ABSTRACT

A Virtual Assistant is a software or a device that constantly interacts with the user by responding to the queries asked by a user as input. Virtual Assistant usually takes input as text and output as text, input as speech and output as speech, input as text and output as speech, and vice versa.

In this project, we tried to implement a virtual assistant which accepts both text and speech as input and provides output in text or speech based on user requirement. We have used Natural Language Processing (NLP) for data processing and Convolutional Neural Networks (CNN) for fetching the output from the provided dataset. We have used JSON (JavaScript Object Notation) dataset, which is faster, easy to use, has better schema support. This model is trained with the same dataset.

The trained model is integrated with the web page using Flask. Web page is built using HTML, CSS, JavaScript. After successful integration user can hear the response to his query from this Assistant.

Keywords: Natural Language Processing (NLP), Convolutional Neural Networks (CNN), JSON (JavaScript Object Notation), Flask.

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CHAPTER 1
INTRODUCTION

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION:

In this digital world, everyone has access to digital devices, and all are using the internet widely. Many Organizations are having online platforms for different purposes mainly to connect with their customers, but all the users are not familiar with usage of digital platforms. Someone should answer their queries now, A Virtual Assistant come into the picture.

Virtual Assistant is a software or a product that constantly interacts with users by responding to the queries of the user. It can be integrated with any website and can effectively used to solve queries of users. They help organizations in enhancing user experience and reduces the amount spent on customer support executive.

It takes query as an input in text or voice and responds in text or voice based on user requirement. This is powered with deep learning algorithm, CNN so that it would respond faster than usual.

Built CNN model is used for Travel Planner when user enters the name of the place listed in dataset. Dataset contains 85 most visited places in Telangana, when user enters the place which is not in the list then model asks to user enter the name in the dataset.

1.2 PROJECT OBJECTIVE:

Our objective is to implement virtual assistant using deep learning algorithm, Convolutional Neural Networks (CNN) which enables model to respond the user. Primary objective is enabling user input as text and speech. And displaying output on the screen and speaking out the text displayed as output. Later integrating this model with an web application which acts as a user interface.

1.3 THESIS ORGANISATION:

Chapter 1:

Deals with Introduction and objectives of the project, organization of thesis.

Chapter 2:

Deals with Literature survey.

Chapter 3:

Deals with explanation of Virtual Assistant.

Chapter 4:

Discusses about Natural Language Processing which is used in the project.

Chapter 5:

Discusses about Convolutional Neural Networks which is used in the project.

Chapter 6:

Explains about the tools and technologies used in the project.

Chapter 7:

In depth explanation of JSON dataset.

Chapter 8:

Explains the methodology and workflow of the project.

Chapter 9:

Discusses about the results of our project.

Chapter 10:

Discusses about the conclusion and future scope.

REFERENCES:

All the references are listed here.

ANNEXURE

CHAPTER 2
LITERATURE SURVEY

CHAPTER 2: LITERATURE SURVEY

2.1 Literature Survey:

1) **Jarvis - A Virtual Assistant based on Artificial Intelligence**

Authors: Dr. M. Sharada Varalakshmi, Dr. P. Lavanya, Sai Prakash Reddy.

This paper focuses on the effective way of using speech recognition. The main intention of this paper is to reduce the noise while taking the input. The author used Triple state Portrayal for differentiating input based on the amplitude level of the input. This can be achieved by Well's Method. The extraction of the best parametric portrayal of the acoustic signs is a significant assignment to deliver the superior acknowledgment execution.

2) **A Review Paper on Smart Personal Assistant**

Authors: Yogendra Kumar Sharma, Neeraj Sharma.

This paper explains different scenarios where Virtual Assistants can be used in daily life. This paper describes the real-time applications of Virtual Assistants. It also explains about assistants like AIVC (Alice), CORTONA, DRAGON MOBILE ASSISTANT, GOOGLE NOW, HOUND, ADVANCE PERSONAL ASSISTANT. It also discusses about the architecture of the virtual assistants mentioned above. It also describes about the technologies used in each of the above applications. Personal Assistant can used anywhere.

3) **Critical Literature Review on Chatbots in Education**

Authors: Hephzibah Thomas.

This paper explains about utilization of chatbots in education. It describes about different learning techniques/methods like Customised learning: Basically, customised learning is having personal tutor for individual student, Spaced Interval Learning: This technique helps students in polishing the content studied before. Student teacher interaction: MOOC is the use of virtual way in tutoring. It also discussed about Integration of chatbots to classrooms. Later discussed about different methods of online education. It mentions that chatbot can also be used in effective way to learn new languages. In conclusion paper

describes that in this digital era using chatbots for learning purpose is very essential. There are also some limitations, but they can be neglected.

4) **Implementation of Virtual Assistant with Sign Language using Deep Learning and Tensor flow.**

Authors: Vani Valsaraj.

This paper primarily uses Virtual Assistant for effective communication between normal people and disabled. The model is built using Convolutional Neural Networks which provides utmost accuracy. This model takes images of signs as input and later processed into text format and displayed on screen.

5) **The Alexafication of Adult Social Care: Virtual Assistants and the Changing Role of Local Government in England.**

Authors: James Wright.

This paper discusses about the role Virtual Assistants in changing the Local Government responsibilities in England. It also talks about Amazon Alexa and how I can be used in medical, education, entertainment, and ecommerce. Virtual Assistant will play a major role in social life. Later discussed about results which include interview of the eight people in which seven out of eight prefer Alexa enabled devices.

CHAPTER 3
VIRTUAL ASSISTANT

CHAPTER 3: VIRTUAL ASSISTANT

3.1 INTRODUCTION:

A Virtual Assistant is a device or software which provides support services to the organisation in solving user queries. They may also assist with any other elements required by the business.

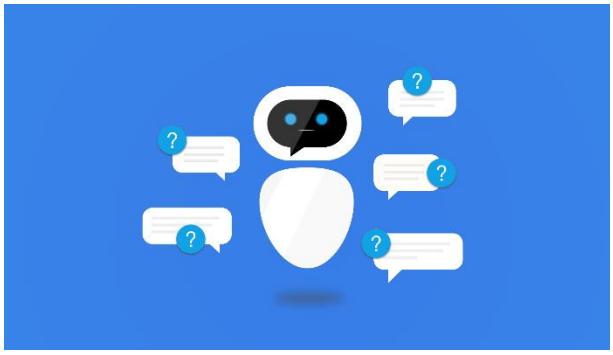


Fig 3.1 Virtual Assistant

A Virtual Assistant can do anything that support staff might do. There are some limitations, but technology is increasing, and offering ways to work around those limitations. For example, they may not be able make tea, lunch, coffee for you but they can place an order for you through a food delivery service.

Virtual Assistant is not limited to clerical work. They can also be used for assistance in marketing, social media, web design, online teaching, virtual meetings, and many other domains.

3.2 TYPES OF VIRTUAL ASSISTANTS:

There are many types of virtual assistants some of them are social media Virtual Assistant, Real Estate VA, Virtual research Assistant, Virtual Administrative Assistant, E-Commerce Virtual Assistant, Data Entry VA, Virtual Bookkeeping Assistant, Virtual Marketing Assistants.

3.3 FEATURES:

Regardless, where we are using Virtual Assistant. It should possess following features:

1) Robustness.
2) Flexibility.
3) Resource efficient.

Robustness:

An ideal Virtual Assistant is expected to be run in the background without human intervention continuously. It should respond to the user instantly and all the time.

Flexibility:

An ideal VA should be flexible enough to deal with huge number of inputs from different users.

Resource efficient:

An ideal VA should use minimum resources as much as possible. It should consume less data and answer maximum no of possible queries.

3.4 APPLICATIONS:

Virtual Assistants have wide range of applications in different domains.

1) Calendar Management
2) Email Management
3) Phone Tasks
4) Travel
5) Business Development
6) Management
7) Accounting
8) Personal engagements
9) Operations

Calendar Management:

VA can be used for managing your calendar, both personal and professional. VA can used in Coordinating and scheduling calls and appointments, confirm appointments, provide reminders about calls and appointments, Reschedule calls and appointments.

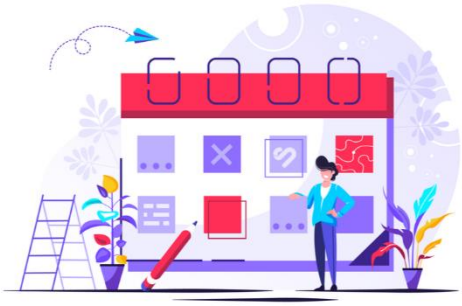


Fig 3.2 Calendar Management using VA.

Email Management:

VA can be used in managing email functions like Screen emails, add people to contacts, Update people's info to contacts, Add contacts to CRM.

Fig 3.3 Email Management using VA.

Phone Tasks:

VA can be used in phone interactions, VA can perform certain tasks like Perform light receptionist duties, transcribe voicemails.

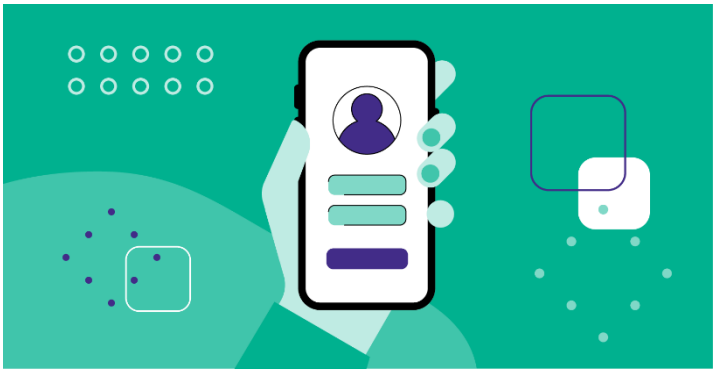


Fig 3.4 Phone Tasks using VA.

Travel:

VA can be used in travelling, for arranging flights and hotels. VA can perform tasks like Research flights, Research hotels, Book flights and hotels, Research transportation options, Book transportation, arrange for events, Suspend newspaper or mail.

Fig 3.5 Virtual Assistant for Travel.

Business Development:

VA can used in market research and can understand market trends. VA can perform certain tasks like Research leads on LinkedIn, Find an email address, Design presentations.

Management:

VA can be used in Organisation's management. VA can perform certain tasks like Assemble reports, help to recruit employees.

Accounting:

VA can be used in handling accounts. VA can perform tasks like maintain the books, create, and send invoices, chase down payments.

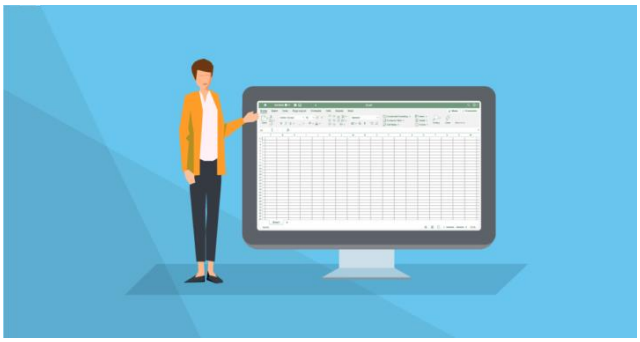


Fig 3.6 Accounting using VA.

Personal engagements:

VA can be used for many personal engagements like Make personal restaurant reservations, make purchases, Research, send gifts, manage the logistics for your hobby, track down problem orders, manage the family calendar, schedule medical appointments, pay personal bills, call stores to get information.

Fig 3.7 VA for Personal Engagements.

Operations:

VA can be used in operations like Fill out online forms, take notes from webinars, convert files, conduct research, set up projects in your project management system, handle file management, schedule social media, proofread and edit letters, blogs and presentations, maintain a virtual assistant manual.

Fig 3.8 VA for Operations.

3.5 ADVANTAGES:

- Limited Equipment needed.
- Minimal Start-up cost.
- Reduced labour costs.
- Increased productivity.

3.6 DISADVANTAGES:

- Security could be an issue.
- Voice recognition may not be perfect, little noise may create disturbances in output.
- Initial cost could outweigh savings.

CHAPTER 4
NATURAL LANGUAGE PROCESSING

CHAPTER 4: NATURAL LANGUAGE PROCESSING

4.1 INTRODUCTION:

Natural Language Processing is acronym for NLP. It refers to AI method to build communication with a system using natural language. Overall goal is to turn natural language into data analysis of NLP.

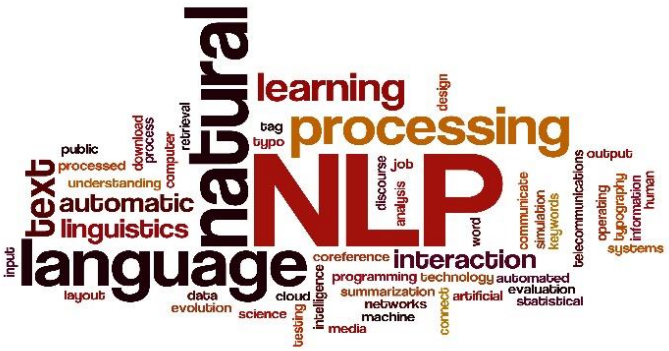


Fig 4.1 Natural Language Processing.

COMPONENTS:

NLP is divided into two components Natural Language Understanding (NLU) and Natural Language Generation (NLG).

Natural Language Understanding:

NLU maps the given input into natural language to useful representation and analysing those aspects of the language. NLU is more complex than NLG.

Natural Language Generation:

NLG generates the phrases, sentences in the form of natural language from internal system.

4.2 STEPS INVOLVED IN NLP:

Basically, six steps are involved in natural language processing.

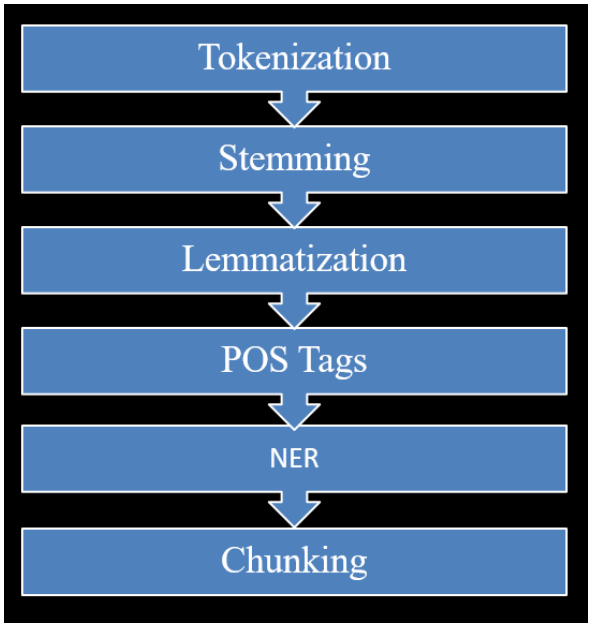


Fig 4.2 Steps involved in NLP.

STEP 1 TOKENIZATION:

Tokenization is the first step in NLP. It is the process which converts sentences into tokens. For example: Consider the sentence "Virtual Assistant is the most useful application in the modern world.", In above sentence tokens are 'Virtual', 'Assistant', 'is', 'the', 'most', 'useful', 'application', 'in', 'modern', 'world'. Here 'the' is repeated twice but it is taken as one token.

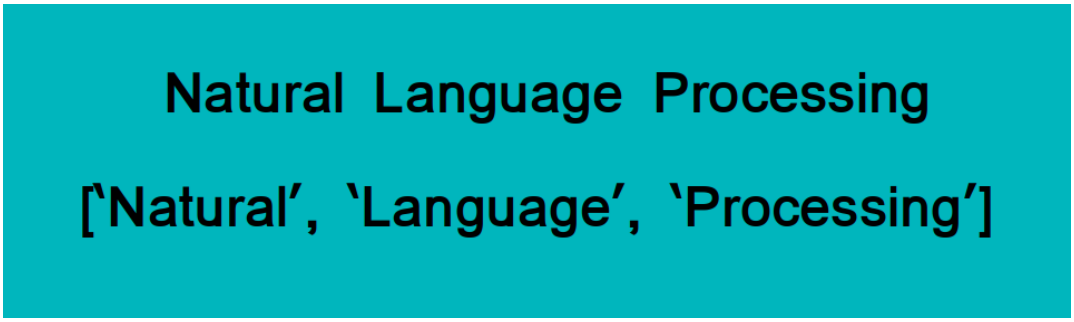


Fig 4.3 Tokenization in NLP.

STEP 2 STEMMING:

Stemming is the second step in NLP. It is the process which converts words into base or root form. For example: Consider the words, 'Affects', 'Affection', 'Affections', 'Affected' and root word will be 'Affect'.

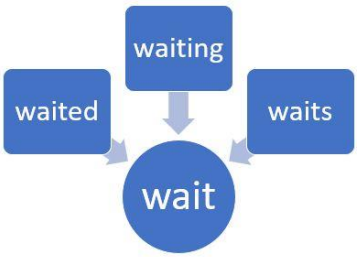


Fig 4.4 Stemming in NLP.

STEP 3 LEMMATIZATION:

Lemmatization is the third step in NLP. This is very much like stemming. It groups together different inflected forms of a word called Lemma. For Example: Lemmatiser should map the words ‘gone’, ‘going’, ‘went’ to ‘go’.

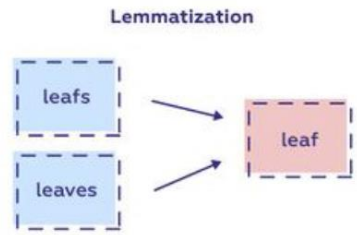


Fig 4.5 Lemmatization in NLP.

STEP 4 POS TAGS:

POS TAGS is fourth step in NLP. POS TAGGING stands for “Parts-of-Speech Tagging”. POS Tagging is process in which words are assigned with labels called as tags. It uses dictionary to assign each word a list of potential Parts-of-Speech.

Fig 4.6 POS Tagging in NLP.

STEP 5 NER:

NER is fifth step in NLP. NER stands for "Name Entity Recognition". NER recognises different words into categories. Some of the categories are "MOVIE", "PERSON", "ORGANISATION", "LOCATION", "QUANTITIES", "MEASUREMENT".

Fig. 4.7 Name Entity Recognition in NLP.

STEP 6 CHUNKING:

Chunking is last step in NLP. Chunking process involves picking up the pieces of information and making them into bigger pieces. Those bigger pieces are called as Chunks.

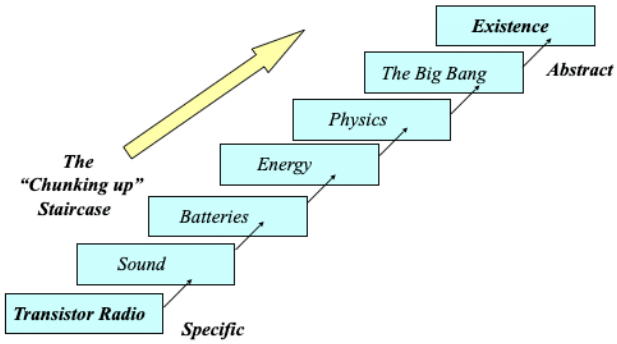


Fig 4.8 Chunking in NLP.

NLTK:

NLTK stands for "Natural Language Tool Kit". It is a library provided by python to perform Natural Language Processing. NLTK is widely used in implementing Natural Language Processing.

Fig 4.9 Python NLTK.

4.3 APPLICATIONS:

- Sentimental Analysis: Twitter, Facebook, Instagram.
- Chatbot: E commerce, Medical, Online Bookings.
- Speech Recognition: Virtual Assistant, Alexa, Siri.
- Spell checking: Grammarly, Autocorrect in WhatsApp.
- Keywords Check: Recruiting for Organisation, Documentation.

CHAPTER 5

CONVOLUTIONAL NEURAL NETWORKS

CHAPTER 5: CONVOLUTIONAL NEURAL NETWORKS

5.1 INTRODUCTION:

A Convolutional Neural Network is acronym for CNN. It is also called as convNet. CNN is a Deep learning algorithm which is usually applied to analyse visual images. It uses a technique called Convolution. CNN automatically detects the important features with any human interference. It learns the key features for each class by itself.

CNN is combination of convolutional layers and neural networks. CNN consists of layers. It contains layers that are convolutional layers, full connected layers, pooling layers, dense layer, hidden layer. CNN reduces the data size of the input by using filters resulting in feature maps.

5.2 CONVOLUTION:

Convolutional Layers are the major building blocks used in CNN. A convolution is the application of filter to input those results into activation. Repeated application of the filter to an input results in feature map. CNN has ability to a learn large number of filters in specific to dataset used for training.

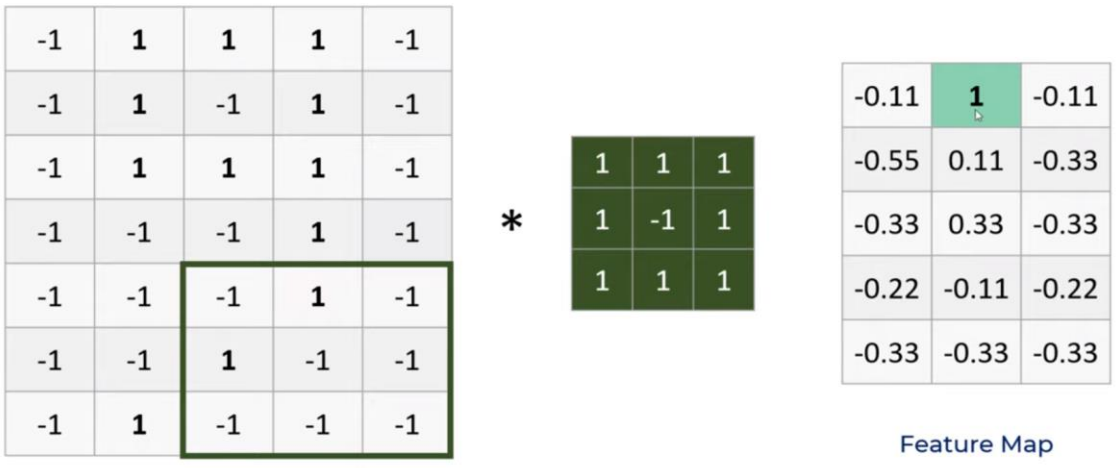


Fig 5.1 Applying filter to input.

In the above example filter applied is loopy pattern detector which results in feature map whose size much smaller than actual input. This will make computation faster.

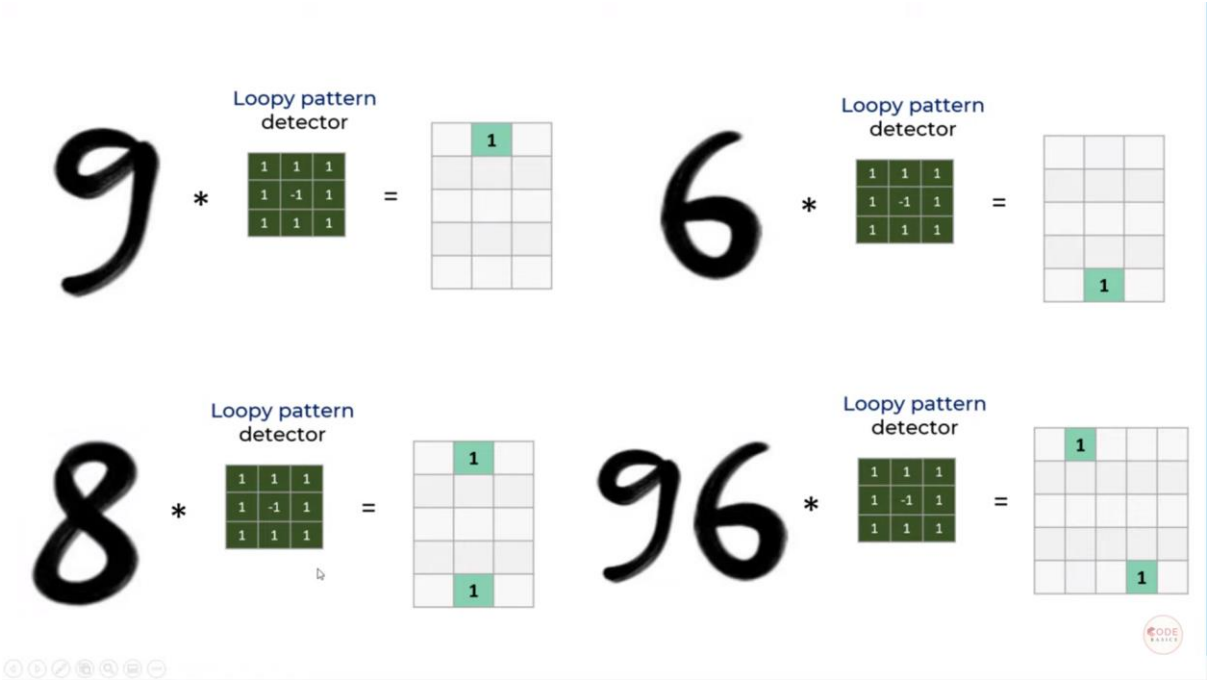


Fig 5.2 Applying Loopy pattern detector to different inputs.

When convolution applied in face recognition, animal recognition. Then we need to create feature map for different parts like nose, eyes, body, legs, and other features.

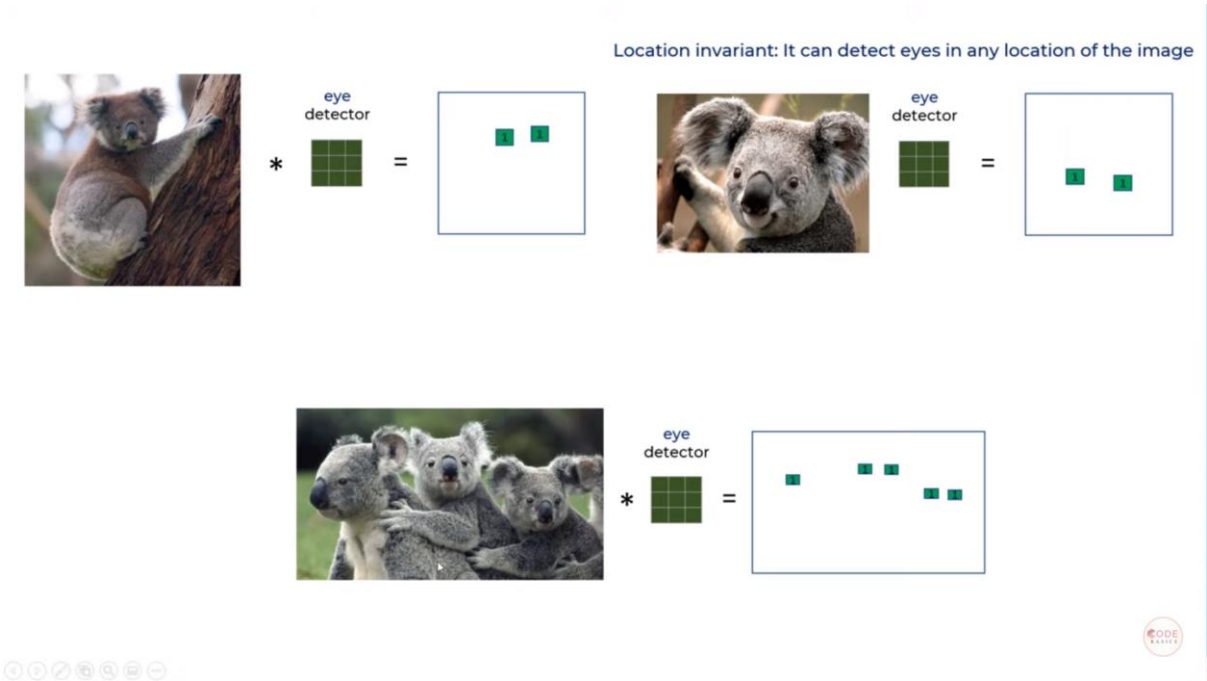


Fig 5.3 Applying eye detector to different inputs.

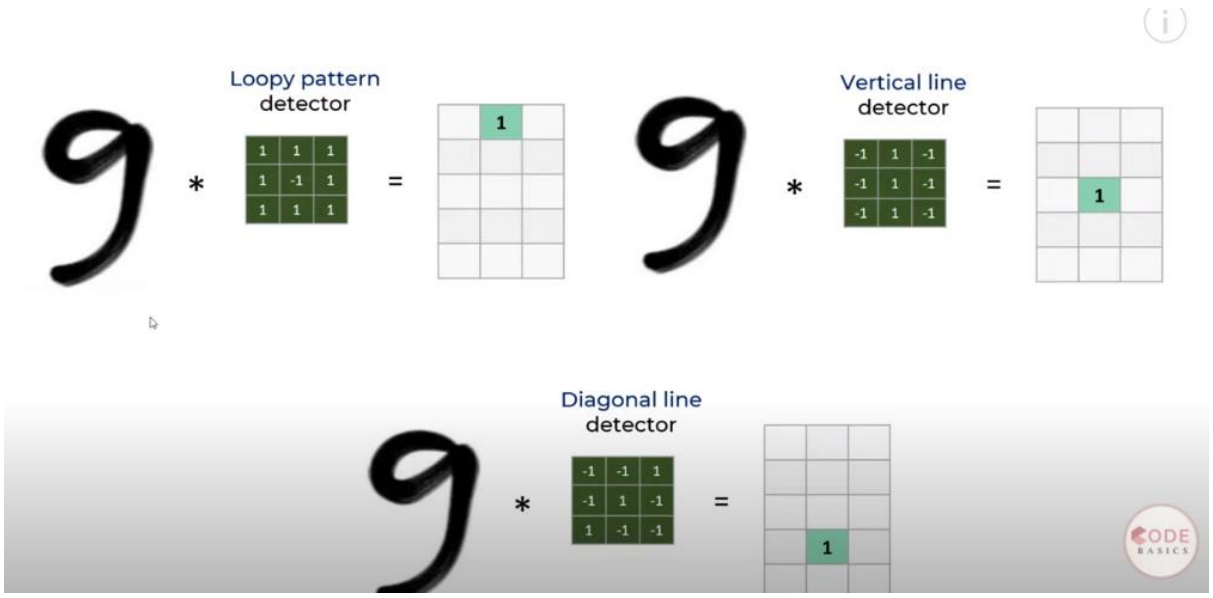


Fig 5.4 Applying different detectors to same input.

In the above picture, applying different detectors/filters same input will result in different feature maps. Each feature map depicts different feature. In the above picture Loopy pattern detector, vertical line detector and diagonal line detector results in three feature maps, each feature map describes respective features.

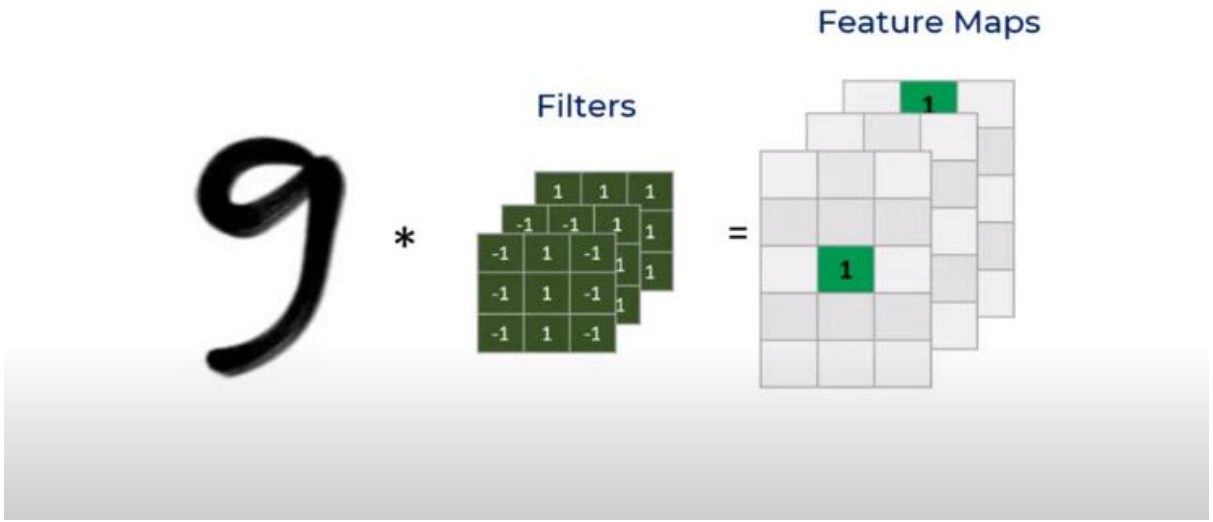


Fig 5.5 Stacking the feature maps of input.

In the above picture Different feature maps are generated by applying different filters/detector are stacked together in the process of convolution.

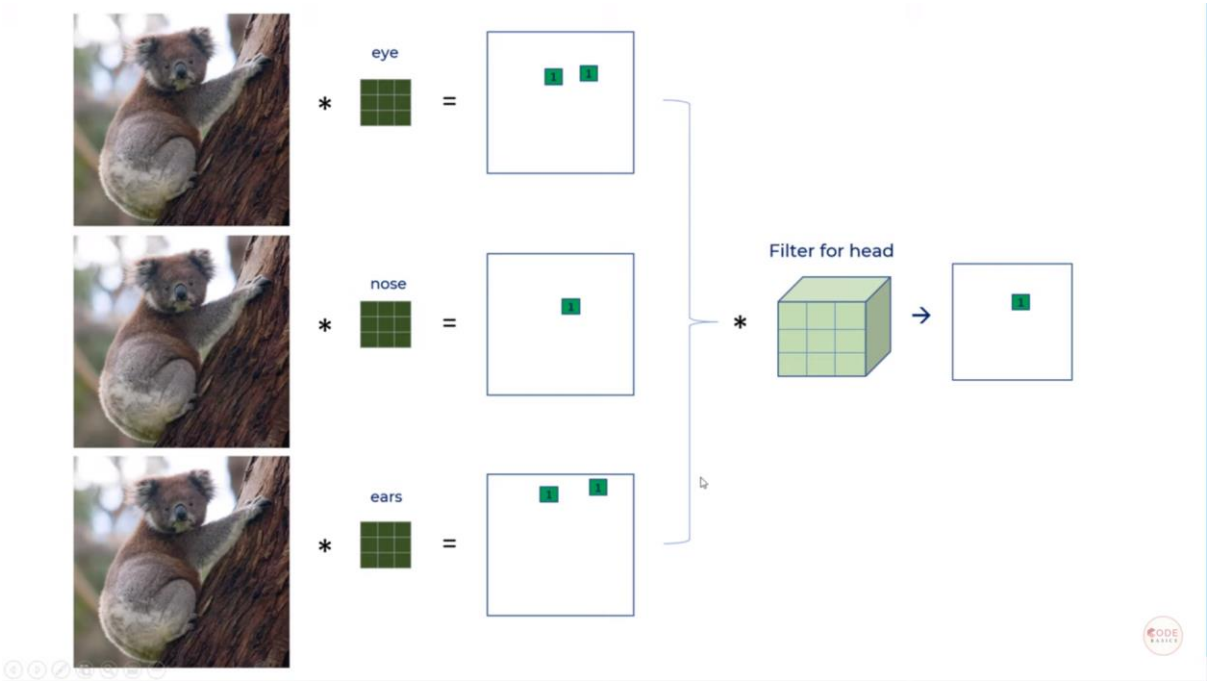


Fig 5.6 Applying 3-dimensional filter to input.

Filters can also be three dimensional. In the above picture three-dimensional filter used is to detect head. One dimension detects nose, second one detects nose, and third one detects ears. Three results combining detects the face of the Koala.

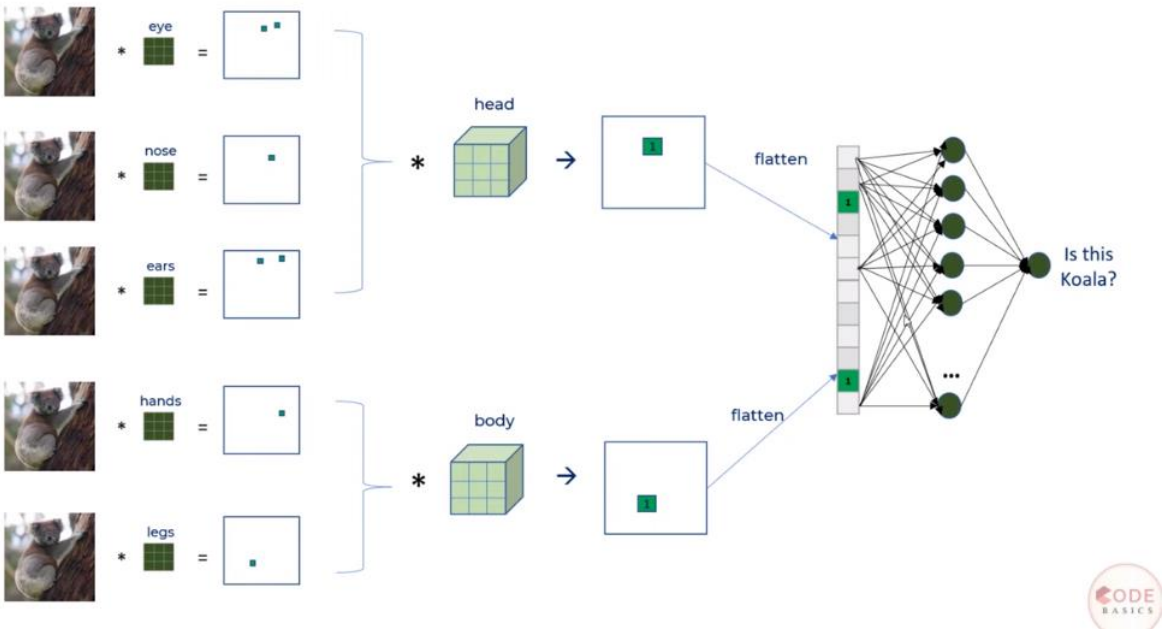


Fig 5.7 Fully Connected Layer of the given input.

Above picture is of Fully connected layer which has both feature extraction and classification. Input is sent through different filters generating feature maps. All the feature maps are stacked. This Feature Extraction will help in detecting the Koala features in any position. Koala may be sleeping, dancing, hanging. Classification is done by simple ANN. This Fully Connected Layer will be able to detect features.

5.2.1 BENEFITS OF CONVOLUTION:

- Connections Sparsity reduces over fitting.
- Conv + pooling gives the location in variant feature detection.
- Parameter sharing.

5.3 RECTIFIED LINEAR UNIT:

Rectified Linear Unit is acronym for Re Lu. It helps with making the model non-linear. Re Lu is a linear function that will output the input if it is positive, if the input is negative then output will be zero.

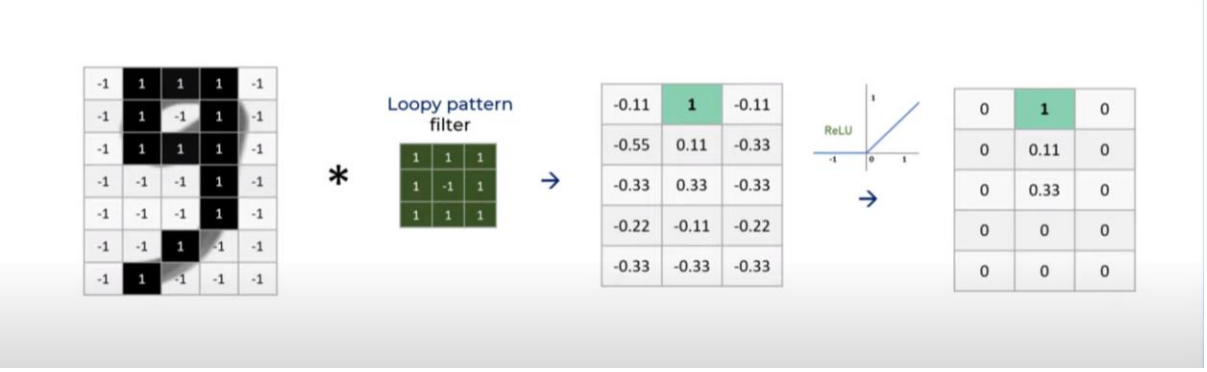


Fig 5.8 Applying Re Lu to input.

Feature map is generated by applying filter/Loopy pattern detector to input. Re Lu is applied to feature map where input is positive output will be same as input. If input is less than zero, then output will be zero.

5.3.1 BENEFITS OF USING Re Lu:

- Introducing nonlinearity.
- Speeds up training.
- Faster to compute.

5.4 POOLING LAYER:

Pooling layers provides down sampling the feature maps by summarizing the presence of features in patches of the feature map. There are two common pooling methods. One is Average pooling. Second is Max pooling. This pooling summarizes the average presence of a feature and the most activated presence of a feature, respectively.

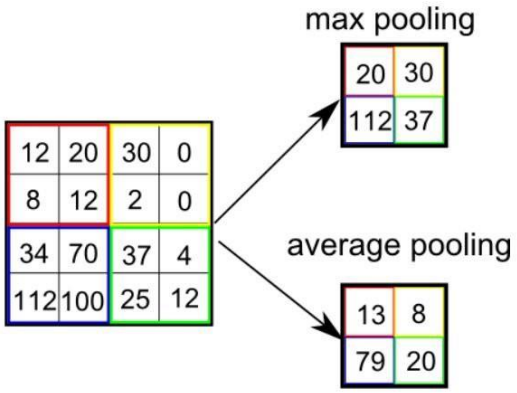


Fig 5.9 Applying Pooling Layer.

Theoretically, Pooling Layer reduces the size of the feature map generated from given input. Pooling process include selecting the window of size n by n and choosing the number one number from each window resulting feature map whose size much smaller than actual feature map.

5.4.1 TYPES OF POOLING LAYER:

For selecting the number from each window there are two methods, they are:

1. Max Pooling.
2. Average Pooling.

MAX POOLING:

Max pooling is a process used to reduce the dimensions of the feature map. In max pooling from each window maximum number is selected and new feature map is generated with selected numbers. Max pooling is most widely used.

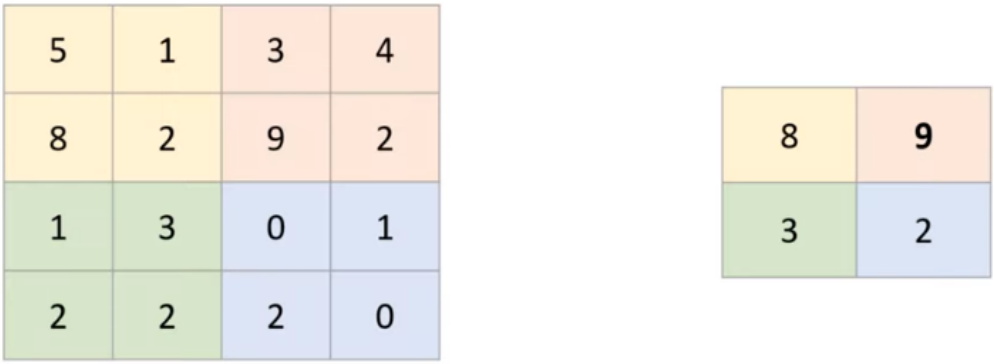


Fig 5.10 Max Pooling 2 by 2 filter stride = 2.

In the above example, the feature map of size 4 by 4 is reduced using max pooling layer. Here window size taken is 2 by 2 and stride is 2, stride can be of any no and window size can be taken based our requirement. From 2 by 2 window largest number among window is selected. In the above example after max pooling 4 by 4 feature map is reduced to 2 by 2 feature map.

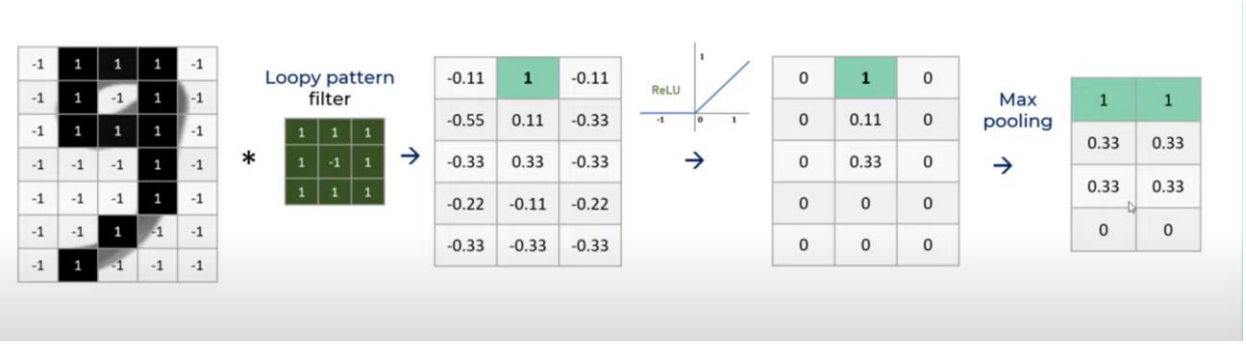


Fig 5.11 Applying Max Pooling on input.

AVERAGE POOLING:

Average pooling is another process used to reduce the dimensions of the feature map. In average pooling from each window average of numbers calculated and selected. New feature map is generated with selected numbers.

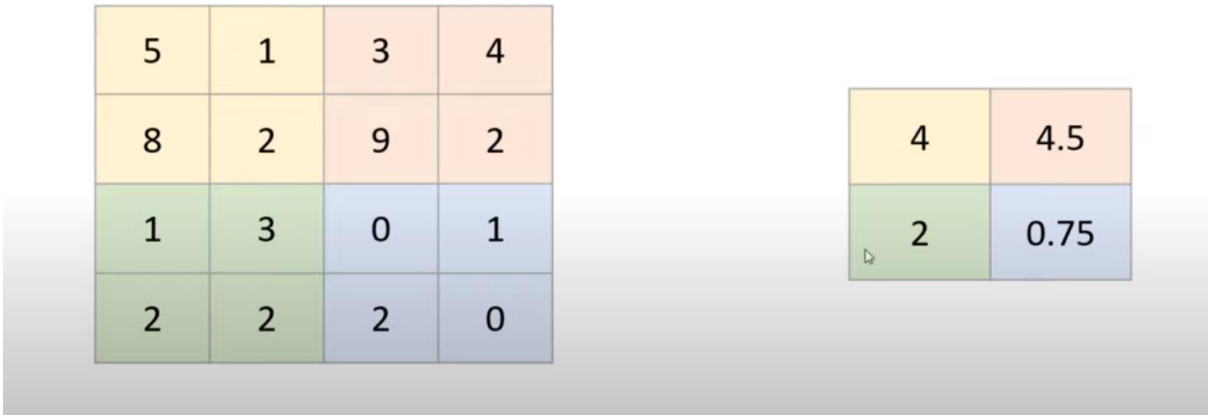


Fig 5.12 Average Pooling on Feature map.

In the above example, the feature map of size 4 by 4 is reduced using average pooling. Here window size taken is 2 by 2 and stride is 2, stride can be of any no and window size can be taken based our requirement. From 2 by 2 window average of all the numbers among window is selected. In the above example after average pooling 4 by 4 feature map is reduced to 2 by 2 feature map.

5.4.2 BENEFITS IN USING POOLING:

- Reduces the dimensions and computation.
- Reduce overfitting as there are less parameters.
- Model is tolerant towards variations distortions.

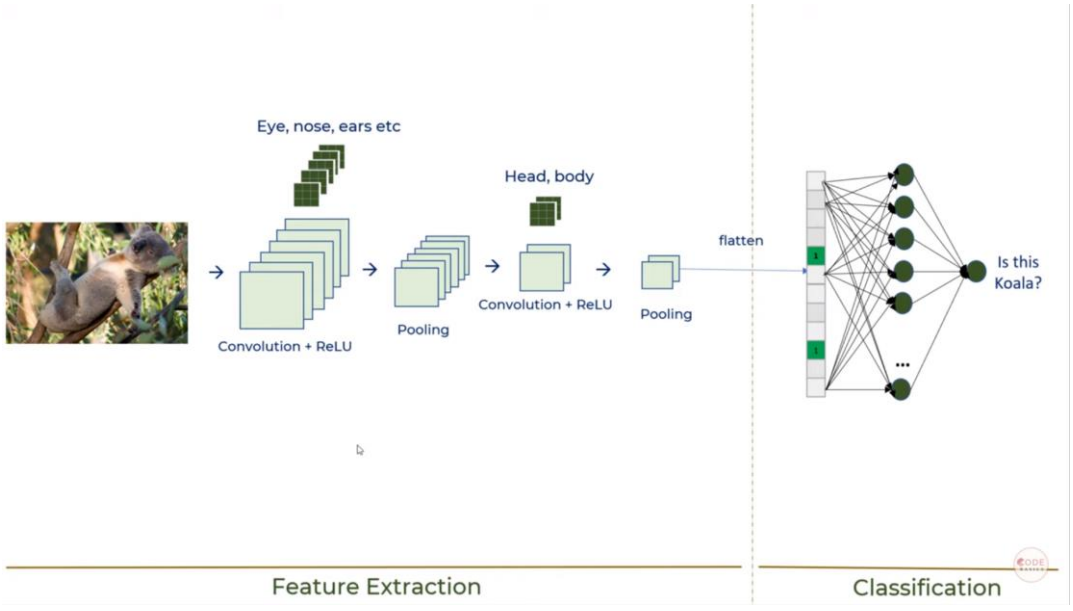


Fig 5.13 Complete CNN for an input.

Above image is complete CNN for an input. Typically, CNN is comprised of Conv + ReLu and Pooling. There can be many layers of Conv + ReLu and Pooling based on input. For above case First layer detects eye, nose, ears of the input and second convolution layer detects Head, body. Later max pooling reduces the dimensions of the generated feature map from input. Classification is done using simple CNN.

5.5 ADVANTAGES OF CNN:

- Local receptive fields.
- Sparse Connectivity.
- Parameter sharing.
- Equivariant representation and translation-invariant.
- Faster Computation.

CHAPTER 6
TOOLS USED

CHAPTER 6: TOOLS USED

6.1 VISUAL STUDIO CODE:

Visual studio code is a text editor for writing programs in different languages. It is developed and maintained by Microsoft. Apart from being only a text editor it also has many features like debugging tool, source control, testing, and an integrated terminal. With these features it becomes Integrated Development Environment (IDE). Apart from default features more functionalities can be added to visual studio code by searching for the required tool and adding them in the extensions section.

Fig 6.1 Visual Studio Code

Visual studio code is a very powerful tool that can support a wide variety of programming languages and scripting languages. It can also integrate with other software tools like Jupyter, cloud services like Azure, version control system like Git, website-based tools like servers, JavaScript frameworks like React, Angular and Node. It can also work with 21 different file transferring formats like JSON. It is compatible with different operating systems like Windows and Linux.

6.2 PYTHON IDLE:

Python IDLE (Integrated Development and Learning Environment) is an open-source tool which is IDE in which python files can be run. Using IDLE we can create, modify, execute python files.

Fig 6.2 Python Logo

Python is open source interpreted programming language. It is dynamically typed. It offers object-oriented features like Polymorphism, Inheritance, Abstraction, Objects, Classes. It is considered as one of the easiest programming languages as it is very much like English language. Python has various inbuilt libraries which reduces the effort of user, we can those libraries and perform some pre-defined tasks. Python can be used in different domains. It can be used in Machine Learning, it can be used in Deep Learning, It can be used in Artificial Intelligence. It can also use as server-side language. With the Django framework Python can also be used for front end web development. Finally, Python is the language with most diversified features.

6.3 GOOGLE COLABORATORY:

Google Colaboratory in short called as Google Colab. Google Colab is a product launched by Google Research in the year 2017. Google Colab allows user to create, modify, execute python programs on browser without any external tool. Google Colab used mainly for executing machine learning, deep learning, data analysis. Google Colab is completely free.

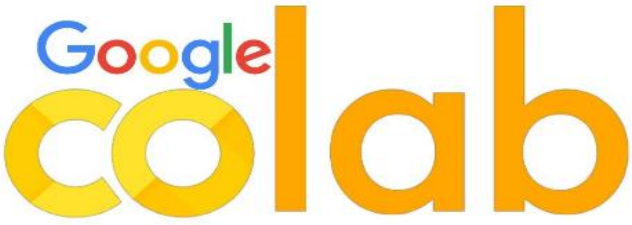


Fig 6.3 Google Colab Logo

Google Colab is best alternative for Jupyter notebook. Notebooks can be created on Google Colab later we can store in google drive or GitHub. Using Colab we can directly connect to GitHub. We can also upload files that already exist on our local computer. Google Colab offers GPU which includes Nvidia K80s, T4s, P4s and P100s.

CHAPTER 7
DATA SET

CHAPTER 7: DATA SET

7.1 ABOUT THE DATA SET:

The dataset used in this project is JSON (JavaScript Object Notation). JSON is a light weighted text-data. This is interchangeable format. It is used to store information in an organized manner. It is used to transmit the data from server to client and vice versa. JSON is Scalable. It is lightweight. It is easy to read and write. It is a text-based, human-readable data exchange format. JSON can be used for both Relational and Non-Relational databases. JSON uses less data overall, so you reduce the cost and increase the parsing speed.

The dataset we used for project consists of records of 85 most visited places all over Telangana. Each Record consists of Intents, Tag name, patterns, and responses and for each record data/context is stored in string format.

7.1.1 SAMPLE RECORD IN DATA SET:

```
Intents {
        {
                "tag": "tag name",
                "patterns": ["pattern name"],
                "responses": ["Responses to Query."]
        }
}
```

CHAPTER 8
METHODOLGY
AND
WORKFLOW

CHAPTER 8: METHODOLGY AND WORKFLOW

8.1 BLOCK DIAGRAM:

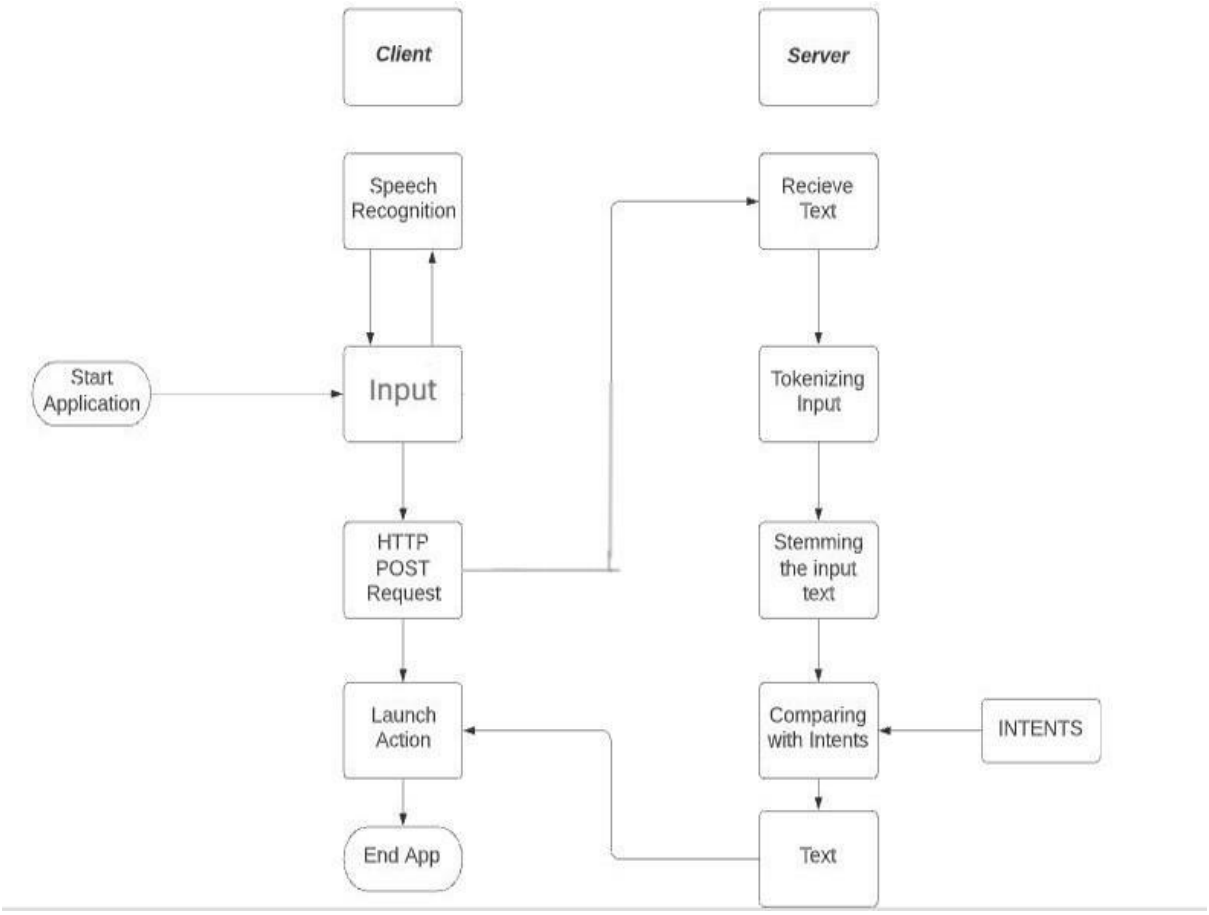


Fig 8.1 Block Diagram.

8.2 DESCRIPTION OF BLOCK DIAGRAM:

In this project both client side and server side are involved. Client side serves as user interface where user can give the input. Server side is where model is present. Model is responsible for processing input and extracting output.

Now let us discuss briefly about each step present in the above block diagram.

Input:

User gives input to the model using web page. User can enter the input in the field.

Speech Recognition:

User can enter input in text or voice. If user enter voice as input. Speech synthesis library detects the voice and converts into text for processing.

HTTP POST Request:

HTTP stands for "Hypertext transfer protocol". After Speech input is converted to text. Client raises a request to server using HTTP POST Request.

Receive text:

Server receives text from client. Server consists of model which processes the input and sends the output to Client. To get output there are some steps to be followed.

Tokenizing Input:

Model uses NLP for tokenizing input. It is the process which converts sentences into tokens. For example: Consider the sentence "The Travel Planner can used for joyful trips", In above sentence tokens are 'The', 'Travel', 'Planner', 'can', 'used', 'for', 'joyful', 'trips'.

Stemming Input:

Model uses NLP for stemming the input. It is the process which converts words into base or root form. For example: Consider the words, 'consulting', 'consultant', 'consultation', 'consultants' and root word will be 'Consult'.

Comparing the intents:

After tokenization and stemming the input next step is comparing the input with the intents present in the dataset and CNN algorithm tracks for the matching result.

Text:

Once matching result fetched, now model will send the output to Client which is sending Response to the HTTP POST Request.

Launch Action:

Client receives output from Server. Now client which is web page displays the output to the user. If user expects voice output speech recognition will read out the text displayed in the output field.

8.3 WORKFLOW:

8.3.1 IMPLEMENTING REQUIRED LIBRARIES:

To build the model we need some of the predefined libraries which offers some operations to do specific task.

```
# importing required libraries
import nltk
from nltk.stem.lancaster import LancasterStemmer
import numpy as np
import tflearn
import tensorflow as tf
import random
import json
from flask import Flask,jsonify, request, render_template,json
```

Fig 8.2 Implementing required libraries.

In this project we have used libraries like ‘nltk’ stands for “natural language tool kit” it supports natural language processing. ‘numpy’ It is a library used to work with arrays. ‘tflearn’ it is used to run ‘tensorflow’.

8.3.2 Loading the dataset of JSON format:

Dataset used in this project is JSON (JavaScript Object Notation), which is easy to handle and has better schema support. In this step dataset is uploaded to model.

```
# loading the dataset of JSON format
with open("intents.json") as jd:
    intents = json.load(jd)
```

Fig 8.3 Loading the dataset of JSON format.

8.3.3 Building the Model:

To build model we will be using NLP and CNN algorithm. NLP takes the input and processing is done which includes steps like Tokenization, Stemming, tagging. The model is trained. Model fetches the output from given dataset.

```
# shuffle our features and turn into np.array
random.shuffle(training)
training = np.array(training)
# creating training list
train_x = list(training[:,0])
train_y = list(training[:,1])
# Building convolutional neural network
net = tflearn.input_data(shape=[None, len(train_x[0])])
net = tflearn.fully_connected(net, len(train_x))
net = tflearn.fully_connected(net, len(train_y[0]), activation='softmax')
net = tflearn.regression(net)
# Define model and setup tensorboard
model = tflearn.DNN(net, tensorboard_dir='tflearn_logs')
model.fit(train_x, train_y, n_epoch=1000, batch_size=8, show_metric=True)
model.save('model.tflearn')
```

Fig 8.4 Building the model.

8.3.4 Generating the HTTP POST Request:

This happens at client side when user enters the input. Client generates HTTP POST Request. When client generates the request. Server receives the input and later process takes place resulting in output.

```
$.ajax({
    type: "POST",
    url:server+appdir,
    data: JSON.stringify(op_nu),
    dataType: 'json'
})
```

Fig 8.5 Generating HTTP POST Request.

8.3.5 Sending the response to HTTP POST Request:

After the input is processed by the model and output is generated then server sends the output as response to HTTP POST Request.

```
@app.route('/op', methods=['POST'])
def sum_num():
    rf=request.form

    for key in rf.keys():
        data=key

    data_dic=json.loads(data)
    input_sent=response(data_dic['str'])

    resp_dic={'str':str(input_sent)}
    resp = jsonify(resp_dic)
    resp.headers['Access-Control-Allow-Origin']='*'
    return resp
```

Fig 8.6 Sending the response to HTTP POST Request.

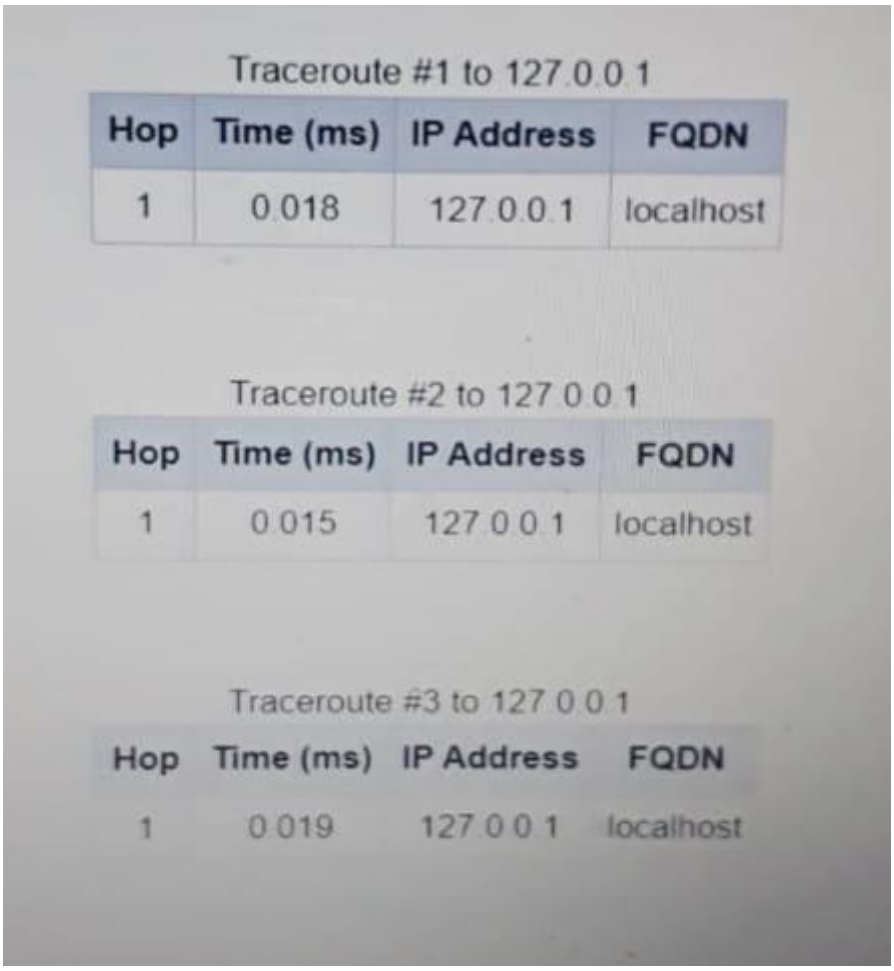
CHAPTER 9
RESULTS

CHAPTER 9: RESULTS

9.1 RESULTS:

Input is given by the user in speech or text, it is processed, and output is displayed on screen. When the input is present in dataset output is displayed. If place name is not listed in dataset application displays “none”. We have calculated the Response Time of our Application.

Response time is the total time taken for an application to respond to request for a service. It is algebraic sum of the wait time and the service time. To measure the response time of our application we used webtestpage.com which reads the time at which user sends HTTP request and time at which output is generated by model. We have calculated response time for three random inputs and calculated the average of those results.



Traceroute #1 to 127.0.0.1

Hop	Time (ms)	IP Address	FQDN
1	0.018	127.0.0.1	localhost

Traceroute #2 to 127.0.0.1

Hop	Time (ms)	IP Address	FQDN
1	0.015	127.0.0.1	localhost

Traceroute #3 to 127.0.0.1

Hop	Time (ms)	IP Address	FQDN
1	0.019	127.0.0.1	localhost

Fig 9.1 Snapshot of results of response time for random inputs.

Input to Output	Response Time 1 (ms)	Response Time 2 (ms)	Response Time 3 (ms)
Text to Text	**0.018**	**0.015**	**0.019**
Speech to Speech	**0.018**	**0.015**	**0.019**

Table 9.1 Response time for random inputs.

Response Time: 0.01733 ms

9.2 SNAPSHOTS OF THE RESULTS:

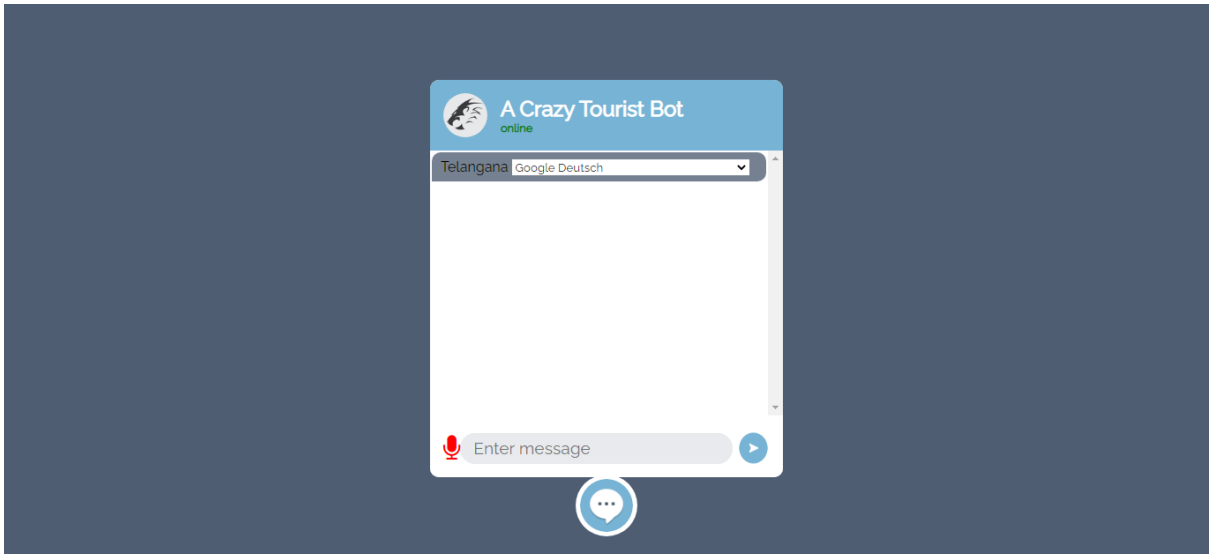


Fig 9.2 Snapshot of UI Template.

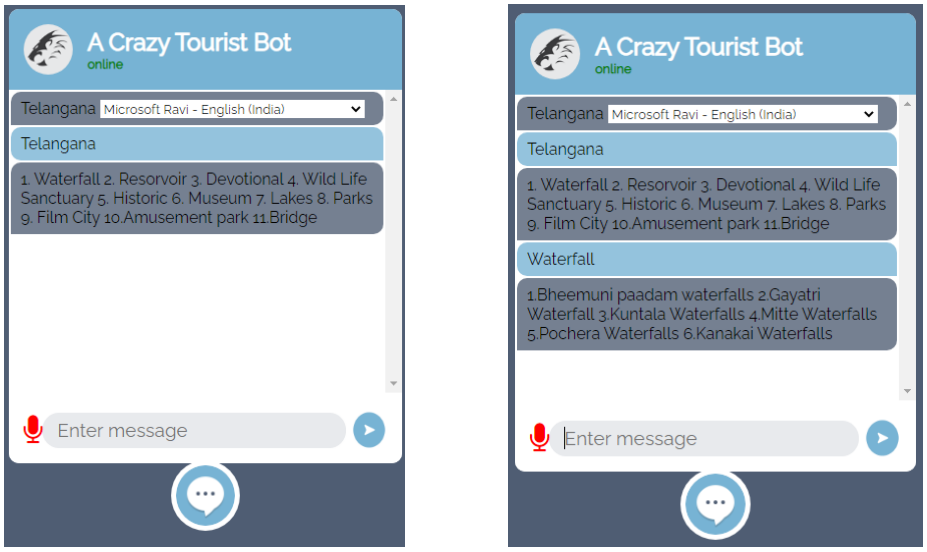


Fig 9.3 Snapshots of results on webpage – I.

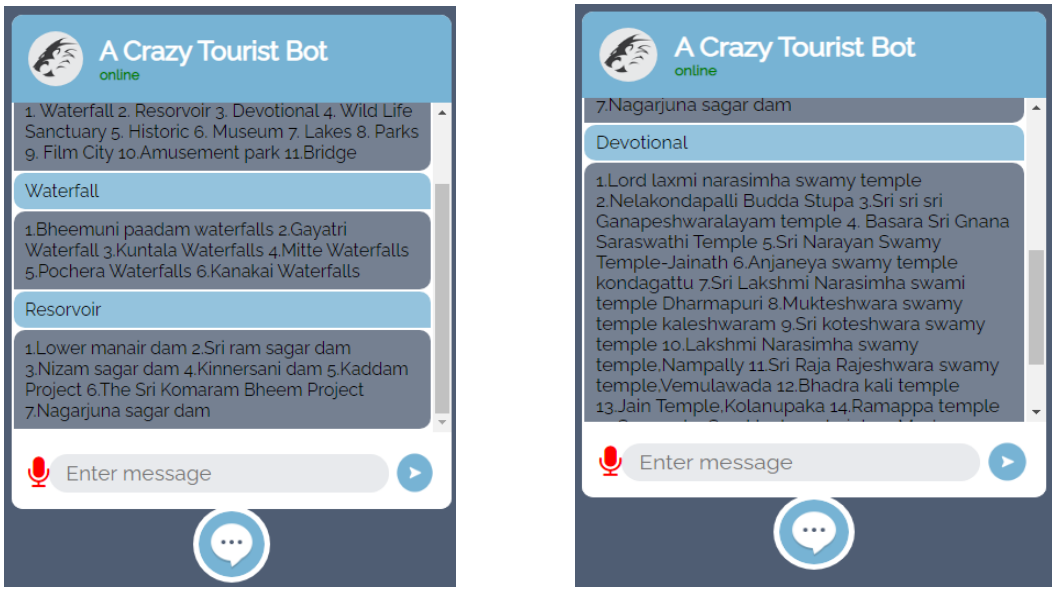


Fig 9.4 Snapshots of results on webpage – II.

CHAPTER 10

CONCLUSION AND FUTURE SCOPE

CHAPTER 10: CONCLUSION AND FUTURE SCOPE

10.1 CONCLUSION:

Virtual Assistant helps in responding to the queries of the users without any human interference. We have built the assistant using deep learning algorithm, Convolutional Neural Networks. This CNN model is trained with Json data set consisting of records of 85 most visited places in Telangana. When user enters the input, which is not listed in dataset, Our Application displays “none”. User should enter input listed in dataset.

This Trained Algorithm is integrated with web page using docker and this web page serves as the user interface for end user and finally our project reduces the human effort in solving queries of users manually and makes profit to organisation by reducing their expenses on customer executive service.

10.2 FUTURE SCOPE:

Virtual Assistant can be further powered by Artificial Intelligence which will increase the speed of response and reduces the response time. Using a non-relational database, we can also add images and videos that can displayed as output with context to enhance the user experience. Dataset can be upgraded with more no of records it enhances the performance.

We can use API (Application Programmable Interface) of google maps and integrate maps with our model so that user can directly use navigation on our web page itself.

This Project can also be used for medical, educational, entertainment, ecommerce and education purposes.

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