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# EnterVu - Recruitment through Data Science and Artificial Intelligence

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*Abstract: Recruiting the perfect candidate is difficult task for an organisation, as it includes huge process for interview. The concept is to determine the suitability of candidate for the job by the means of CV Analysis, Knowledge Analysis, and Qualitative Prediction using Audio analysis. The best suitable candidate will be determined by assessing the examination performance and video answers to personality questions (uploaded by the candidate), using Data Analytics and Artificial Intelligence. The candidates will appear for the exam of their interested domains, then record and upload video answers to the defined personality questions. And this data will be analysed to determine the suitability of candidate using Data Analytics and Artificial Intelligence. Currently the recruitment process is hectic and costly. Also, the candidates are in large numbers so there is scarcity of jobs and the candidates may have to work in a domain away from their interests. This project will help the recruitment process to be cost effective and also the appropriate candidates will have suitable job and thus, each job will be performed by the appropriate person, which will surely contribute to enhance the progress.*
*Keywords: Recruitment, Artificial Intelligence, Audio Analysis, Data Analytics, Data Science, Skill-sets.*

## I. INTRODUCTION

India, being the epicentre of population boom and an increasing technological hub with centres like Pune, Hyderabad and Bangalore, Employment problems are one of the major issues to be solved. We find that many of the employees are not comfortable with their job, and also sometimes, the job is not what they are interested for. This is also an issue with the employers, as in some cases the employees aren't suitable for the job. This creates imbalance in careers, business and opportunities. The reason behind this is improper allocation of jobs and improper judging of skills. Besides, the recruitment process is hectic and costly. The recruitment process is carried out in personal or video conferencing. The management of time and place constraints in the process are difficult.
Even though there are screening processes, due the large number of applicants, and a few members to judge them, the applicants may not be judged correctly. Their skill-sets may not be justified properly. Implementing a system, which would define proper skill-sets and assign suitable jobs considering the interests and personality of the applicants will solve the issue to greater extent.

## II. STUDIES AND FINDINGS

Traditional recruitment system was time consuming, hence an online recruitment system was introduced for University Staff in Nigeria. The system was efficient and capable of managing almost all stages of the process. The system employed a 3-tier architecture. Advertise job, Shortlist, Interview, Reject/Appoint candidate were the steps in the system [3].

Recruiting the perfect candidate isn't an easy task. It requires many processes for manipulation of the candidate's capabilities. Next tough part is the comparison and delivering feedback to the candidates. There are lots of online websites which is based on job offering. They provide intermediate communication platform. None of these websites provide tracking of the interview process. Keeping a track of these processes is necessary. Recruitment Tracking System is a system developed by students of Alpha College of Engineering, Gujarat. The system keeps a track of the recruitment process, which enhances the management of the Recruitment Procedures. The system is online, and also helps jobseekers to hunt for jobs and organisations to find for candidates. The system, in short, is a platform for the - i) The Jobseekers and ii) The Companies, mainly [6]. In March 2017, Mariia Bogatova, Bachelor of Business Management, published a thesis on Improving Recruitment, Selection and Retention of employees. The research was focused on recruitment channels, selection methods and retention tools for small-and-medium-sized companies. The research was designed and conducted in order to improve the work of the organisation [4].HR departments were prompted to shift to paperless processes. This is where the E-Recruitment system was encouraged. Including technology in the process would reduce the cost of

recruitment processes, and ease will be achieved. Reducing the cost as well as the Human Resource personnel spends less time on the hiring process. Applicants have an advantage of applying from remote areas, without physically filling in with documents [2].

The rapid developments of job markets, left the traditional recruitment system becoming insufficient. The enormous number of applications received, cannot be manually manipulated, hence an Online Automatic Recruitment system was proposed in the year 2015-16.

The proposed system was based on Exploiting multiple Semantic Resources and Concept-Relatedness Measures [5].

None of the above works focused on defining skillsets of the candidate and providing appropriate match of job-candidate. We found that, Now-a-days recruitment procedures are carried out either in Personal Visit or Video Conferencing. But Personal Visit, time and place of both the Interviewer and the Candidate has to be same, while in Video Conferencing only the time has to be same and place can be varied.

These procedures are time consuming and costly to be carried out. Besides due to lots of applicants many of them have to compromise their skill-set and perform other tasks (for example A Java Developer has to work on Database Maintenance) due to lack of identification of their skill-sets. Also, the recruiter team has to analyse all the candidates individually. Hence, a system is required which will analyse the skill-set of each candidate by examining them and using Data Science and predict their personality using Artificial Intelligence and then shortlist them as per their calibre for the jobs.

## III. PROPOSED SYSTEM

We propose a system EnterVu, to overcome the present obstacles in recruitment process. EnterVu is a system that replaces the traditional recruitment process with an advanced process. It is a dedicated evaluating system, that focuses o the performance of candidates for evaluating their skills and predicting their personality. Paperless processes are now-a-days in use. EnterVu stores all the constraints and candidate, as well as procedural information and data to the database AWS S3 and AWS RDS. Employment is a major part of our career and online recruitment systems are very popular these days. This is why the system is implemented over the web. The personality prediction paradigms are one of the trending technologies used.

EnterVu, predicts the personality such that the person is judged correctly, using audio analysis paradigms. AWS EC2 provides processing power and sufficient performance for the system. AWS is cost effective and scalable, which makes it more favourable for use in the implementation of EnterVu.

## IV. OBJECTIVES

The main objectives of EnterVu are

A. Eliminate time and place constraints from recruitment process
B. To judge applicant properly and define skills accurately
C. To implement the Recruitment process at advanced level
D. Eliminate persisting employment problems
E. To provide fair opportunities to the youth
F. To implement cost effective and efficient recruitment system.

This system can serve as HR team assistant widely used for recruitment purpose. Through this system, the candidate can achieve a suitable job as per his interests and capabilities.

## V. SYSTEM SPECIFICATIONS

A. *User Classes And Characteristics*

This project is meant to provide a hybrid solution that is more convenient and economical. The system can define skills based on performance, and match the best suitable ones. The user interface will be as interactive as possible. Users would share and store data effortlessly. Also, the administrator could issue permissions for accessing the storage device and features available, to all users, and administrator can have full control over the system. The user is authenticated for having a valid user credential, as per the administrator. The system will thus require a user-name and password to have access to the portal. It is also important that the system be as user friendly and as dynamic as possible, so that it can interact with various users simultaneously. Most importantly, the system must be reliable, regardless of the situation, the data must be prevented from errors and secured.

*B. Requirements*

This project will work in the minimum system specifications as follow:

1) HTML5 compatible browser and Active internet connectivity
2) AWS or any equivalent server (4 CPUs 8gb of RAM and above)
3) A storage instance of minimum 100GB
4) User consisting of an audible output
5) User consisting of web-cam or video recording device
6) User consisting of a microphone or any other voice recording device

*C. User Interfaces*

The user interface includes a login page as soon as the application starts with a text box for user-name and a password box for the password. Once the application starts, we have normal page consisting of basic menus in title bar, apart from this we have various news updates on the portal as per user interests. A web-interface is provided to carry out the examination and another web-interface for video answering. Another interface is provided to display the final output that is the analysed and predicted outcomes.

*D. Hardware Interfaces*

The system has following hardware requirements or interfaces:

1) Server (AWS or equivalent) for processing and hosting the system.
2) A host device (Computer) used by the user for using the application.
3) Audio and video recording equipment
4) Microphone for audio input.
5) Speaker or Headsets for audio output.

*E. Analysis Model: Incremental Model*

The incremental build model is a method of software development where the product is designed, implemented and tested incrementally (a little more is added each time) until the product is finished. It involves both development and maintenance. The product is defined as finished when it satisfies all of its requirements. This model combines the elements of the waterfall model with the iterative philosophy of prototyping. EnterVu system needs to be developed incrementally. As there are major components that may needed to be altered while the development process. Incremental Model enables to do this, and adding some features each time will enable us to decide the exact feature and hep in adding more features. Thus, we are using INCREMENTAL MODEL for the development of this project.

*F. Software Quality Attributes*

The application software gives justice to important quality attributes such as:

1) *Flexibility*: Input related to various domains accepted by the system.
2) *Reliability*: System generates data based on user data and is reliable.
3) *Usability*: Provides simple user interface easily accessible by the various users on the network.
4) *Scalability*: System can be used for variable data as well as is scalable on multiple systems.
5) *Security*: Secure, as the system asks for user's credentials to provide access to system.
6) *Dependability*: System is dependable on the data collected by the process and outcomes from the system are dependent.
7)

## VI. SYSTEM ARCHITECTURE

The overall system design consists of following modules:

1) Storing Candidate Registration details
2) Creating Login profile.
3) Managing Portal for news updates, etc.
4) Conduct Examination.
5) Preparing question set as per interests of the candidate.
6) Evaluate the next question to be asked based on previous questions.

*7)* Analysing test results.

*8)* Define skill-sets based on the analysis- Report 1.

*9)* Video answer recording for personality questions.

*10)* Extract audio from the video for Audio analysis.

*11)* Store Audio analysis outcomes Report 2.

*12)* Generate combined report.

*13)* Submit combined report to HR team.

The system consists of three subsystems: Front-end(web-app), processing unit (AWS EC2 server) and database (AWS S3, MySQL). The database is in MySQL. We use python language for the implementation of all the processing modules concerned with Data Science. The web-app is the interactive end for users, where users will perform all their activities. The examination will be carried out through web-app and the results will be stored to database, from here the results will be analysed using Data Analytics paradigms. The analysis outcomes will be used for defining skill-sets, strong weak concepts, etc. After this, the video answers will be stored to the database. The audio extracted from video will be analysed. The analysis of audio will yield Confidence, Fluency, Grammar, communication skills of the candidate. Finally, the combined report of result analysis and audio analysis will be submitted to the HR team.
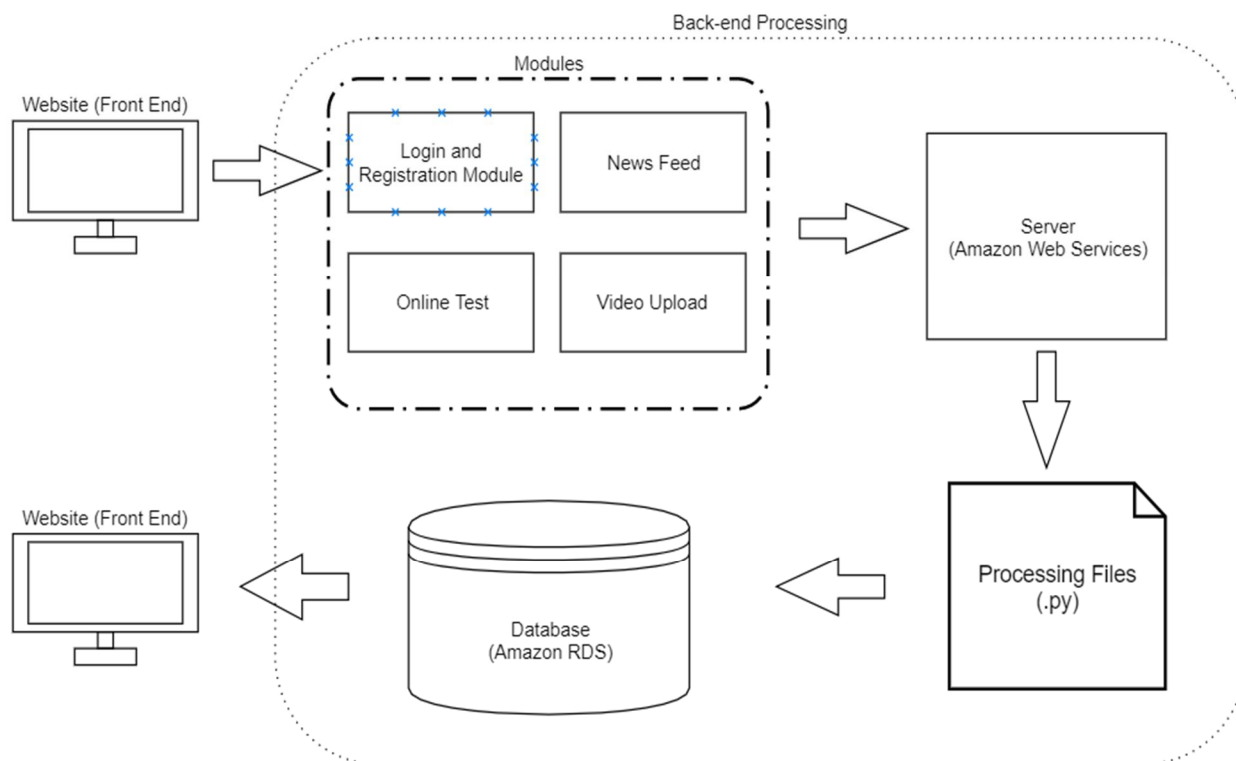


Figure 1. SYSTEM ARCHICTURE

## VII.     ADVANTAGES AND LIMITATIONS

*A.  Advantages*

*1)* Data Science is best for analyzing properties from given data.

*2)* AWS from Amazon is regarded as one the best cloud computing platforms.

*3)* Data Analytics yields efficient outcomes.

*4)* Audio Analysis is advanced technology and accuracy is high.

*5)* Cost effective.

*6)* Reduced human intervention and human dependency.

*B. Limitations*

1) Latency may be introduced in Audio Analysis.
2) Server Failures may occur.
3) Complete Personality analysis is not possible.
4) May take substantial time to train and implement.

## VIII. FUTURE SCOPE

The system implemented now is based on analysis of exam results and audio or voice. The video can be analysed for prediction of personality and other constraints such as expressions, manners, etiquette, etc.

## IX. CONCLUSION

Upon addressing the employment problems that persists, it is quite interesting to see how the project can be implemented and have potential to take the recruitment process to advanced level and solve many of the problems regarding employment and the process.

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