

Harnessing Artificial Intelligence to Empower HR Processes and Drive Enhanced Efficiency in the Workplace to Boost Productivity

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Abstract— The current study aims to advance knowledge about how to relate to AI-based systems for HR operations to increase productivity and develop applications. The system uses AI technologies including machine learning, natural language processing, and classification analysis to automate and streamline HR operations like job applications, recruitment, learning enhancement, mentoring for applicants, and enrichment of start-ups. The solution is anticipated to improve process accuracy and efficiency while reducing the time and cost associated with HR functions. The project entails creating a system for applications as well as an efficient system. The project's outcomes are anticipated to show the potential advantages of AI in HR-related tasks.

Keywords—Artificial Intelligence, HR functions, machine learning, natural language processing.

I. INTRODUCTION

To examine novel approaches to increase HR productivity in-depth and to suggest a solution by creating an application or idea that uses AI/ML-based algorithms. By using machine learning algorithms to analyze employee data, HR can identify patterns and factors contributing to employee turnover, allowing them to take proactive steps to prevent it. In Summary: By automating tedious operations, delivering data-driven insights, and enhancing employee engagement and retention, AI may greatly increase HR productivity.

II. PROBLEM UNDERSTANDING

A. Problem Definition

HR Department is always in work with every organization. It is there to help the organization with multiple tasks such as Hiring Candidates, defining the rules for the organization and setting the bar for all the employees to be well educated in all aspects.

B. Problem Overview

To boost productivity, cut expenses, and enhance the overall employee experience, businesses are continually

seeking methods to streamline their HR procedures. Traditional HR procedures, however, can take a lot of time and resources, which causes inefficiencies and delays in decision-making. The volume of data and information needed to make informed judgments is another challenge HR personnel frequently faces.[8]

By using the power of artificial intelligence to improve decision-making, expedite HR procedures, and improve employee experience, an AI-based HR productivity-boosting app can assist enterprises in overcoming these difficulties. Routine operations such as organizing interviews and screening resumes can be automated with the aid of the software, freeing up HR staff members to work on more important projects. Predicting job fit based on candidate profiles can also assist in identifying the most qualified applicants, increasing the effectiveness and efficiency of recruiting.

An AI-based HR productivity-boosting tool can also aid in improving performance management by monitoring employee performance, offering individualized feedback and growth plans, and pinpointing areas for development. To find areas for improvement and tailor the work experience, it can also analyse

employee feedback, sentiment, and behavior. This increases employee engagement and satisfaction.

Yet creating a successful AI-based HR productivity-boosting app necessitates a thorough comprehension of HR procedures, machine learning algorithms, data analytics, software development, and user experience design. Consequently, the issue is to create an app that efficiently answers organizational needs while offering a seamless and user-friendly experience for HR professionals and employees.

III. LITERATURE REVIEW

In the paper (A Study of Artificial Intelligence and its Role in Human Resource Management, 2019) according to the researcher Vivek V. in this report, AI in HR productivity is vital, and only 40% of organizations and industries use AI in their recruitment process. The majority of these businesses are just using chatbots for the AI process. While AI can help in the interview process by analyzing words and speech patterns in exams, it can also be used to reduce administrative burdens. He also mentioned that AI can help us in the recruitment and selection process by selecting the right applicants with the necessary skill set and making fair decisions, which lowers discrimination. AI may also make work faster and more efficient by performing fundamental activities such as file reporting, copying, filing, etc. The researcher also explained how AI can pose challenges for the team because not everyone in the industry is skilled enough to understand the AI tools, and finding the right candidate to manage AI will be a major challenge in the industry. It can also be difficult for HR to make decisions because AI can override HR decisions.

In the paper (Artificial Intelligence and Human Resource Management in Indian IT Sector, 2019) researchers tell us about the lessons for adopting AI, and they give reasons AI, for example, will enable us to gain or maintain a competitive advantage in every field of labor; AI will enable us to enter new markets; and it will also help us reduce costs and make their work even faster than other competitors who aren't using AI yet. AI also makes things more customer-friendly and fulfills their wants by tailoring them to their specific requirements. Researchers also recognized certain benefits of AI in Business, such as improving their products' features, functionality, and performance, freeing up people through automation, and improving overall efficiency and inventiveness. It will also assist in decreasing manpower, developing new goods, making better decisions using Deep Learning and Analysis, and so on.[9]

In the study "Artificial Intelligence in Human Resource Management" the researcher discusses the advantages and difficulties of implementing AI in the field of HRM. The researcher informs us about the advantages of artificial

intelligence include lessening the administrative workload, assisting with talent acquisition, predicting employee retention rates, eliminating errors, allowing businesses to obtain accurate results, raising employee engagement at work, and many other benefits. The drawbacks of artificial intelligence include the fact that it might be challenging for staff members to learn and adapt to the AI tools while still being proficient in their respective fields and digital technologies. Technology is challenging and restricting the role of the HR department's ability in making day-to-day work-life decisions based on the experience they have.[10]

The research article "Role of Artificial Intelligence in Human Resource Management: Overview of its Benefits and Challenges" discusses how AI can help in the recruitment process. It can assist with resume screening and background checks. Human resource management employs artificial intelligence (AI) tools like chatbots, customer relationship management (CRM), and Applicant Tracking Systems (ATS), to deliver real-time responses to all inquiries asked by candidates. They also discussed how AI tools have enabled them to identify skill shortages and build training courses for employees that are personalized to their needs in this article. AI-powered tools automate the learning process by making videos. Researchers also observed a crucial point: if an employee intends to quit the firm, the management might undertake measures such as encouraging them through raises and discounts to entice them to return. AI tools can also assist us in assessing reasonable compensation for employees based on education, experience, skill set, and so on.[11]

In the study article "To Study the Impact of Artificial Intelligence on Human Resource Management," researchers discuss the future influence of AI on various occupations. Teaching kids in the United States with the help of AI allows them to learn topics in new ways and attracts them to studies. Automated automobiles are one of the best instances of AI that will eliminate drivers and reduce the number of accidents. Artificial intelligence can also outperform lawyers by forecasting better legal outcomes. Researchers learn about well-known organizations such as Aeye, Google, and IBM that are already utilizing AI to boost their work effectiveness. AI is vital in the recruitment process, performance management, talent management, and maintenance, among other things.

In this paper, "AI is coming - and HR is not prepared" As the world of AI is rapidly evolving, candidates have very little knowledge of any of the AI systems, making the competition difficult and forcing them to learn how to use AI technology to its maximum potential. There had been many polls performed in the last 18 months held by many huge multinational companies and they find out that there is a shortage of expertise and experience to work with AI. Companies like IBM have

also found out that if companies won't make the learning of AI necessary for their employees they will going to lose their edge in the upcoming days' Researchers also said that only some employees in the United States are using AI functions and they fear that HR won't be able to make use of it effectively.

The paper titled "The impact of AI on strategic HR decisions making" how AI plays a vital role in human management, mostly in manpower-related work to boost productivity. It is difficult to keep the record manually but with the assistance of AI it can be done easily with the help of automation and that would make the recruiting process easier and faster as HR gives most of his working hours in this process. Researchers also noted that AI will make superior decisions in employee performance and appraisal systems; it will not discriminate on any basis and will provide a fair opinion on everything.

Existing System

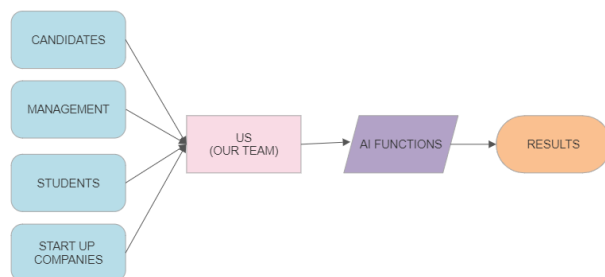
There are many areas where AI-powered tools are already being used such as recommendation systems on learning platforms, AI also helps in employee engagement by analyzing employee sentiment and engagement levels through natural language processing(NLP) and sentiment analysis, another area where AI is used is performance management here AI-powered tools provide real-time feedback, coaching, and development opportunities to employees, enhancing their performance and productivity, AI is also helpful for professionals to understand where training and development is required, improving the overall performance of the organization, AI also assists in employee retention by predicting which employee is most likely to leave and why this information can be used to develop targeted retention strategies such as offering career development opportunities, mentoring, or flexible work arrangements[12]

AI has the potential to transform HR by improving productivity, streamlining processes, and enhancing decision-making capabilities. By leveraging AI-powered tools and technologies, HR professionals can focus on strategic activities that add value to the organization, while AI takes care of the administrative burden.

A. Proposed System

We desire to make an application with multiple interfaces.

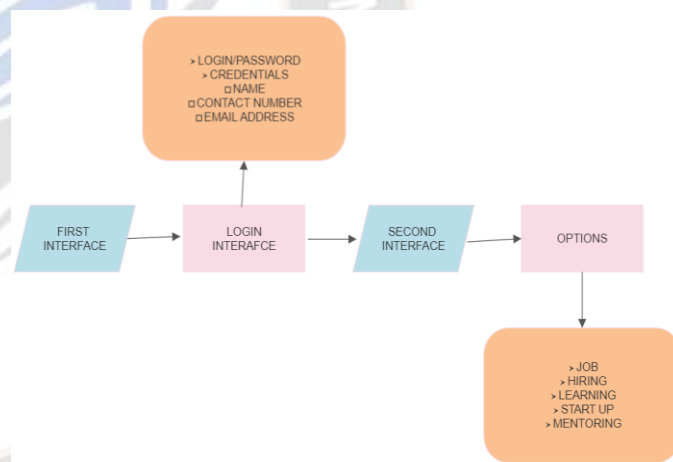
for every user that leads to the desired result as per the user's aspiration. The main concept of the project is well described below:



• Login interface:

This is the first interface that the user will see after opening the app. This will comprise of the following thing:

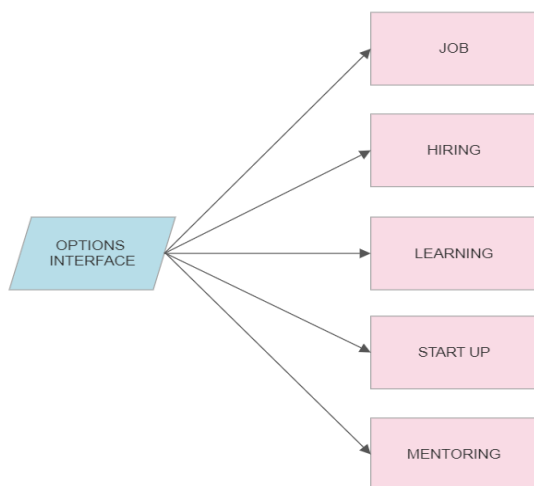
1. Login/Signup
2. Password
3. Credentials
4. Name
5. Contact number
6. Email address



• Choice interface:

After logging in or signing in the user will get to the main menu which will show the following options to the user:

1. Job
2. Hiring
3. Learning
4. Startups
5. Mentoring



• Job Interface:

If the user selects the job option then the user will get to this interface which will contain the following options:

1. Verification

Here the user will have to fill in the following details

- a. Age more than 18 or not
- b. Aadhar card number
- c. Degree credentials if passed
- d. If not mark sheet of the 5th-semester min required less than that won't be allowed.

2. Field and Skillsets

Here the user will choose his field of interest as per the degree he has completed or pursuing. Some examples are as follows:

- a. Computer science engineer
- b. Data science engineer
- c. Electrical engineer
- d. Aerospace engineer

etc.

3. Profession choice

Here the user will choose the job of his preference which will be shown based on the selection of the option is chosen in the just above option.

4. Test

After filling the user will have to give 2 tests subject test and the ethics test.

a. Subject test

This test will comprise of 20 questions about the English language 50 questions from skills and fields selected

Each question will be of 2 marks.

There will be no negative marking

Passing eligibility 75%

Total attempts allowed 3

b. Ethics test

This test will comprise of

30 questions based on ethics and soft skills

Each question will be of 2 marks

There will be no negative marking

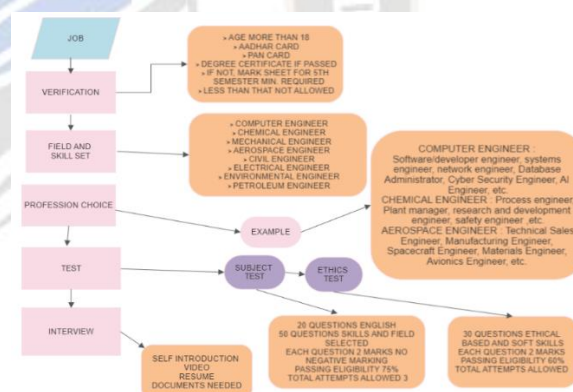
Passing eligibility 60%

Total attempts allowed 2

5. Interview

After completing all the above steps the applicant will have to upload the following things for interview evaluation:

- a. Self-introduction video
- b. Resume
- c. Documents Needed



• Hiring Interface:

If the user selects the hiring option, then the user will get to this interface which will contain the following option

1. Profession interested

This option will let the hirer decide the category he wants to hire.

2. Field skill set

This option will let the hirer decide the skillsets required for the job he is providing.

3. Salary

This option will let the hirer decide the salary he will be paying for the job Ione is providing.

4. Verification

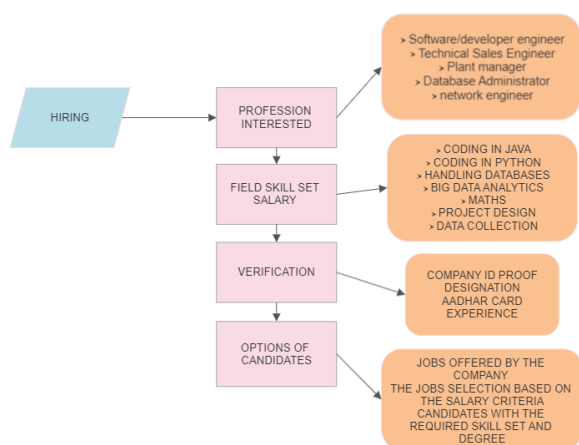
Here the hirer will have to provide the following details for verification of the firm. It will comprise the following options

- a. Company ID
- b. Designation
- c. Aadhar Card
- d. Experience

5. Options for candidates

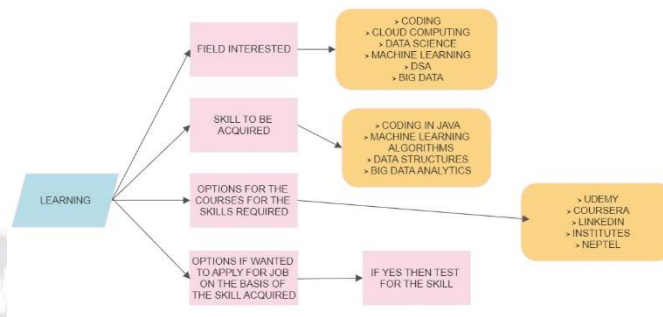
There will be the option provided for the candidates which are as follows:

- a. Job offered by the company
- b. Job selection based on the salary criteria
- c. Candidates with the required skill set and degree



4. Available jobs based on the skillsets acquired.

If yes then a test will be taken on the skillset the candidate acquired.



Start-Ups Interface:

If the user selects the start-up option then the user will get to this interface which will contain the following options:

1. Hiring

This interface allows the start-up owner to hire the employee available on the app.

2. Investment

This interface allows the start-up owner to raise investment for his firm by contacting the big companies in partnership with the app.

3. Mentoring

This option will allow the owner to get expert mentorship from the big bulls companies for the best of his company.

4. Getting infrastructure

This option will allow availing the infrastructure for buying or renting around their location.

5. Providing Equipment

This option allows the owner to get the best option and dealers available around them for purchasing.

Mentoring Interface:

If the user selects the mentoring option then the user will get to this interface which will contain the following options:

1. Searching for job profiles based on the degree

This allows the candidate to get expert mentorship and suggestions according to degree and skillsets.

2. Skills required for the specific job profile

This allows the candidate to get expert mentorship and suggestions so that he can be ready for a particular job of his desire.

Learning Interface:

If the user selects the learning option then the user will get to this interface which will contain the following options:

1. Field Interested

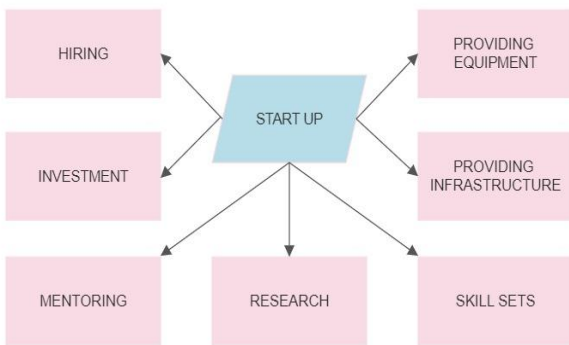
The candidate can choose the field of interest he wants to pursue his learning.

2. Skills to be acquired

Here the candidate can choose a specific job and the AI will let you know the skillset you are lacking and will suggest online courses for acquiring those skills.

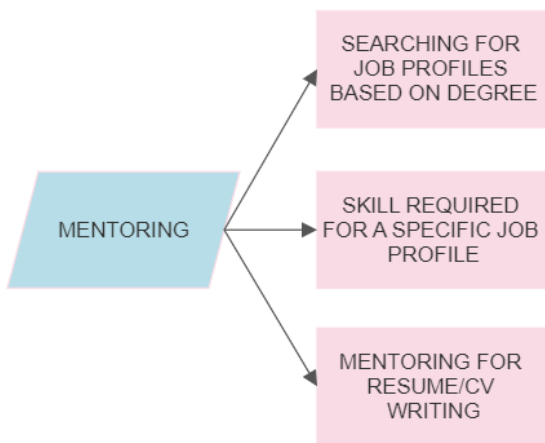
3. Options for the courses for the skills required

Direct links will be provided to the candidate for the skillsets he wants to acquire.



- **Mentoring Interface:**

This allows the candidate to get expert mentorship and suggestions to write a better resume/CV which is very important for anyone to apply for a job.



IV. PROBLEM FORMULATION

The problem at hand is the issue of doing every single work on a manual process. In this fast-moving world, HR departments and candidates have very little time and want the work done as soon as possible. Doing things with the help of a manual process takes plenty of time, making the person go through a long process waiting time.

The HR department of an organization is already having an immense workload for managing a variety of tasks recruitment, employee onboarding, performance evaluation, and employee engagement. However, these non-automated tasks can be pretty lengthy and time-consuming which can lead to ineffectiveness in HR productivity. Therefore, the decision of using AI to boost HR productivity in the organization can give fortunate results in less time without affecting the efficiency of the work.

Few problem formulations in the different sectors of HR management:

A. JOB:

In the field of Job finding for the new generation, there comes many disadvantages of not using AI.

1) Limited reach: seeking jobs manually can limit the seekers to a few job boards or company websites and they will miss all those opportunities which were not advertised or they were not aware of.

2) Time-consuming: job seekers may have to sit for many hours for finding the relevant position in hundreds of job postings which can be especially frustrating using AI can make their work faster and more accurate as per their requirements.

3) Inefficient matching: Traditional methods for job seeking often rely on keyword matching, which can be irrelevant for the job seeker to find the desired position for him/her. AI algorithms, on the other hand, can take into account a wider range of factors such as the candidate's location, salary expectation, and work experience to provide a more relevant job.

B. Hiring:

Some disadvantages of not having AI in the hiring process are:

1) Biasness: Human recruiters are prone to unconscious biases that can influence the hiring decision. They may favor candidates who share their gender, race, or educational background and reduces the personal touch. on another side, AI algorithms can be designed to eliminate such biases and focus solely on the candidate's qualifications and job fit.

2) Inefficient screening process: The screening process can be time-consuming and may not identify the best candidates which can lead to limited candidate pooling. while AI algorithms can analyze large volumes of candidates and provide the recruiters with a shortlist of the candidates by saving a lot of time it can increase efficiency.[14]

C. Start-ups

1. Limited access: Access to massive datasets that might offer insights into industry trends, consumer behavior, and other crucial elements may be restricted for businesses without AI. Massive volumes of data may be analyzed by AI algorithms, which can then give startups insightful information that will help them expand.[15]

2. Inefficient decision-making: Using a trial-and-error method for making some important decisions can be risky and inefficient. Having the AI algorithm helps them make informed decisions about product development, marketing strategies, and other key areas which will increase the efficiency of success.

3. Competitive disadvantages: Companies that don't use AI may be at a disadvantage in the marketplace compared to their competitors that do. By helping startups to evaluate customer data, improve their marketing tactics, and enhance their product offers, AI can provide them a competitive edge.[16]

D. Mentoring:

If the user selects the mentoring option then the user will get to this interface which will contain the following options:

1. Searching for job profiles based on the degree

This allows the candidate to get expert mentorship and suggestions according to degree and skillsets.

2. Skills required for the specific job profile

This allows the candidate to get expert mentorship and suggestions so that he can be ready for a particular job of his desire.

3. Mentoring for resume/CV writing

This allows the candidate to get expert mentorship and suggestions to write a better resume/CV which is very important for anyone to apply for a job[13]

E. Learning:

If the user selects the learning option then the user will get to this interface which

will contain the following options:

1. Field Interested

The candidate can choose the field of interest he wants to pursue his learning.

2. Skills to be acquired

Here the candidate can choose a specific job and the AI will let you know the skillset you are lacking and will suggest online courses for acquiring those skills.

3. Options for the courses for the skills required

Direct links will be provided to the candidate for the skillsets he wants to acquire.

4. Available jobs based on the skillsets acquired

If yes then a test will be taken on the skillset the candidate acquired.

V OBJECTIVES

Using artificial intelligence to improve HR procedures, boost productivity, and improve the employee experience is the goal of applying AI in HR productivity. The

following are some ways that AI-based HR productivity-boosting technologies might benefit organizations:

1. **Streamline HR processes:** HR procedures can be made more efficient by using AI-based solutions to automate regular operations like resume screening, interview scheduling, and onboarding procedures. This frees HR staff members to work on more strategic projects.
2. **Improve Recruitment:** By examining resumes, finding keywords, and forecasting job fit based on candidate profiles, AI-based solutions can be used to find the best candidates for a job.
3. **Improve Candidates:** AI-based solutions may assess candidates, behaviour, and feedback to pinpoint areas for development and personalize the studying environment.
4. **Improve Mentorship:** AI-based systems can be used to monitor candidates' performance and offer individualized growth plans, and feedback.
5. **Boosting Start-Ups:** AI-based solutions may examine start-up requirements, and forecast upcoming developments, and problems, helping decide the further step based on data analysis.

VI METHODOLOGIES

The dataset will be loaded into the algorithm first. To precisely establish what must be done, the algorithm is set up so that we first clean the dataset and show a few results. The dataset is then preprocessed in order to get it ready for machine learning models. We will then run Regression on our dataset after that.

Regression will then be used on our training dataset, which contains 90% of the data, and the remaining 5% on our testing dataset.

Regression analysis will be done in a way that provides answers to questions like, "How many candidates passed at the first attempt, the second attempt, or the third during the subjective test?" How many hiring profiles could employ people, and how many could not? How many small, medium, and large start-ups received assistance? How many students completed their coursework with the goal of receiving a certification? Then visualize those results.

VII EXPERIMENTAL SETUP

The experimental setup is a set-up in Google Collaboratory. We import the modules Pandas, NumPy, Matplotlib.pyplot and sub tools such as Ensemble, Preprocessing, Model selection, Regression, Pylab and scikit-learn module.

We use multiple self-prepared datasets to perform our analysis. These datasets are as follows: job.csv, hiring.csv, mentoring.csv, start_up.csv and learning.csv. These have multiple fields.

Job dataset has age, Aadhar card, degree certificate, marks of attempts of subjective and ethics tests etc. This dataset has 24 columns and 154 entries.

The hiring dataset has fields such as company ID proof, designation, Aadhar card, experience, do they want experienced candidates or interns, and how much salary they are offering. This dataset has 11 columns and 150 inputs.

Mentoring dataset has fields namely designation, mentoring required for resume, job, or for information, future scope. This dataset has 7 columns and 150 entries.

Start-Up dataset has columns named for if want to hire, if, yes then how many employees, do you want to invest or you want personal evaluation, do you want to mentor, do you want help with infrastructure or with equipment. This dataset has 14 columns and 150 entries.

Learning dataset relatively has less columns namely designation, do you want online platform, do you want certification, do you want job based on the skill acquired after certification. This dataset has 9 columns and 155 entries.

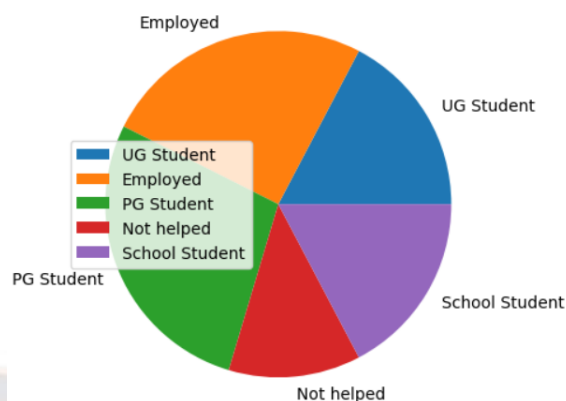
Finally, we have visualized how many candidates passed during which attempt in the subjective test, how many candidates passed the ethics test, how many small/medium/large start-ups we helped, how many hiring department people qualified to hire the candidates. How many different candidates got help for acquiring skills and how many different candidates got mentoring?

VIII. CONCLUSION AND FUTURE SCOPE

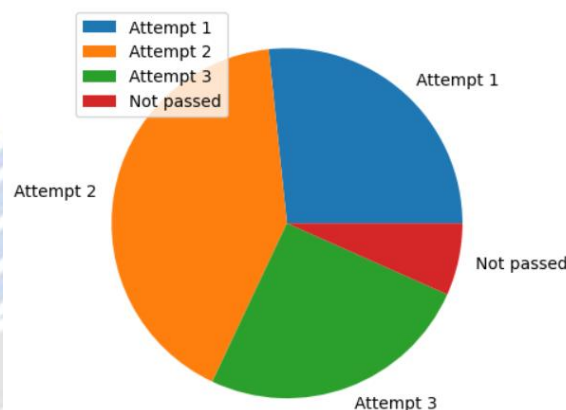
We found that many candidates get help for the aspects they want whether it is learning, or it is applying for a job or it is getting mentoring hiring team get well-vetted candidates and the candidates go through a thorough process and they won't have to worry about fraud companies wasting their time.

In the process of data cleaning many columns we dropped as they were not required for the visualization. Such as the package offered, the skills a candidate has, do candidates want to apply for a job or not after learning.

On performing the analysis, we get the following results:

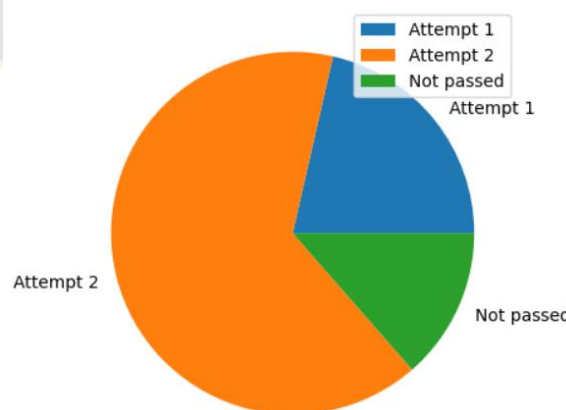


How mentoring helped different candidates. It helped 17% of Undergraduate students, 25% of employed students, 27% of Postgraduate students, 17% of School students and 12% of candidates who were not helped.



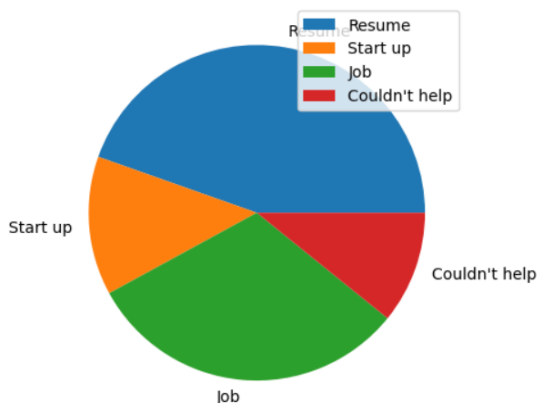
How many candidates were passed through any of the three attempts given to them.

In this we know 27% of candidates passed on 1st attempt, 40% of candidates passed on the second attempt, 25% of candidates passed on the third attempt and 0.6% of candidates failed in all three attempts.



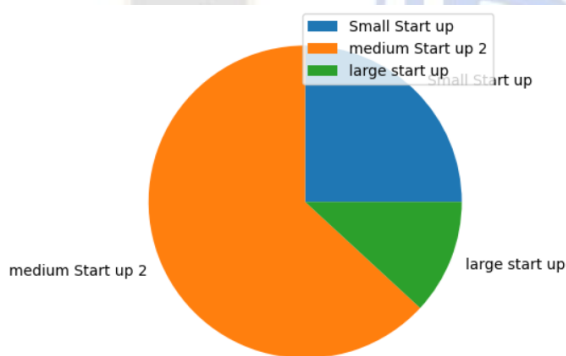
How many people passed the ethics test after getting passed through the verification stage and the subjective test stage?

In the visualization, we get to know that 21% of candidates passed the ethics test on the first attempt, 65% of candidates passed on the second attempt and 13% failed in this or any previous stage.



How many candidates were helped in the learning process?

40% of candidates were mentored for resumes, 13% of candidates were helped with mentoring for start-ups, 31% of candidates were mentored for the job and 10% of candidates were there we couldn't help mentoring.



The size of the start-up helped.

We helped 25% of small start-ups, 63% of medium start-ups, and 11% of large start-ups.

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