

HR Functions Productivity Boost by using AI

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Abstract— In today's fast-paced world, the Human Resources (HR) department plays a pivotal role in the success of any organization. With a plethora of tasks to manage, the HR team often faces the daunting challenge of screening and selecting the best candidates for various positions. To streamline this process, we propose a novel system that integrates the power of Kruskal algorithm for resume screening, conducting a qualifying test called "BTNT," and psychological testing like Emotional Intelligence to analyze the shortlisted candidates. Our proposed system utilizes a Knapsack approach under Dynamic Programming to suggest the most suitable candidates for HR roles. By automating these tedious HR tasks through Artificial Intelligence (AI), we ensure a faster, more accurate, and cost-effective selection process.

Our research paper presents a detailed analysis of the proposed system's effectiveness and showcases the benefits of adopting this innovative approach. We believe that this cutting-edge system will revolutionize the HR industry by providing an efficient, objective, and unbiased selection process. The BTNT test's incorporation will help identify candidates' technical skills, while the psychological test will highlight their soft skills. This holistic approach ensures that organizations not only hire the best-fit candidates but also create a positive work environment that fosters growth and development. Our research paper is a must-read for any HR professional looking to optimize their recruitment process and gain a competitive edge in the market. With our proposed system's implementation, companies can attract and retain top talent, improve employee productivity, and ultimately increase their efficiency.

Keywords—Artificial Intelligence (AI), "BTNT test", Psychological Testing, Greedy Approach, Kruskal algorithm, Dynamic Programming, Knapsack approach.

I. INTRODUCTION

AI and intelligent technologies in HRM functions

The process of recruitment and selection is a critical aspect of any organization's success. The Human Resources (HR) department plays a vital role in finding the right fit for each role. The traditional method of resume screening and conducting interviews can be time-consuming and often fails to identify the most suitable candidate for the job. In this context, we propose a revolutionary approach that incorporates Kruskal's algorithm and psychological testing to streamline the HR functions, specifically in the recruitment and selection process.

Our research paper explores the innovative system that leverages the power of Kruskal algorithm for resume screening and conducts a qualifying test called "BTNT." This test will analyze technical skills and Personnel Understanding to evaluate soft skills, resulting in a complete evaluation of candidates' competencies. The proposed system uses a Knapsack approach to shortlist the most suitable candidates for

the HR roles, resulting in a faster, more objective, and unbiased selection process.

The utilization of Artificial Intelligence (AI) in the HR industry is not a new concept. However, our proposed system's unique blend of Kruskal algorithm, BTNT test, Knapsack approach, and automation of HR tasks through AI will ensure a more effective, efficient, and accurate recruitment and selection process. The proposed system will not only save time and resources for organizations but also help identify the right fit for each role and create a positive work environment that fosters growth and development.

We are living in a world of Augmented Reality that is not true artificial intelligence because AI originally means to impart human like skills to machine like self-thinking, but we have to feed data to a model for now to get our results. But we can make Machine Learning better and more efficient by merging it with some powerful algorithms. That's why here we tried to merge Kruskal Algorithm,

Knapsack Approach, and different psychological tests together to have outstanding results.

The paper serves as a valuable resource for HR professionals seeking to optimize their recruitment process and improve the overall employee experience. By adopting our innovative approach, Organizations can boost efficiency, draw in and keep top employees, and ultimately accomplish their corporate goals.

[2] The idea of artificial intelligence (AI) was initially put out in 1956 during a symposium held at Dartmouth College. The goal of ongoing research is to provide robots with the ability to distinguish between their internal activities and the outside environment. AI is interdisciplinary in nature and combines data from several unrelated domains.

II. OBJECTIVES

1. To highlight the importance of a holistic approach in identifying the best-fit candidates for HR roles that considers both technical and soft skills.
2. To benefit the organizations in terms of faster, more accurate, and cost-effective selection process.
3. To provide HR professionals with valuable resources to optimize their recruitment process, improve employee productivity, and achieve corporate goals.
4. To evaluate the effectiveness of the new procedures using a pre-post design to identify significant changes in employee outcomes.
5. To provide recommendations for further improvements and modifications based on the evaluation results.

III. PROBLEM STATEMENT

Human Resources (HR) plays a crucial role in organizational success, but the recruitment and selection process can be a bottleneck, costly, and yield subpar results. Traditional methods like resume screening and interviews are highly subjective, leaving room for error in evaluating candidates' technical and soft skills. This inefficiency can lead to negative work environments, low productivity, and difficulties in achieving corporate goals.

To tackle these issues, there is an urgent need for a revolutionary approach to recruitment and selection, which can optimize the process with cutting-edge technology, and create a work and create a workplace culture that drives success. Our research seeks to address this gap by developing an efficient, objective, and unbiased selection process, leveraging AI, powerful algorithms, and psychological testing.

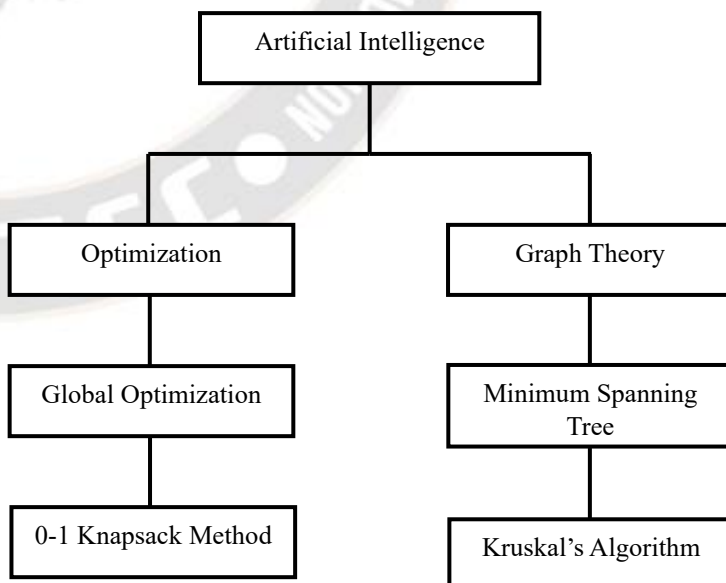
IV. Drawbacks of Current System

There are several drawbacks to existing HR procedures, including:

1. Bias and discrimination: HR procedures can be influenced by unconscious biases, resulting in discrimination against certain groups, such as women, people of color, or those with disabilities.
2. Lack of flexibility: Many HR procedures are rigid and inflexible, which can create problems when dealing with unique situations that require personalized solutions.
3. Poor communication: HR procedures can be difficult to understand, leading to confusion and misunderstandings between employees and HR staff.
4. Time-consuming and bureaucratic: HR procedures can be overly bureaucratic and time-consuming, leading to delays and frustration for both employees and HR staff.
5. Inefficiency: Some HR procedures are outdated and inefficient, resulting in a waste of time and resources.
6. Lack of transparency: HR procedures can be opaque, making it difficult for employees to understand the decision-making process and their rights and responsibilities.
7. Limited focus on employee well-being: Many HR procedures are focused solely on compliance and legal issues, rather than the well-being and satisfaction of employees.

Overall, these drawbacks can lead to a negative employee experience, decreased productivity, and a higher turnover rate. It's important for HR departments to regularly review and update their procedures to ensure they are fair, effective, and aligned with the organization's values and goals.

V. LITERATURE REVIEW:



[1] The study demonstrates an intelligent hiring system that streamlines and automates the employment process using machine learning techniques. Candidate screening, job

matching, and personality evaluation are just a few of the modules included in the suggested strategy, which aims to improve upon the shortcomings of traditional hiring practices and raise the bar for hiring.

The candidate screening module uses natural language processing (NLP) techniques to analyze resumes and extract essential information about candidates' education, work experience, and skill sets. The job matching module uses the decision tree method to compare a candidate's qualifications with those of the position. The personality evaluation module analyses candidates' social media profiles and predicts their personality traits based on their online behavior using a machine learning algorithm.

The proposed approach for managing human resources appears promising in terms of machine learning techniques. To ascertain its effectiveness in real recruitment contexts and to ascertain how it influences the diversity and fairness of the hiring process, more research is necessary.

Contrast of this System with our Proposed System:

1. This system uses the same traditional approach of data preprocessing to select resumes unlike our ML model employs a cost-efficient greedy strategy to efficiently evaluate and rank the resumes.
2. It doesn't evaluate employees properly resulting in poor selection. But The BharatTech Nexus Test (BTNT) is a proctored exam for overall analysis of candidates with high level of our new psychological test.
3. It does not effectively suggest candidates based on the most important skills they acquire. To resolve this issue, we use 0-1 knapsack algorithm.
4. Overall, the suggested approach makes use of cutting-edge methods to assess applicants and update them by personalized AI generated updates.

Through our innovative approach, we offer a compelling solution that surpasses the previous method in cost-effectiveness, impartiality, and efficiency, while effectively mitigating all its deficiencies.

[2] AI provides the information processing muscle to parse and learn from big data, allowing for more effective management interventions and more fitting opportunities for professional development. "Emotion analysis" is a new discipline that analyses data from social media activity of employees to determine their positive and negative emotions as well as any biases they may have. When used wisely, these technologies might elevate emotion analysis software to the top of HRM practice, enabling organisations to respond to employee motivation and sentiment.

Adoption of AI has the potential to enhance HRM performance, but there is a disconnect between expectations and reality.

The focus of the next part, which examines the predicted skill sets that businesses will need to have, will be on how to improve HR staff's capacity to meaningfully query and comprehend AI applications.

AI technologies have allowed HRM to adopt a proactive approach to organisational issues rather than a reactive one. A practical example of this is the adoption of an Organization Guidance System (OGS), which defines desirable results with respect to four vital domains of corporate success: talent, organisation, leadership, and human capital. OGS responds to the pressing demands for quick-response adaptation that have arisen during 2020 as a result of the pandemic, social unrest, and economic difficulties. Additionally, AI has the potential to shift digital knowledge away from the use of scorecards and dashboards which contain out-of-date information and towards the use of big data as a more trustworthy direction for company operations.

It's ability to improve HRM practises makes it justifiable to elevate the HR function to the position of a value-creating activity that may increase shareholder value. This suggests a portfolio strategy of allocating resources to HR programs, such as promoting staff re-training to make it possible to interact proficiently with AI applications. This trend is a sign that HRM is being increasingly acknowledged as being aligned to corporate priorities and deserving of greater organisational prominence.

The HR function has traditionally been divided into four positions: Handmaiden, Lawyer, Regulator, and Change-maker. However, in order to support adaptive behaviour at the organisational level, HRM practises are under growing strain due to the rapid speed of change.

Caldwell's fourfold mode has been strongly empirically challenged by **Guenole & Feinzig (2019)**. Caldwell revised his first models and came up with the descriptive positions of Champion, Converter, Expert, and Synergist. His updated framework focuses on potential HR function responsibilities in the process of organisational transformation.

AI technologies have allowed HRM to adopt a proactive approach to organisational issues rather than a reactive one. According to Abdeldayem and Aldulaimi (2020), a more strategic role for HRM inside firms would need to be properly implemented, for example by considering the effects of employee well-being on operational productivity.

[3] This paper describes how to implement Kruskal's approach for determining the MST in a graph. To efficiently discover the

MST, the authors describe the technique in depth and go over how it can be applied to a Union-Find data structure.

The algorithm's theoretical foundation is presented in the paper, along with an explanation of how it determines a graph's MST. The implementation of the method using the Union-Find data structure is then described by the authors, along with a step-by-step breakdown of the process. They also offer the algorithm's pseudocode and describe how to modify it for improved performance.

The results of the algorithm's testing on various graphs are then covered by the authors.

They demonstrate that their implementation is effective and performs well in terms of both time complexity and space complexity by comparing its performance with that of other algorithms for determining the MST.

The study concludes with a thorough discussion of how Kruskal's algorithm determines the graph's minimum spanning tree and proposes an effective implementation. Experiments and comparisons with different algorithms are also performed by the authors to show the efficacy of their implementation.

[4] This study presents a novel approach for determining the MST in a graph. The authors explain how the new Filter-Kruskal algorithm outperforms the MST algorithms already in use while still upholding the same validity criteria.

The classic Kruskal approach is described in the paper's opening section, along with a brief review of the challenge of finding the MST in a graph. The authors then discuss the Filter-Kruskal algorithm, which employs a filtering method to minimize the number of edges that must be considered when building an MST. As a result, the algorithm can concentrate on the edges that are most likely to be a part of the MST and skip over the edges that are unlikely to be included in it.

The Filter-Kruskal algorithm is thoroughly explained by the authors, who also examine its time and space complexity. Additionally, they demonstrate that the Filter-Kruskal algorithm outperforms other MST algorithms, such as Kruskal and Prim, on a range of graph types by comparing the algorithm's performance with that of these algorithms.

The paper concludes by introducing a new Filter-Kruskal algorithm for determining the MST in a graph. The authors show that, while upholding the same correctness guarantees, the new algorithm is capable of outperforming older MST algorithms in terms of performance. The study makes a significant contribution to the subject of graph algorithms by providing a thorough description of the technique and examining its time and space complexity.

[9] Research has extensively examined the importance of emotional intelligence and found that it directly improves job performance. The study uses a descriptive research design to collect data from 685 middle management employees through observation, questionnaires, and surveys.

According to the research, emotional intelligence and job performance are strongly correlated, with emotional intelligence directly influencing employee performance across all five sectors.[21]

The study's conclusions have important ramifications for India's banking, power, healthcare, information technology, and advertising sectors. It implies that enhancing communication within the workplace, enhancing management effectiveness, and improving training effectiveness all depend significantly on emotional intelligence. Additionally, the study emphasizes how crucial emotional intelligence is for choosing the right job roles and succeeding in organizations.[22]

[10] Situational judgement tests (SJTs) and job performance are the subjects of a thorough investigation in this article.

After conducting a meta-analysis of earlier studies on SJTs, the authors conclude the positive correlation between SJT scores and job success across a range of industries and job types. This suggests that SJTs are a legitimate and trustworthy method for assessing job performance.[18]

How does SJT fit into job performance, then? According to the authors, SJTs subject candidates to fictitious situations and ask them to respond with decisions based on their values, knowledge, and skills. SJTs offer a more accurate picture of how well a candidate might perform on the job by evaluating their capacity to apply these qualities in real-world circumstances.

In conclusion, the authors emphasize the value of using SJTs in the hiring and selection processes by proving their validity and reliability in predicting job performance.

[11] Engineering, information technology, and nursing occupations are the focus of Khalid ALMamari and Anne Traynor's study, which examines the role of cognitive abilities in job performance prediction. To examine the construct validity of cognitive abilities.

Their findings suggest that in predicting job performance across all three occupations, both general and specific cognitive abilities are crucial. The researchers discovered that while specific cognitive abilities were more closely related to job-specific tasks, general cognitive ability was a strong identifier of overall job success prediction.

The importance of bifactor models in examining the construct validity of cognitive abilities and their connection to job performance is also highlighted.

[12] It examines the connection between the Five-Factor Model of Personality and job satisfaction. A significant positive correlation between job satisfaction and four of the five personality traits like extraversion, agreeableness, conscientiousness, and emotional stability was discovered in the study's analysis of data from 117 independent samples. Additionally, the study discovered that, compared to the other personality traits, job satisfaction was more closely associated with emotional stability.

Individuals who score high in conscientiousness tend to have higher job satisfaction levels as they are organized. On the other hand, those who score highly on the neuroticism scale are more likely to be anxious, insecure, and easily stressed, which lowers their level of job performance.

The ability to work in a team, cooperate with others, and have strong interpersonal relationships are all necessary for fostering a positive work environment and a higher level of job satisfaction.

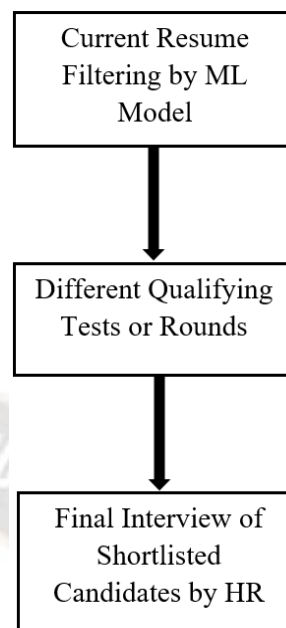
[13] It focuses on the connections between prosocial knowledge, emotional intelligence, and skill in service encounters. The paper examines how much prosocial cognition and emotional intelligence mediate the link between personality and service encounter skill.

The study discovered that the relationship between personality and service encounter skill is partially mediated by emotional intelligence.

Overall, the paper offers insightful information about the intricate interactions between personality, emotional intelligence, prosocial awareness, and service encounter skill. It emphasizes the significance in service-oriented professions because these traits are essential to provide high-quality service experiences.[19]

[14] **The Hogan Personality Inventory (HPI) manual** is a thorough instruction manual for the HPI assessment tool, which is frequently employed in the discipline of organizational psychology to assess psychological characteristics and predict job success. The manual offers comprehensive explanations of the theoretical underpinnings and psychometric characteristics of the HPI.[20]

VI. EXISTING SYSTEM



1) Current Hiring process requires candidates to submit their Resume's which is filtered through ML Model which then further are screened by the recruiting team or hiring manager to identify the most suitable candidates who meet the minimum qualifications and job requirements. These individuals will typically screen candidates based on their experience, education and other key criteria and may further use their specialized software to help manage the application process.

2) Candidates have to go through different qualifying exams and rounds. These consists of different aptitude tests challenging the thinking abilities. Failing this test leads to disqualification from being shortlisted.

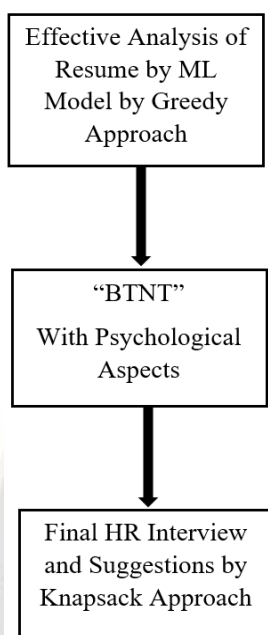
3) After screening resumes and short listing qualified candidates, recruiters will typically identify a shortlist of candidates who meet the minimum qualifications and requirements for the role. These large number of candidates will then be invited for an interview, which may take place in-person or remotely, depending on the company's policies and the location of the candidate. During the interview, the hiring team will assess the candidate's skills, experience, and fit for the job. They may ask a variety of questions to gauge the candidate's abilities and to determine whether they would be a good fit for the company culture.

[17] It may include skills assessments, reference checks, and background checks. In some cases, companies may also ask candidates to complete additional assignments or assessments, such as personality tests or case studies.

The hiring process can take anywhere from a few weeks to several months, depending on the volume of applications and the complexity of the role.

Throughout the process, employers will typically communicate with candidates to keep them informed about the status of their application and to answer any questions they may have. Ultimately, the goal of the hiring process is to identify the most qualified and suitable candidates for the role, while also ensuring a positive candidate experience.

VII. PROPOSED SYSTEM



1) Our proposed system Resumes are analysed efficiently by ML model through "Greedy approach". Using Kruskal's Algorithm,

By prioritizing the most important abilities, this technique can assist in shortening the time and effort needed to test or interview each candidate. Additionally, it can give insight into the key competencies needed for the position, which can be used to improve job descriptions and create more potent hiring plans. Main objective of using Kruskal's Algorithm is to avoid biasing and provide us with a optimal and feasible approach (low to almost null cost).

2) "BharatTech Nexus Test" or short for "BTNT"

The BharatTech Nexus Test is a comprehensive examination designed to evaluate the thinking abilities and technical knowledge of candidates in the Indian tech industry. This test is intended to identify the top talents and young prodigies who have the potential to make significant contributions to the industry.

The qualifying exam is designed to test the basic knowledge of the candidates and to ensure that only the best candidates proceed to the next level. The AI-generated test, on the other hand, evaluates the candidates' thinking abilities and technical knowledge in a proctored environment where candidate's eye movement will also get tracked. There will be System's pre-

requisite test like for the microphone. Before the initialisation of the exam, sound will be produced in the candidate's hardware and check for "vibrations" to ensure that microphone levels are not set to 0 or low. This algorithm has been proven to be highly effective in assessing complex problem-solving skills and critical thinking abilities.

The BharatTech Nexus Test can be taken in many parts as rounds according to the choice of company by feeding different Question Banks to the model.

This test also considers the psychological aspects, Emotional Intelligence and challenges candidate's general thinking abilities while writing the exam as it follows a mixed approach for transition towards some situational based "Subjective Types Questions" where everyone will get a chance to display their unique approach and gain a competitive edge.

3) Final HR Interview and suggestion through knapsack approach.

Knapsack algorithms can be used to create tests that evaluate a candidate's thinking abilities and technical knowledge, but it is important to carefully consider the specific requirements of the test and how the algorithm will be applied.

To use a knapsack algorithm in this context, you would need to define the items that are being evaluated, such as specific technical skills or problem-solving abilities. Each item would then be assigned a weight and value, which could represent the level of difficulty or importance of the item. The weight could represent the amount of time or resources required to complete the item, while the value could represent the impact that item has on the overall evaluation of the candidate.

VIII. GREEDY APPROACH

To obtain a globally optimal solution, a greedy approach to problem-solving entails selecting the best option available locally at each phase. This means the best decision is made based on the knowledge provided at each stage of the problem, without considering how that decision can affect subsequent phases. [3] Optimization problems typically use the greedy strategy to find the best answer to a problem, such as the shortest path or the quickest way to finish a set of tasks. Before using the greedy method, it is crucial to properly analyze the issue and consider alternative measures. [23][24]

Kruskal's Algorithm

[4] Kruskal's approach is an established technique that employs a greedy strategy for determining the minimum spanning tree (MST) of an undirected graph with weighted edges. The MST is a subgraph that joins every vertex in the graph with the least amount of edge weight overall. If adding the edge does not cause the MST to cycle, Kruskal's approach works by arranging

the graph's edges by weight before adding them to the MST. It keeps track of the vertices that are already connected in the MST using a disjoint-set data structure. The technique has a time complexity of $O(E \log E)$, making it a straightforward and efficient method for determining the MST.

IX. EXPERIMENT AND RESULTS:

Define the graph: Define the graph with the required skills as nodes and the similarity between the skills required for different job positions as edges with their respective weights. The weights can be determined by factors like the importance of the skill and the frequency of its use in the job.

The relevance of the skill and how frequently it is used at work are two aspects that affect how much weight each factor has.

Let G be the graph with (e_1, e_2, \dots, e_n) be the edges and (w_1, w_2, \dots, w_n) be the weight of these edges.

let T be the set of edges in the minimum spanning tree of G .

1. Sort the edges in non-decreasing order of weight:

Sort E in non-decreasing order of weight, let $E = \{(e_1, w_1), (e_2, w_2), \dots, (e_n, w_n)\}$

2. Initialize an empty set of visited skills:

Let $V = \{\}$.

3. Initialize the selected candidate set with the candidate(s) who possess the skill with the highest weight:

Let $T = \{(e_1, w_1)\}$.

4. Iterate over the sorted edges and add the candidate who possesses the skill connected by the edge with the highest weight to the selected set if they are not already present in the set:

For $i = 2$ to n :

If V does not contain the vertices of e_i , then add e_i to T and add the vertices of e_i to V .

5. Add the skills possessed by the selected candidates to the set of visited skills if and only if it does not create a cycle in T :

for i in $\text{range}(n)$:

if $T \cup \{e_i\}$ does not contain a cycle:

$T = T \cup \{e_i\}$:

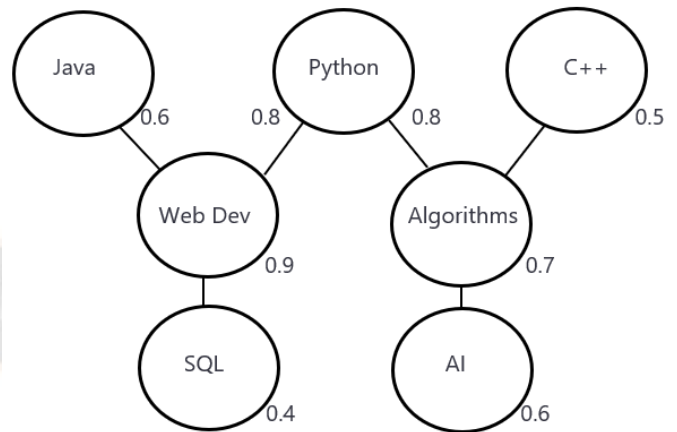
for each vertex v in V , add v to the set of visited skills.

6. Stop the iteration when all required skills are covered by the selected candidates.

7. Use the minimum spanning tree to optimize the testing and interviewing process by prioritizing the testing or interviewing of candidates based on the most critical skills first.

Output T.

Let's take an example of a Software Development Company has to screen resumes for SDE role:



STEP 1: Sort the edges in non-decreasing order of weight:

Java-C++: 0.5 Java-AI: 0.6 AI-Algorithms: 0.7

SQL-C++: 0.5 Python-AI: 0.6 Algorithms-Web Dev: 0.7

Java-Web Dev: 0.9 Python-Web Dev: 0.9

STEP 2:

Empty Set, $V\{\} = 0$;

STEP 3:

Selected set: {Web Dev}

STEP 4:

Selected set: {Web Dev, Algorithms, AI}

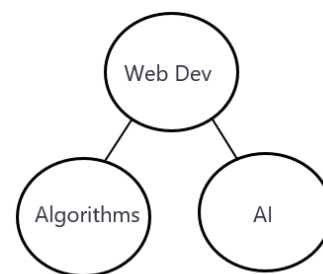
STEP 5:

Visited skills: {Web Dev, Algorithms, AI}

STEP 6:

Stop the iteration when all required skills are covered by the selected candidates.

Output the minimum Spanning Tree:



STEP 7:

Display the shortlisted candidates:

Shortlisted candidates: {Web Dev + Algorithms + AI}

X. DYNAMIC PROGRAMMING

Dynamic programming is an optimization technique that breaks down complex problems into smaller subproblems by storing the solutions to these subproblems. The technique enables efficient calculation of inputs recursively. This method is very helpful in software development projects because it allows programmers to utilize dynamic programming techniques to analyze code issues and find the best fixes. Dynamic programming techniques can determine the best answer to the overall issue by computing the solutions to all potential subproblems and storing them.

Dynamic programming is used to simulate sequential decision processes, such as dynamic systems controlled by a decision maker.

[5] Depending on the condition of the system at each decision point, the decision-maker chooses an action from among the choices. This method focuses on data archiving and reuse to boost algorithm performance, which makes it a desirable choice for handling optimization issues.

Knapsack Problems are efficiently solved using Dynamic Programming.

Knapsack problem is a classic optimization problem in computer science and mathematics that involves choosing a set of items to maximize a specific value while staying within a limited capacity. The problem has a wide range of practical applications, including resource allocation, logistics, scheduling, and finance.

The knapsack problem can be formulated in different ways, but the most common form is the 0-1 knapsack problem, where each item is either taken or left behind. To solve the issue, a set of objects with certain weights and values must be packed into a knapsack with a finite capacity in a way that maximizes their combined value while retaining the capacity.

It has several extensions and variations, including the bounded knapsack problem, where each item can be taken a limited number of times, and the multiple knapsack problem, where there are multiple knapsacks with different capacities.

[5] The problem can also be formulated as a fractional knapsack problem, where items can be divided into fractions and packed accordingly.

In conclusion, the knapsack problem is a fundamental optimization problem with various practical applications. It has several formulations and solution approaches, each with its strengths and weaknesses. However, with the development of new algorithms and optimization techniques, it is possible to solve the problem efficiently and obtain near-optimal solutions.

[6] Here, we consider the classical 0-1 Knapsack Problem where a subset of n items has to be packed into a knapsack of capacity c . Each item j has a profit p_j and a weight w_j , and the problem is to maximize the profit sum of the chosen items without exceeding the capacity c . Thus, we have the integer linear programming equation:

$$\text{Maximize } z = \sum_{j=1}^n p_j x_j$$

$$\text{Subject to } \sum_{j=1}^n w_j x_j \leq c$$

where $x_j \in \{0,1\}, j \in \{1, \dots, n\}$

[6] where x_j takes the value 1 iff item j is packed without loss of generality, all coefficients p_j, w_j and c are assumed to be positive integers. To avoid trivial cases we assume that $w_j \leq c$ for all $j \in \{1,2,\dots,n\}$ and that

$$\sum_{j=1}^n w_j > c$$

Illustration by an algorithm as:

Step 1: Input the available job positions, number of candidates, and their respective scores in the BTNT test with Emotional Intelligence test.

Step 2: Calculate the suitability score for each candidate by combining their BTNT and Emotional Intelligence scores. This score represents the candidate's overall fitness for the job.

Step 3: Sort the candidates in descending order based on their suitability scores.

Step 4: Make a Knapsack according to the number of job positions available considering its capacity to hold.

Step 5: For each candidate in the sorted list, add them to the Knapsack if they fit the job position's requirements and the Knapsack has available space.

Step 6: Remove the added candidate and their score from the list and reduce the Knapsack's capacity accordingly.

Step 7: Repeat steps 5 and 6 until the Knapsack is full or all candidates have been evaluated.

Output the shortlisted candidates, along with their suitability scores, to the HR team for further evaluation.

XI. FINAL RESULT AND DISCUSSION:

By using this approach in the proposed HR functions system, the algorithm can quickly and objectively select the most suitable

candidates for the job. The approach considers the number of available job positions and the candidate's overall fitness for the job, resulting in a faster, more efficient, and unbiased selection process.

By continuing the above example of the company has three open positions for software developers and have a pool of five candidates (that are selected through Kruskal’s Algorithm) who have taken both the BTNT test and the psychological test, and we use the 0/1 Knapsack approach to select the best candidates for the job positions.

Candidate	BTNT Score	Psychological Test Score	Suitability Score
A	90	80	170
B	60	55	115
C	85	75	160
D	70	85	155
E	75	95	170

Table 1: Candidates Scores

Position	Candidate	Suitability Score
1	A	170
2	E	170
3	C	160

Table 2: Knapsack

In this example, the knapsack has a capacity of three job positions, and the candidates are sorted by their suitability score in descending order. The knapsack is initially empty, and the first three candidates that fit the job position's requirements and the knapsack's available space are added to the knapsack.

Candidates A, E and C have the highest suitability scores and meet the job position's requirements, so they are selected for the job positions and suggested to HR.

Hence, our novel system streamlined the process of selection and recruitment for HR and output the desired, more relevant and deserving employees.

The unique blend of algorithms resulted in a revolutionary result and outcome the best way to identify the most critical resource of an organisation i.e., its employees.

XII. PSYCHOLOGICAL DESIGN

[14] **The Hogan Personality Inventory (HPI)** is a personality test designed to measure normal-range personality traits in individuals. Robert Hogan and his associates created it in the 1980s, and since then, it has become a widely used assessment tool in a variety of contexts, including selection and career development.

To help people understand their strengths and weaknesses and make wise career decisions, many organizations use it as part of their selection process.

An instrument for measuring personality traits that are important for job performance is the Hogan Personality Inventory (HPI). **However, the HPI has received criticism for not measuring emotional intelligence in this area (EI). The capacity to comprehend and control one's own emotions as well as those of others is known as emotional intelligence.**

As a result, the HPI might not offer a thorough evaluation of a person's capacity for understanding and controlling emotions at work.

Numerous job roles, particularly those that require interpersonal communication, leadership, and conflict resolution, place a premium on emotional intelligence assessment. Therefore, even though the HPI is a useful tool, it might not give a full picture of a person's chances of succeeding in a particular job role.

Emotional intelligence Test: It is an important factor in job performance, especially in jobs like HR where interaction with others is required. People with emotional intelligence are better able to manage conflicts, communicate clearly, and comprehend others' viewpoints.

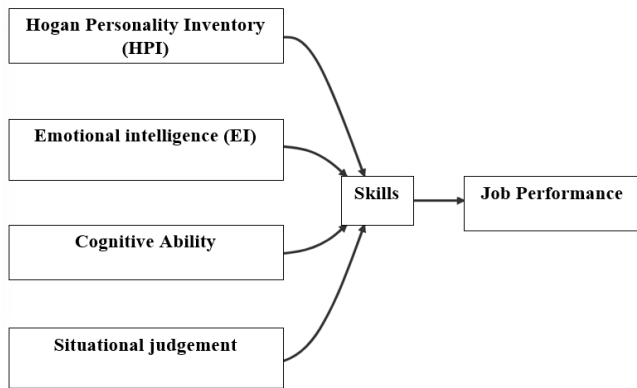
Cognitive Ability Tests: These tests assess a person's capacity for learning, reasoning, and problem-solving. These tests can be incorporated into the evaluation process to reveal information about a person's potential for success in particular job roles.

Situational judgement tests (SJTs): SJTs ask candidates to select the best course of action after being presented with realistic scenarios.

An individual's capacity for making decisions and their likelihood of handling real-life workplace situations can both be measured by this kind of test.

To overcome with the drawbacks of HPI, we proposed a new Psychological Test that combines HPI with EI, Cognitive ability Test, Situational judgement test for thorough examination of a Candidate.

The assessment would reveal the candidate's personality traits as well as their capacity to comprehend and control emotions, communicate clearly, and handle social situations by incorporating all tests. A more complete picture of the candidate's suitability for a position in HR would emerge from this.



For Instance, a company hire an SDE to work on developing a new mobile app.

The Hogan Personality Inventory is designed to identify personality traits that are relevant to the job. For an SDE, this might include traits such as attention to detail, problem-solving ability, and the ability to work independently or in a team environment. By using the inventory to assess a candidate's personality, employers can better understand how well-suited they are to the demands of the job.

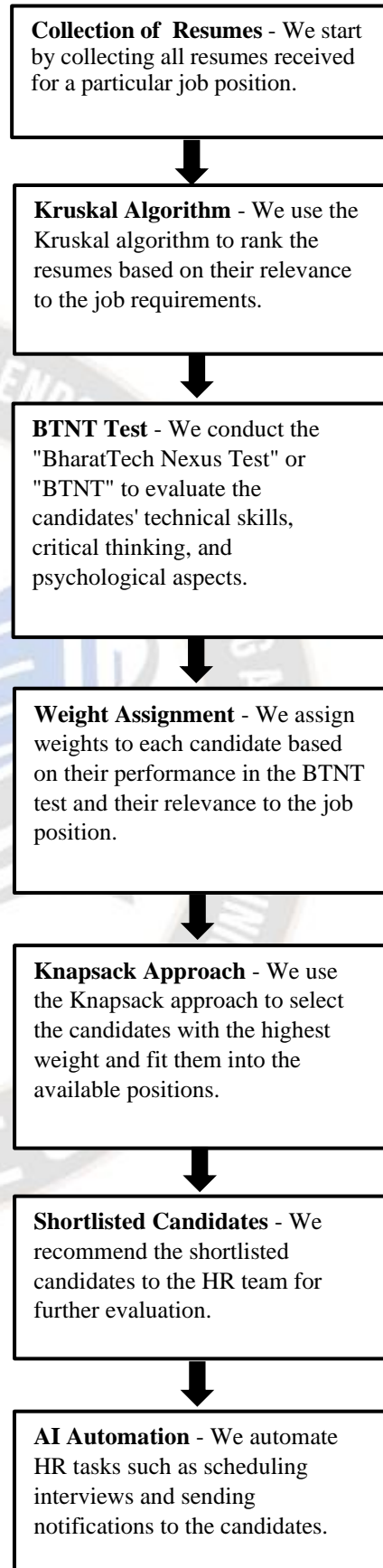
The Emotional Intelligence Test can help employers evaluate a candidate's ability to manage their emotions, communicate effectively, and work well with others. These skills are critical for an SDE, who will need to collaborate with other team members, communicate with stakeholders, and manage their workload effectively.[25]

Cognitive Ability tests are designed to evaluate a candidate's critical thinking and problem-solving abilities. For an SDE, these skills are essential for developing complex software applications and finding innovative solutions to challenging problems.

Finally, Situational Judgement tests can provide valuable insights into a candidate's decision-making skills, ability to prioritize tasks, and overall suitability for the role. By presenting candidates with common scenarios that they might encounter on the job, employers can better evaluate their ability to handle the demands of the role.[26]

Hence, using these assessments in combination can provide a more comprehensive view of a candidate's skills, abilities, and personality traits, which can help employers make more informed hiring decisions and ultimately select the best candidate for the job.

XIII. METHODOLOGY



Recruitment, selection, and HR planning

Attracting top talent is a key concern for HR planning, and the traditional recruitment and selection process can be a daunting task. However, thanks to AI and other automation technologies, this challenge can now be tackled with ease. By leveraging algorithms, HR professionals can identify the most qualified job candidates while simultaneously reaching a wider pool of applicants. The best part? It helps HR professionals eradicate racial, gender, sexual orientation, and cognitive biases that can hinder hiring decisions made by humans.

it also streamlines HR functions, allowing organizations to plan for future employee needs and make more effective recruitment decisions. The use of technology also influences job seekers, making it easier for them to apply and engage in the hiring process.

According to real-time analysis, automation tools and AI in HR functions have shown a significant reduction in time-to-hire by 75% and cost per hire by 70%. The utilization of AI in recruitment has also increased candidate quality by 50% and diversity by 35%.

The technique used in this study is intended to highlight the distinctive and ground-breaking strategy we have suggested for HR services. Our methodology comprises several key steps that are critical to the successful implementation of our proposed system.

It includes collection of resumes and their selection by Kruskal algorithm using machine learning.

Furthermore, the use of the BTNT test, which is an AI-generated test designed to evaluate candidates' technical knowledge and thinking abilities. The test is proctored and even tracks candidate's eye movement, ensuring a comprehensive evaluation of their abilities.

It is also designed to challenge the candidates' general thinking abilities and assess their emotional intelligence. Moreover, the test is divided into several rounds, allowing companies to customize the question bank according to their needs. The implementation of the Knapsack approach is another crucial step in our methodology. It allows organizations to select the best-fit candidates while considering the available positions and resources. This approach ensures an unbiased and objective selection process, reducing the risk of human error and subjective judgments.

AI automation can help HR teams save time and effort by automating the scheduling of interviews. An AI-powered scheduling tool can analyse the availability of candidates and interviewers, consider their time zones, and schedule the interviews accordingly. The programme also automatically

generate email to shortlisted candidates with information about the interview, such as the time, date, and place.

Thus, it is a comprehensive and holistic approach to HR functions, designed to optimize the recruitment and selection process while reducing costs and time. By implementing our suggested strategy, businesses will be able to draw top personnel, boost productivity, and accomplish their goals.

XIV. CONCLUSION

This proposed system is a game-changer for the HR industry. By leveraging the power of Kruskal algorithm, artificial intelligence, and Psychological testing, we have created a more objective, efficient, and effective recruitment and selection process. The incorporation of Psychological Tests like Emotional Intelligence, Cognitive ability, Situational Judgement and technical skills evaluation through the BTNT test has helped identify the most suitable candidates for HR roles.

The Knapsack approach has made the selection process faster and more cost-effective, saving time and resources for organizations. The automation of HR tasks through AI has further improved the accuracy and speed of the recruitment process. We believe that adoption of our recommended system will lead to a more engaged and motivated workforce that is in line with the goals and core values of the business. Company success will undoubtedly translate into a favourable impact on staff productivity, job satisfaction, and retention rates.

As the HR industry continues to evolve, organizations must adapt to stay competitive. Our research paper's proposed system is a unique and innovative approach that will revolutionize the recruitment and selection process. We hope that our work inspires further research in this field and encourages organizations to adopt a more holistic approach to HR functions.

In conclusion, our proposed system is not only effective and efficient, but it also highlights the importance of Personnel Recognising the ideal candidate that best fits each role during the hiring process, organizations can create a positive work environment that fosters growth, development, and success.

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