Reception Automation with Robotics and DNN

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Abstract— The Reception Area is a very important element of the overall organization. This project describes the design and development of a Reception Bot which is considered as a possible solution to Reception Automation. Across the world, robotics technology is replacing manual labor at a rapid pace. In Institutions and organizations, sometimes visitors face a lot of problems due to unavailability of receptionist at the front desk. These shortcomings can be handled by using a reception automation system where 'Reception Bot' is used to attend the visitors, entertain the guests and other receptionist's tasks as well. This automated attendee is based on the machine where a user, visitor or a guest can interact with the bot for the gathering of various information regarding the college which are being authenticated by the management to be disclosed. It can serve as the assistant for the institution's members, staff and management. It will fix the appointments for the visitors or inform the institution for the arrival of the following guests and visitors. This project would be a great approach towards the development of automation in various domains.

Keywords: Reception Bot, Reception automation, attendee, assistant

I. INTRODUCTION

"Reception Automation" is product-based software. This software is used in automating the receptionist's process without any manual involvement at front desk of any Institution or an organization. This software uses natural language processing for the interaction of various visitors and guests for interaction. This approach towards the automation in this domain would be very efficient in many ways. Automation is the practice of performing self-acting processes or computers. Information regarding the colleges, which are being authenticated by the management to be disclosed. It can serve as an assistant for the institution's members, staff and management. It will fix the appointments for the visitors or inform the institution for the arrival of the following guests and visitors in other words it can work as a manager as well as reminder of meetings and events. This software will also keep a record of previous events and appointments. It will provide required data for any related event after that. This project would be a great approach towards the development of automation in various domains. As the world is moving towards the automation and everything is becoming more and more smarter, so RoboCeption is a step to take world more ahead in automation. The influence of the automation is growing in the technology domain. The influence of the automation is growing in the technology domain.

A. Issues in Traditional System

The current and traditional Front Desk System at particular organization is the existence of an employee who is concerned to handle the visitors that visits the organization.

II. EXISTING PROBLEM

Traditionally any institution or any organization has a front desk usually called as reception. Serve tourists by properly greeting them, welcoming them and guiding them; alert visitor arrival company personnel; establish security and telecommunications network.

Receptionist Job Duties:
1) Welcomes guests by greeting them, by phone or in person; by addressing or responding to inquiries.
2) Directs visitors by maintaining directories for employees and departments; offering instructions.
3) Maintains protection by following procedures; logbook monitoring; issuing badges to visitors;
4) Ensures a secure and clean reception area through following procedures, rules and regulations.
5) Maintains cohesion between work teams through recording and communication of acts, anomalies and ongoing needs

And what if the receptionist is not so well to handle the specified jobs properly?

What about the manual errors by human receptionist ?

What about the distractions from various things in surroundings ?

What if he is not present at the particular moment to attend the visitors, making the visitors restless?

What about the backup for the same?

These all limitations are needed to be resolved, and the proposed solution can be helpful in resolving most of the errors that aren't beyond the human Intelligent Quotient.

The current and traditional Front Desk System at particular organization is the existence of an employee who is concerned to handle the visitors that visits the organization. At colleges also the same system exists. The Front Desk worker provides customer service to a diverse student body and faculty both in person, on the telephone, and in writing. Thus colleges are seeking an individual who is comfortable communicating in a professional and welcoming manner. Typical responsibilities include greeting students, visitors, scheduling sessions and meetings, and providing visitors with additional information. In order to follow our policies and practices, effective applicants will be able to work efficiently with our small team and the Front Desk Manager. Additional tasks include managing logistical assignments and keeping our center loosely run. This is chosen for candidates with office experience, the ability to accomplish a variety of tasks and customizable availability.

Also there are various existing systems that we are going to mention below, that are capable of doing such tasks:

A. Virtual receptionist

A virtual receptionist is a actual, live human, who as a traditional receptionist performs the entire telephone responses duties. In this case the word virtual indicates that such activities are carried out from a remote location, e.g. a call center or office. A virtual office receptionist has software which connects them to the phone and computer system of your company, so that all calls are routed to them. Throughout your business practices, live virtual receptionists are qualified and able to access customer information so that they can have a personal, professional customer service experience.

B. Front desk using Digital Receptionist

A digital receptionist, often referred to as a visitor registration or visitor check-in app, is a software solution that greets visitors as they arrived at your workplace. Essentially, they automated reception so you can center your attention wherever your company needs you.

Although the digitization is available as per the digitization mentioned above at front desk but we can even go further with applied neural networking and robotics for more advancements and enhancements at front desk of organizations.

III. TECHNOLOGIES AND COMPONENTS APPLIED

In present day the human Receptionists' problems encountered are need to get concerned having both the aspects of organization and the visitors visiting the premises as well. Thus we can skip the human intervention with the application of automation. Automation, the application of software to tasks previously performed by humans or, gradually, to otherwise impossible tasks. Although the term mechanization is often used to refer to simply replacing human labor with machines, automation usually suggests the implementation of machines into a self-governing structure. Automation has revolutionized all places where it was introduced, and there is not one part of everyday life which it has not influenced. Thus for implementing the same, various technologies with various software components are being used. These are enlisted with briefings.

A. Software components used are:

1) Google's Speech to Text API

Through implementing powerful neural network models in an easy-to-use API, Google Speech-to-Text allows developers to translate audio to text. Over 120 languages and variants are recognized by the API to support the global user base. You can disable voice control, transcribe audio from call centers, and more. It can process streaming or pre-recorded audio in real time, using the ML technology from Google.

2) NLP with Python for tokenization and stop words removal

Natural Language Processing or NLP is an artificial intelligence field which enables the machines to read, understand and extract meaning from human languages.

Tokenization Is the method of segmenting text into words and sentences. Essentially, the job is to break a text into pieces called tokens, while throwing away other characters, such as punctuation. Stop Words Elimination Involves getting rid of articles, pronouns and prepositions in common language, such as "and," "the" or "to" in English. In this method some very common words that seem to add little to no meaning to the NLP target are filtered out and omitted from the text to be processed, thereby eliminating popular and frequent terms that are not informative about the corresponding content.

3) Chat Bot with DNN

A chatbot is a software program that uses text or text-to-speech to perform a chat conversation instead of direct communication with a live human user. This software program is being implemented with the use of Deep Neural Network. Deep learning is part of a broader family of methods in machine learning focused on artificial neural networks with learning in representations. Training may be tracked, semi-supervised or unmonitored.

Studying and neural network algorithm, first have a review on neuron,

As the name suggests, the neural networks were influenced by a human brain's neural architecture, and the basic building block is called a Neuron as in a human brain. The nature is close to that of a human neuron, that is, it takes an output in certain inputs and burns. In purely mathematical terms, a neuron is a substitute for a mathematical function in the machine learning universe, and its only task is to provide an output by applying the function to the given inputs.

Before you understand a Neural Network, it is important to understand what a layer is in a Neural Network A layer is nothing more than a collection of neurons taking in an input and generating output. Inputs for each of those neurons are interpreted through the activation functions assigned to the neurons. The leftmost layer of the network is called the input layer, and the output layer to the right. The middle node layer is called the hidden layer, since its values are not detected by the training collection. We may say that our example of a neural network has three input units (not counting the bias unit), three hidden units and one output unit. Each neural network contains 1 output layer and 1 input.

Selecting the activation function that will be used again depends on the problem involved and the data type used. Now for a neural network to make accurate predictions that each of those neurons in each layer is learning certain weights. The algorithm used to learn the weights is called reverse propagation. A neural network that has more than one hidden layer is generally called a Deep Neural Network. A Deep Neural Network (DNN) is a multi-layered artificial neural network (ANN) between the input and output layers. The DNN seeks the right mathematical manipulation, whether it is a linear relationship or a non-linear relationship, to transform the input into output.
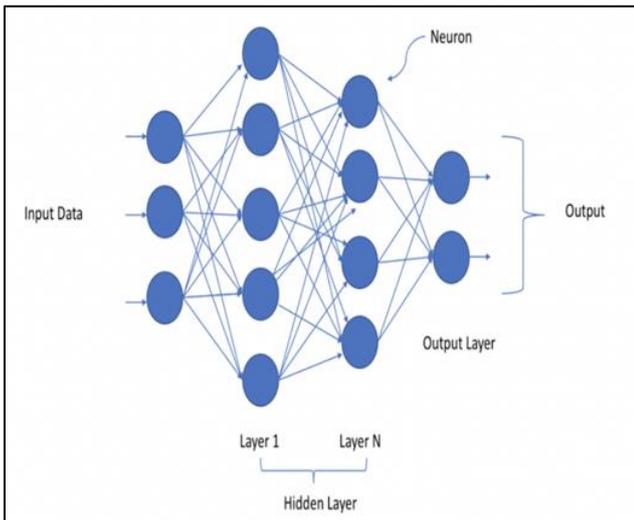
Fig. 1: Deep Neural Network

B. Hardware components used are:

−   The RaspberryPi is a very inexpensive computer running Linux but it also provides a set of GPIO (general purpose input / output) pins that allow you to monitor physical computing electronic components and explore the Internet of Things (IoT).
−   A microphone, colloquially called a microphone or a mic, is a tool - a transducer - which converts sound into an electrical signal.
−   To output the voice from bot that is here ableby the visitors for convenient conversation with the bot.
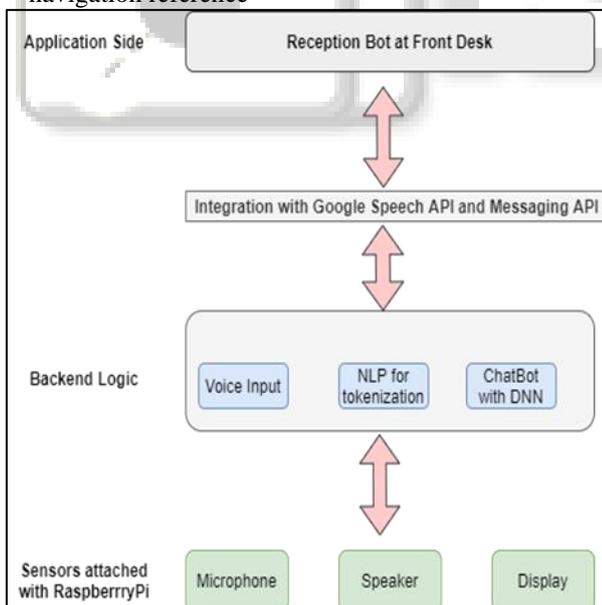−   Display screen for maps shown to visitors for indoor navigation reference

Fig. 2: High Level Architecture of the proposed system

IV. RESEARCH METHODOLOGY

Traditionally any institution or any organization has a front desk usually called as reception. Serves visitors by greeting, welcoming, and directing them appropriately; notifies company personnel of visitor arrival; maintains security and

telecommunications system. Research methodology considers the following parameters:

A. Population:

A population is the entire set of cases that are of interest to a sample. Covering the colleges of the University we surveyed, the inference we can draw is that no college has the digitization of the receptionist, and even no backup for the receptionists are being seen in most of the colleges. Thus the finite population surveyed inspires for the implementation of the product.

B. Sample:

We have a small sample on which the considerable conclusions were accomplished so that to take care of the inferences drawn.

Also, statically, not even 5% colleges of our university are being using the digitization. And even many organizations are not using those technologies.

C. Hypothesis:

The product implemented with very high accuracy, all the essential and considerable designs to achieve the problem's solution is much efficient and economically in favor of the organization, college, any educational institute.

D. Level of confidence:

It is represented as a percentage and reflects how far inside the confidence interval lies the true percentage of the population who will select an answer. Possibly there might be few errors as no machine, no robot can achieve the intelligence level beyond the human intelligence and level of IQ cant be tested for any machinery object.

Our Research is typically based on the quality analysis of the front desks of the institutes and different organizations. Including the following qualities:

1)   Whether the receptionist is qualified enough to serve the visitors, customers, guests in the very convenient and comfortable manner.
2)   The quality of time and competency of the individual task given to the frond desk operator in any organization.
3)   The presence of receptionist matters the most as it's the very first desk to approach over by any individual visiting for the first time in the institute or organization.

Thus, analyzing such qualities also let us think for the research to develop a system for all the front desk operations at different places.

Hence, the proposed solution for the existing problem can be described as:

To overcome these limitations of the manual receptionist, a product based system can be an effective solution for the enlisted problems. This software provides the automation of the receptionist's desk where there will be the 24 x 7 availability of it to serve the visitors and the organization as well. The software that will be so efficient in the tasks the organization wants to be done. It will serve as a backup to the receptionist in the absence. A complete secured system assisting the entire organization's or an institution's staff. Will be fair to each and every visitor

without any personnel concern. Also it is entirely official and formal .

Therefore, the solution might be definitely a great change in the traditional way of official maintenance.
This includes the mentioned features:
- Interacts with visitors in human understandable language(English)
- Intimates the particular staff member if required.
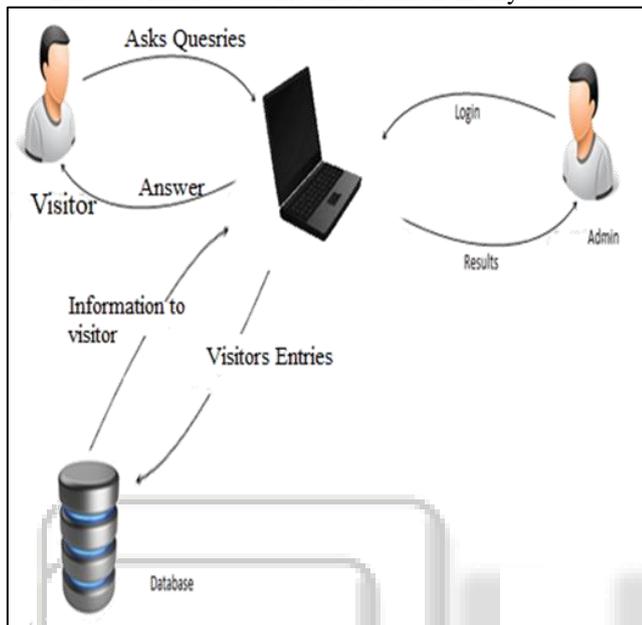- Directs visitor to cabins and rooms if in any case.

Fig. 3: Process flow of the proposed system

V. RESULT

The RoboCeption is the automated bot which is interacting effectively with the visitors coming in the organizations. It answers all the queries of the visitors which include frequently asked questions and all the appointment related queries. It takes query in a form of natural language, process them and give the response according to the visitor's query. Also in the case of meeting, it will notify the staff member to whom visitor wants to meet via message and takes the response and from the staff member and give that response to the visitor. It also guides the visitor to the required room or cabin using map of the organization.

VI. CONCLUSION

The conclusion of this study suggests that knowledge of specific domain improves the results. This Project has been implemented on system platform. Also, different attributes are added to project which are advantageous to the system. The requirements and specifications have been listed above. This project uses MySQL and Machine Learning based Python libraries and Python scripting as backend infrastructure. Using different security system, the application will be unbiased and could not be manipulated. Automated tool-building like Make will support us in many ways. They help us to automate repetitive commands, hence saving us time and reducing the likelihood of errors compared with running these commands manually.

Some of the enlisted enhancements that would bring the mentioned changes are:
- Analysis of more captured data.
- Enhancement in Datasets.
- More Attractive Displayable Bot.
- More advanced version for various organizations
- Generative modeling
- More learned robot
- Guiding the visitors to the cabin personally

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