

Alpha-The Talking Assistance

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Abstract— These days, everything basically is moving towards robotization whether it might be the vehicle business or medical clinic industry or some other industry. Robotization is the way to bring a change. With rapid development in artificial intelligence (AI) and robotics technology, automation is at a tipping point. Today, robots can perform a slew of functions without considerable human interaction. Automated technologies are not only executing iterative tasks, but also augmenting workforce capabilities significantly.[1] In the most recent decade, many individuals began making a trip starting with one spot then onto the next via air, i.e., via Planes. Alpha - The Talking Assistant is one of the examples of automation. It is a talking assistant which can be used at many different places according to the need. Alpha robot can be used at airports, hospitals, malls, restaurants, and at many more places. People will be entranced as they will be welcomed by a robot at these places.

Keywords: Amazon web services (Aws), Alexa skills, Haar-Cascade algorithm, Age and Gender Recognition

I. INTRODUCTION

Robotic assistants help reducing the manual efforts being put by humans in their day-to-day tasks. In this paper, we develop a voice assistant robot. The human voice commands are given to the robotic assistant using Amazon Alexa. A voice assistant or intelligent assistant is a software agent that can perform tasks or services for an individual based on verbal commands i.e. by interpreting human speech. This research paper focuses on the integrating this software with a robot that also uses visual aid to identify gender and age of a person to communicate accordingly. The image of person standing in front of it are processed in real time and the output obtained is then sent to Alexa skill as input. At all the places the alpha will play different roles such as at airport it can be used to welcome the travelers by complementing them according to their gender and propose them some famous spots to visit in that city. The travelers will be entranced as they will be welcomed by a robot at the air terminal and will get some information to visit the well-known places in that city. There are many solo travelers who have a layover at airports for hours, so they can interact with the robot to pass the time efficiently. In hospitals the alpha robot can be used to interact with the patients to tell them about the availability of the doctors, the timing of the doctors, cleaning of the hospitals, etc. At restaurants the alpha robot can be used to greet the customers as well as suggest the best dish to order. At malls the alpha robot can be used to tell the visitors about the sales in the mall, on which shop there are sales as well as which shop is on which floor and etc.

II. LITERATURE SURVEY

The automation of much of the process at airports, restaurants, hospitals, etc. has occurred so gradually that,

chances are, you may not think about all the touch points that used to be human interaction. Here are a few of the areas where you may soon see robots guiding us at different levels.

A. Arrivals

Right when you enter a place, there are singing and dancing robots that welcome you. One such is at California's Mineta San Jose Airport that will also cajole you to take a selfie. At airports robots patrolling the perimeter may be analyzing your gait, body language or other characteristics that could be interpreted as suspicious. The B-3PO (described as "similar to a Dalek" by unnerved FT writer Gillian Tett) glides through the halls at New York's LaGuardia, albeit presumably not screaming "Exterminate!" at random passerby. Those who could be tempted to cheekiness when faced with artificial intelligence may want to take care, however, these Anbot police robots in China are armed with tasers and can "autonomously decide where to patrol", according to Popular Science.

B. Coffee Stations

For those who believe that caffeine is more lifeblood than beverage, easy access to coffee is a must-have. Briggo is a mini cafe run by robot baristas. Customers order coffee and various coffee-based drinks via app or using tablets at Briggo's "Coffee Haus" kiosks, where the drinks are made entirely by machine.^[6] Similarly, the Coffee Haus robots at the Austin-Bergstrom International Airport goes beyond the sad vending machines of yesteryear and lets customers order through an app ahead of time. The coffee is held in a locked area, and pickup is achieved by using a code to open the door. The robots may remove human interaction from the process, but chances are, they at least will spell your name correctly.

C. Baggage Drop-off

Robots help in managing baggage at airports and hotels. A new potential roll out by KLM will see Care-E, a baby blue buggy that's fully automated, greets you by scanning your boarding pass, carries up to 85 lbs. of luggage, and uses cute winky smiley faces and chirps, buzzes and beeps to communicate. Slow walkers can stroll leisurely behind the robot's 3 mph speed, and Care-E can guide you to washrooms and shops and wait while you do your business, then guide you to your gate.

D. Personalized Experience

Robots can be used to provide a personalized experience. Robots can interact with a customer or passengers and help them with their queries. An AI-translator airport robot can prove to be of great help for tourists from different countries. It can understand multiple languages and solve queries. They can guide them to the taxi stand, refreshment areas, and baggage carousels if the tourists are unable to understand the directions displayed on boards. They can

even serve as an entertainment source for kids by interacting with them, playing videos and audios as requested by kids on screens attached to them. In October 2016, the Mineta San José International Airport used customer service robots to entertain passengers. These robots could dance, play music, and click photographs of passengers that could be emailed or displayed on the robot's screen. Additionally, robots can even serve as personal porters, helping carry luggage and provide customers a happy experience.

E. Airport Security

Security is a major concern in today's age for airports. Airport robots armed with computer vision, artificial intelligence, and machine learning technologies can significantly improve the security at airports. Robots can detect threats with the help of embedded facial recognition technology. They can scan for suspicious people or people showing unnatural behavior at airport terminals. The robots can alert security officials or even capture the suspect themselves. The Anbot security robot deployed at Shenzhen's Bao international airport can identify suspicious people and is even equipped with a taser if the need arises. However, facial recognition technology is not completely dependable at the current stage, and hence, airport robots can't be entrusted completely with airport security yet.

F. Management

Robots have been deployed for carrying out mundane and repetitive tasks at airports, such as cleaning and maintenance. With the help of sensors, the robot can detect obstacles in its path and avoid them, ensuring that the robot works efficiently. It can choose the best route available for cleaning and can move autonomously using a map of the airport stored in its database.

Airports can get congested at times and can prove to be a harrowing experience to flyers. Airport robots can be leveraged to ease congestion and provide a happy experience to passengers. Robots can limit the number of passengers in a particular area of the airport if it detects that the area may get crowded. They can prove the most useful during the holiday seasons when airports and hotels operate to their maximum capacity. With efficient management, these can run smoothly and reduce overhead costs resulting from inefficiently managed situations.

Many airports around the world are using robots at air terminals like robot Spencer in Amsterdam Schiphol airport (AMS), Josie Pepper - the robot operated by Lufthansa at its Munich (MUC) hub, robot Hitachi's EMIEW3 at Tokyo's Haneda Airport and many other are examples. In this race of robotization, India has also shown its participation by introducing robot RADA at Delhi International airport which uses AI technology to address passengers' queries after scanning their boarding passes, such as departure gates, flight status, weather at destination and also for entertainment purposes.^[1]

Robot, which opened in November 2017, is India's first robot-themed restaurant that uses robots to serve food. At the Semmancheri restaurant, one of the white-and-blue robots, holding a tray of noodles, says, "your food is ready, take it yourself, have a nice day", in a subdued, mechanical

voice. The actual serving, though, is done by the waiter, who shadows the robot.

III. METHODOLOGY AND PROCESS

The proposed system works in following two phases:

- In the first phase, the robot will use camera to perform gender and age detection in real time by using face detection algorithms. The age value fluctuates, so it will then take average of ages predicted in few milliseconds and then forward these predictions to Alexa skill kit via http endpoint.

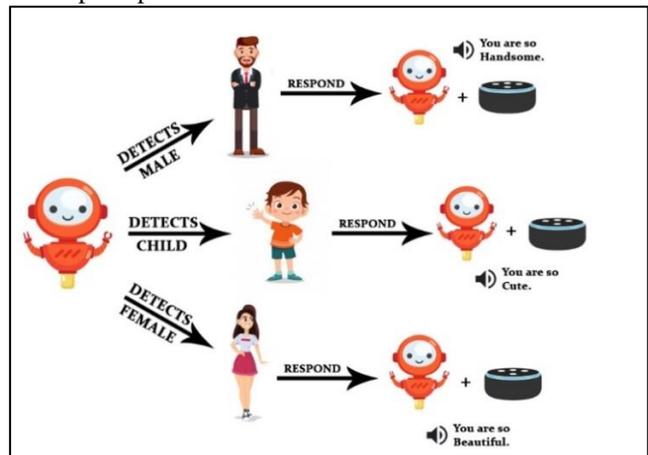


Fig. 1: Proposed Solution

- In the second phase, as per the input from detection algorithm, Alpha will greet the person accordingly using Alexa voice. If the person is a male, Alpha will compliment him that you are handsome; if the person is a female, Alpha will compliment her that she is beautiful and if it is a child, compliment it as cute.

Many different algorithms have been preferred based on the most widely used criteria. The algorithms are Face Detection in color Images using Principle Component Analysis (PCA), Blink Detection (human eyes are simultaneously blinking; this can be used to find and normalize faces), Real-Time Face Detection Using Edge-Oriented Matching, skin color, wavelet, Artificial Neural Network (ANN) and Haar-Cascade. Among all these we used Haar-Cascade as it showed better accuracy and fast response in real time scenario.

A. Haar Cascade

Haar Cascade is a machine learning object detection algorithm proposed by Paul Viola and Michael Jones in their paper "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images (where positive images are those where the object to be detected is present, negative are those where it is not). It is then used to detect objects in other images. Luckily, OpenCV offers pre-trained Haar cascade algorithms, organized into categories (faces, eyes and so forth), depending on the images they have been trained on. The idea of Haar cascade is extracting features from images using a kind of 'filter', similar to the concept of the convolutional kernel. These filters are called Haar features.

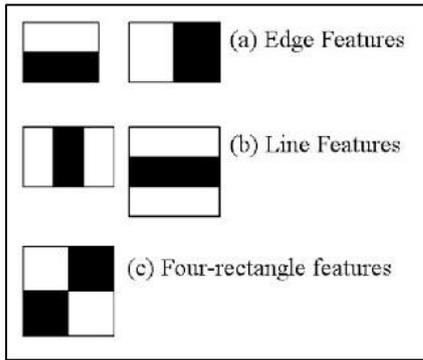


Fig. 2: Haar features

The idea is passing these filters on the image, inspecting one portion (or window) at the time. Then, for each window, all the pixel intensities of, respectively, white and black portions are summed. Finally, the value obtained by subtracting those two summations is the value of the feature extracted. Ideally, a great value of a feature means it is relevant. [3]

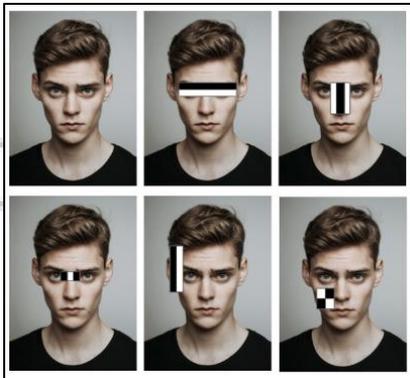


Fig. 3: Implementation of haar features

B. Averaging the Output

After the detection of the gender of the person, we take an average of 20 frames as the detection is live so it fluctuates. To be more accurate we take the average of the age of 20 frames and see how much times the model predicted the same gender. After the final gender of the person is obtained, the model chooses a comment randomly from the dictionary of comments for both male and female accordingly.

C. Alexa Skill Activation

To get the endpoint to use when calling the Alexa Skill Activation API for a user, first make a GET request to the Alexa API Endpoint API. This API returns an endpoint based on where the user's Amazon account is registered. Use the returned endpoint when you call any of the Alexa Skill Activation API operations.

If the GET request returns more than one endpoint, then the Alexa service could not determine the correct endpoint for the user. In this case, when you call the Alexa Skill Activation API for the user, you must call each of the endpoints in sequence. Only one call will succeed. [4]

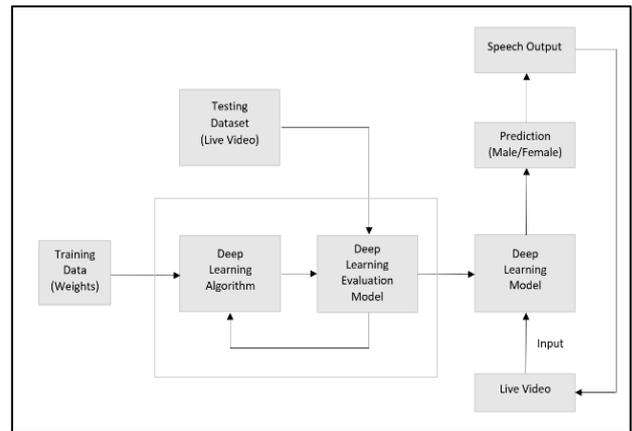


Fig. 4: Process Flow

IV. RESULTS

The Model is running without error and directs to a localhost where output generated can be seen.

```
(ml) C:\Users\sanch\Downloads\Keras_age_gender-master>python app.py
Using TensorFlow backend.
C:\Users\sanch\AppData\Local\conda\conda\envs\ml\lib\site-packages\sklearn\externals\joblib\_init_.py:15: FutureWarning: sklearn.externals.joblib is deprecated in 0.21 and will be removed in 0.23. Please import this functionality directly from joblib, which can be installed with: pip install joblib. If this warning is raised when loading pickled models, you may need to re-serialize those models with scikit-learn 0.21+.
warnings.warn(msg, category=FutureWarning)
* Serving Flask app "app" (lazy loading)
* Environment: production
  WARNING: This is a development server. Do not use it in a production deployment.
  Use a production WSGI server instead.
* Debug mode: on
* Restarting with windowsapi reloader
Using TensorFlow backend.
C:\Users\sanch\AppData\Local\conda\conda\envs\ml\lib\site-packages\sklearn\externals\joblib\_init_.py:15: FutureWarning: sklearn.externals.joblib is deprecated in 0.21 and will be removed in 0.23. Please import this functionality directly from joblib, which can be installed with: pip install joblib. If this warning is raised when loading pickled models, you may need to re-serialize those models with scikit-learn 0.21+.
warnings.warn(msg, category=FutureWarning)
* Debugger is active!
* Debugger PIN: 219-553-490
* Running on http://127.0.0.1:5000/ (Press CTRL+C to quit)
```

Fig. 4: Localhost IP obtained on running Model through flask



Fig. 5: Age and Gender Detection

The figures above show that the algorithm is successfully working in real time to detect age and gender of a person and generating correct outputs.

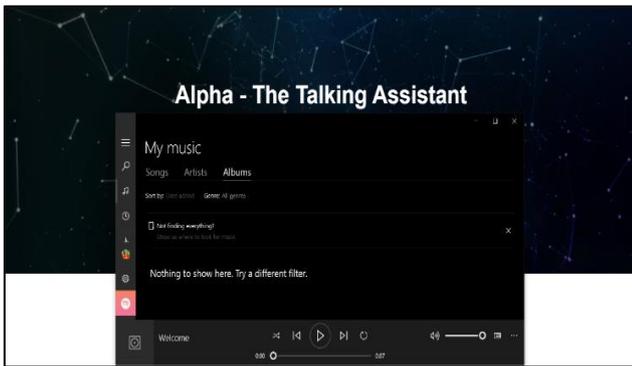


Fig. 6: Speech output of result obtained

V. CONCLUSION

In today's world, people are attracted to many fancy technologies which leave them awestruck and make them ponder about the science behind it. Alpha will similarly become the center of attraction at the airport, hotels, Café, etc. that will interact with the passengers/customers and will help skyrocket the tourism of the city and customers at restaurants. This paper introduced an Alexa Skills and Machine Learning based application. This application has a number of advantages such as low cost, reliability, never affected by adverse weather etc. In our future research, we intend to extend the initial results obtained to include additional performance metrics, such as the ability to guide people around the airport and hotels, greet them on arrival and act as help desk for small queries.

Some Future Enhancement are-

- Can be implemented in all the cities.
- Multilingual Communication.
- Enhanced as a Guide.

REFERENCES

- [1] <https://thepointsguy.com/news/say-hello-to-the-new-era-of-airport-robots/>
- [2] <https://www.allerin.com/blog/are-robotic-terminals-the-future-of-aviation>
- [3] <https://medium.com/dataseries/face-recognition-with-opencv-haar-cascade-a289b6ff042a>
- [4] <https://developer.amazon.com/en-US/docs/alexa/account-linking/skill-activation-api.html>
- [5] <https://edition.cnn.com/travel/article/robots-in-airports/index.html>
- [6] <https://builtin.com/robotics/robots-in-restaurants-food-service>