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SMART HIRE

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ABSTRACT: Organizations are under pressure as never before to hire top talent. The war for talent is more intense than ever before and companies are looking for any advantage they can get in attracting and hiring the best employees. The hiring manager of a company could receive many resumes for a job posting. It is a challenge to go through and evaluate all the resumes. Hiring the apt employee according to the mentioned job description is a tedious job for a job call, many job seekers will apply for it and submit their resumes to the company. There are chances of getting resumes that are not matching to the mentioned role as provided by the company Matching of job profiles, removal of duplication and evaluation of resumes are a tedious job for the HR of the company The Smart Hire is to assist hiring managers and others involved in the hiring process to fast track the initial screening of resumes. This project aims to assist hiring managers and others involved in the hiring process to fast track the initial screening of resumes.

KEYWORDS: Resumes, Smart Hire, Managers, Job Seekers .

I. INTRODUCTION

A. Background

A company receives many resumes for a particular job offer and finding the most appropriate among this is a hectic job for the recruiters. The resumes may contain many skill set the job doesn't need, but manually sorting out the thousands of resumes is very difficult. Smart Hire can be used to reduce the workload of a HR recruiter by identifying the most suitable resumes and its skillset. The application also extracts the details like name, contact details, skill set etc., making it easier for the job recruiters to identify and detect the qualification and skill set. The system also provides a way to findout the duplicated resumes that may be incorporated within the many resumes received.

B. Features

The main problem arises in shortlisting candidates which is the hectic task of handling resumes and duplication of the resumes. Smart Hire helps in ranking the resumes and fetching the required details from the resumes. The application also helps in identifying the duplicate resumes and get details of the candidates from the social media platforms.

The objective is to make a app to work out the predefined function according to the user's demand.

- It reduces the human effort and time spent after these tasks.
- It eases the tedious job of ranking the resumes.
- The Hiring manager can enter the details of the job and find the most suitable candidate for the job profile
- The duplication of the resumes can be effectively reduced.
- The manual work done by the hiring managers can be eliminated.

C. Motivation

Hiring the apt employee according to the mentioned job description is a tedious job For a job call, many job seekers will apply for it and submit their resumes to the company. There are chances of getting resumes that are not matching to the mentioned role as provided by the company matching of job profiles, removal of duplication and evaluation of resumes are a tedious job for the HR of the company.

Therefore, the main motivation behind implementing this project was to assist hiring managers and others involved in the hiring process to fast track the initial screening of resumes.

II. LITERATURE SURVEY

This discusses about the various literatures and publications that are conceptually or technically related to the various aspects of this project, which are studied and analysed before the implementation of this project.

D. Related Papers

- Resume Parser with Natural Language Processing by Satyaki Sanyal, Souvik Hazra, Soumyashree Adhikary, Neelanjan Ghosh
- Resume Classification using various Machine Learning Algorithms - Riya Pal, Shahrukh Shaikh , Swaraj Satpute and Sumedha Bhagwat
- Resume Parsing and Categorizing by AbeerZaroor
- Resume Information Extraction with A Novel Text Block Segmentation Algorithm
- Automated Resume Evaluation System using NLP, Rohini Nimbekar; Yoqesh Patil; Rahul Prabhu; Shainila Mulla
- Resume Parser Using Natural Language Processing Techniques,Shubham Bhor1 Vivek Gupta Vishak Nair Harish Shinde Prof. Manasi S.Kulkarni
- Social Media Analysis using Natural Language Processing Techniques-Jyotika Singh

CASE STUDY ANALYSIS

REFERENCES	ADVANTAGES	DISADVANTAGES
2017-Resume Parser with NLP	Text with different format can be converted to text. Resume is ranked.	Duplicates are not Recognized
2022-Resume Classification Using Various Machine Learning Algorithms	Resume is classified and ranked	An interface for candidate to upload and edit resumes are not available
2010-Resume Information Extraction with novel Block Segmentation	Each block is extracted to check skills and extract other information about the candidate	Only PDF Documents can be parsed
2022-Social Media Analysis Using NLP	Video Reviews are extracted monthly and yearly basis. Comments are analyzed	Resume analysis is not done
2017-Resume Parsing and categorizing by Abeer Zaroor	It can Parse all types of formats and effectively categorize the resume.	Social Media Analysis is not done
2019-Automated Resume Evaluation System	Ranking of resumes are done	Duplication of resume is not done. Additional details about the candidate are not obtained.
2021-Resume Parser using NLP techniques	The system will provide the quality of applicants to the company and unfair practices in the process will be dampened.	The resumes can be uploaded many times.

E. Observation and Conclusion

While conducting the literature survey, most of the papers, I went through, were discussing about ways to find out the duplicated resumes. Different types of techniques were used to extract the details of the candidate from social media.

Above discussed papers suggested various methods and technologies to assist hiring managers and others involved in the hiring process to fast track the initial screening of resumes.

Therefore, the aim was to develop a cost effective method to assist the hiring managers to do the screening process of the resumes.

Various papers discussed here allows classifying and ranking the resumes, extracting video reviews on monthly and yearly basis, to provide the quality of applicants to the company.

The NLP based data extraction engine helps the recruiters in identifying the right person for the job and it can be done using SMART HIRE Application.

III. DESIGN AND IMPLEMENTATION

Design of the system includes mainly two steps:

- System Design
- Detailed Design

In System design a structural framework for the entire system is created. It is done in such a way that related part come under particular groups. Thus after the system design, a network of different groups is obtained. It is the high-level strategy for solving the problem and building a solution. It includes the decision about the organization of the system into subsystems, the allocation of subsystems to hardware and software components, and major conceptual and policy decisions that form the framework for the detailed design.

In detailed design, each group is studied in detail and the internal operations are decided. Based on this, the data structures and the programming language to be used are decided. Apart from detailed design, the system design can be grouped into physical design and structural design. The physical design maps out the details of the physical system and plans the system implementation and specifies the hardware and software requirements.

Structured design is an attempt to minimize the complexity and make a problem manageable by subdividing into smaller segments, which is called modularization or decomposition. In this way structuring minimizes intuitive reasoning and promotes maintainable provable of systems. The structured design partitions a program into small, independent modules. They are arranged in a hierarchy that approximates a model of the business are and is organized in a top-down manner. Logical design proceeds in a top-down manner. General features, such as reports and inputs are identified first. Then each is studied individually and in more detail. Hence the structured design is an attempt to minimize the complexity and make a problem.

Main components of System Architecture are :

- **Flutter Application** :In this the mobile based and web based application is created end users can interact with the system using the app.
- **FireBase** :Used for storing the resumes entered to the system through the application interface
- **NLP Engine** : This engine is used to rank and shortlist the resumes using tokenization.

- **FLASK and FAST APIs** : These are used for finding the duplicated resumes and provides the shortlisted resume details
- **SOCIAL MEDIA APIs** : These are used to find out the details of the shortlisted candidates using their social media handles

Fig. 1 Proposed Schematic Diagram



Fig. 1: Use Case diagram

IV. SEQUENCE DIAGRAM

A Sequence diagram simply depicts interaction between objects in a sequential order i.e. the order in which these operations take place.

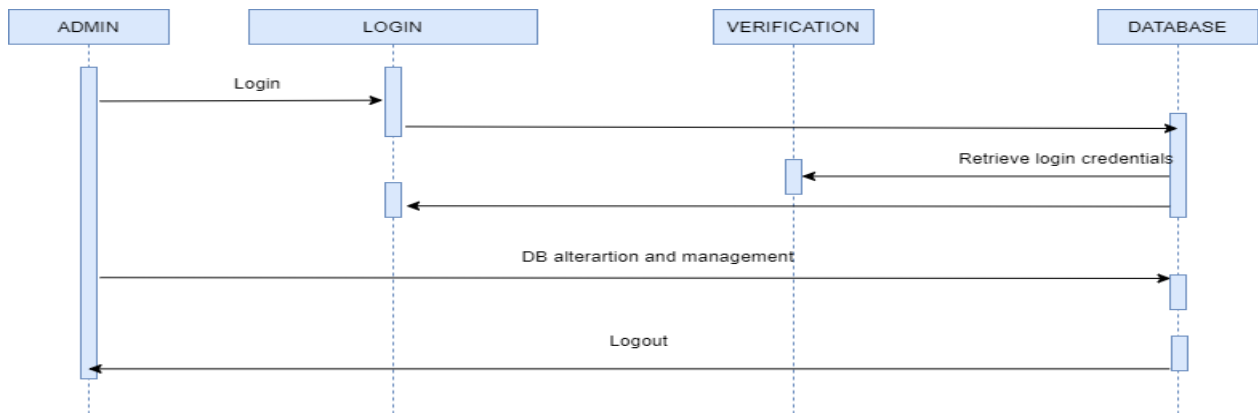


Fig. 2 Admin Sequence Diagram

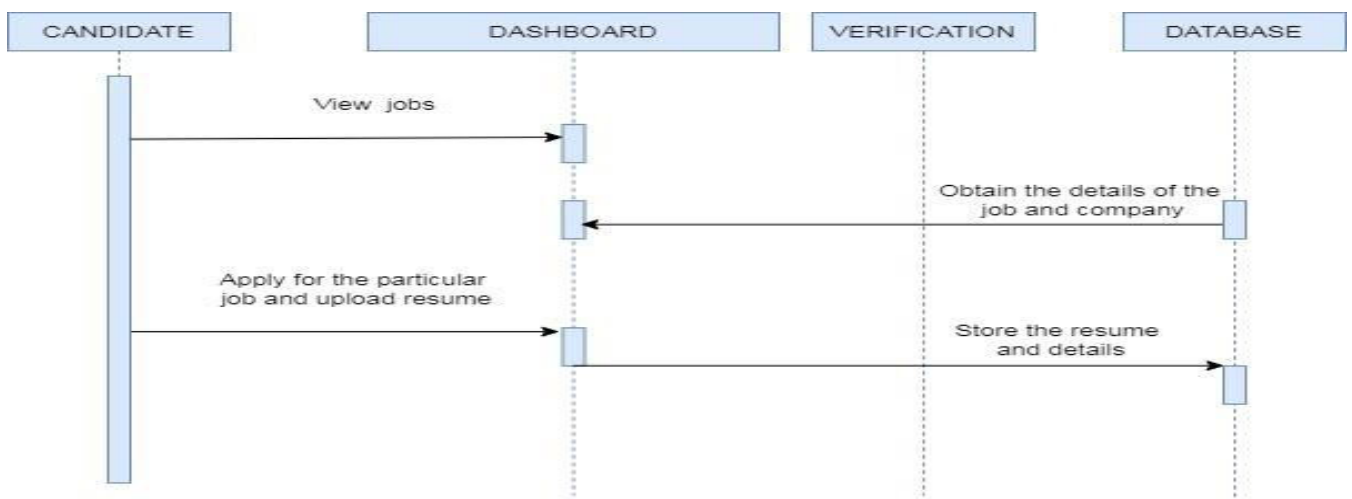


Fig. 3 Candidate Sequence Diagram

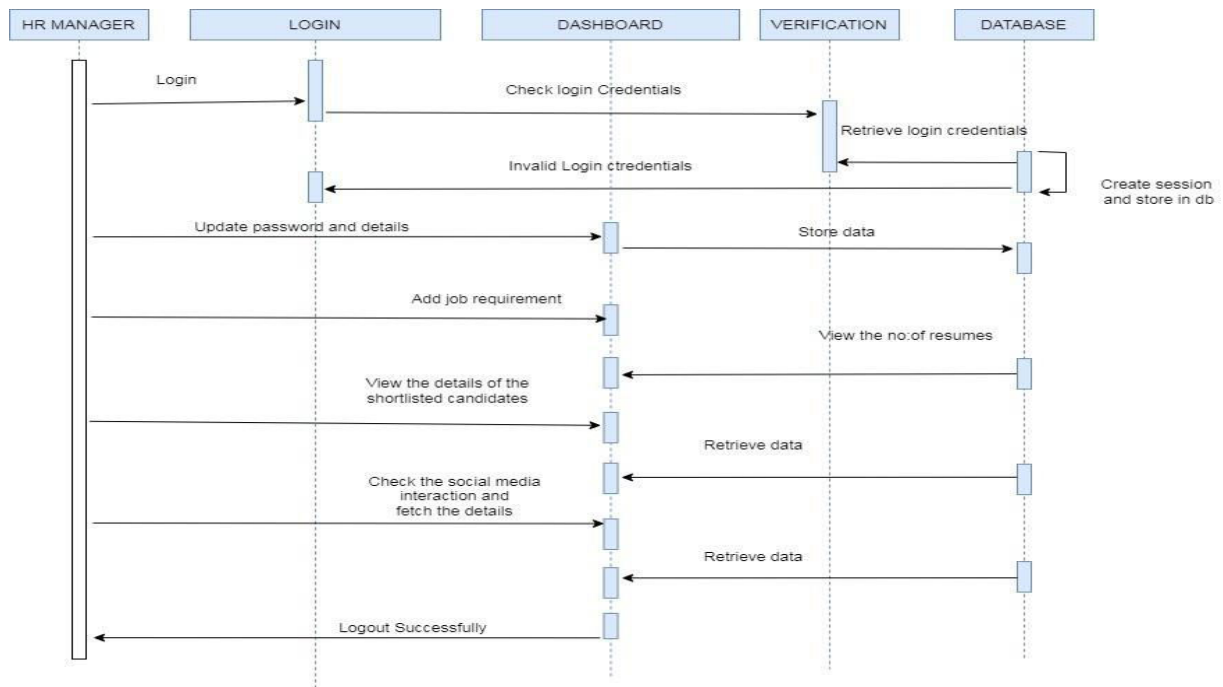


Fig. 4: HR Sequence Diagram

IV. THE WORKING SCENARIO

It starts with the person entering the room which is the region of interest or the target region and ends with the robot performing some functions based on the position of the person in the room.

A. Video Capturing

- A static camera was used for capturing the video of a particular room where there is an elderly person who is being assisted by a home assistive robot.
- The captured video is converted to still images frame by frame.
- The initial frame with no moving object is taken as the reference frame and the frame where the moving object appears is taken as the current frame for further processing
- The reference frame and current frame are given to a background subtractor to separate foreground from the background.

B. Moving object detection

- Background subtraction is the process of separating out foreground objects from the background in a sequence of video frames.
- It is a widely used approach for detecting moving objects from static cameras.
- For motion detection two images of the same size are taken from video – one is the background image in which moving object is not present and the other one is the current image in which the moving object appears .
- Frame Difference method was used for detecting moving objects from the difference between the current frame and a reference frame.
- The subtraction of the image is done pixel-by-pixel. So the background of the current image and the reference image will have the same pixel value.
- A threshold value is selected such that it is not too low or too high for accuracy.
- The threshold value is applied to this difference to get the foreground mask.

- If the difference between the pixels is greater than the threshold value, then it is a foreground pixel. Otherwise it is a background pixel.

$$D(x, y) = 1 \text{ if } F(x, y) - B(x, y) > T$$

Otherwise

C. Human Identification

- Blob detection method was used to detect regions in a digital image that differ in many properties such as brightness or colour compared to surrounding regions. All the points in a blob will be similar to each other.
- Blob detection was used to obtain regions of interest for further processing.
- These regions show the presence of moving object in the image and can be applied for object tracking
- The aspect ratio (width/height ratio) is calculated for each blob to identify the detected moving object as human.
- Finally a PIR sensor was used to confirm if the identified moving object is a human.

D. Tracking using Kalman filter

- A tracking algorithm using Kalman filter was used to locate the human at any point in time.
- For this only a limited region of the image is searched to improve efficiency.
- Kalman filter is used for tracking objects and focuses on two important features:
 - Prediction of object's future location
 - Reduction of noise introduced
- Kalman filter is composed of two stages – PREDICTION and CORRECTION
- Kalman filter track the system in discrete interval of time.
- After morphological operations are done to remove noise and fill in holes, predict new locations of existing track.
- Use the Kalman filter to predict the centroid of each track in the current frame, and update its bounding box accordingly.
- Shift the bounding box so that its center is at the predicted location.
- It also deletes the tracks that have been invisible for too many consecutive frames.
- Finally it draws a bounding box and label ID for each track on the video frame and the foreground mask.
- It then displays the frame and the mask in their respective video players.

V. CONCLUSION

In the first phase of the project a static camera was used to capture the video of a room where the person was supposed to be. Then background subtraction algorithm was used to differentiate foreground image from background. Morphological operations were done to remove noise so that we can get a clear image of the foreground where further processing will be done. by calculating the aspect ratio and using a PIR sensor we identify the detected moving object as human.

In the second phase Kalman filter was used for tracking the human and based on the position of the human in the room hardware part was successfully implemented.

The system is designed in such a way that any common man can easily use it without any ambiguity or confusion.

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