vector is equal to the number of known words.

You can imagine that for a very large corpus, such as thousands of books, that the length of the vector might be thousands or millions of positions. Further, each document may contain very few of the known words in the vocabulary.

This results in a vector with lots of zero scores, called a sparse vector or sparse representation.

Sparse vectors require more memory and computational resources when modeling and the vast number of positions or dimensions can make the modeling process very challenging for traditional algorithms.

As such, there is pressure to decrease the size of the vocabulary when using a bag-of-words model.

There are simple text cleaning techniques that can be used as a first step, such as:

- Ignoring case
- Ignoring punctuation
- Ignoring frequent words that don't contain much information, called stop words, like "a," "of," etc.
- Fixing misspelled words.
- Reducing words to their stem (e.g. "play" from "playing") using stemming algorithms.

A more sophisticated approach is to create a vocabulary of grouped words. This both changes the scope of the vocabulary and allows the bag-of-words to capture a little bit more meaning from the document.

In this approach, each word or token is called a "gram". Creating a vocabulary of two-word pairs is, in turn, called a bigram model. Again, only the bigrams that appear in the corpus are modeled, not all possible bigrams.

For example, the bigrams in the first line of text in the previous section: “It was the best of times” are as follows:

- “it was”
- “was the”
- “the best”
- “best of”
- “of times”

A vocabulary then tracks triplets of words is called a trigram model and the general approach is called the n-gram model, where n refers to the number of grouped words.

Often a simple bigram approach is better than a 1-gram bag-of-words model for tasks like documentation classification.