REPUBLIC OF TÜRKİYE

OSTİM TECHNICAL UNIVERSITY

Development of AI-Integrated Career Portal: BMC Automotive

FEYZA DUMAN
210102001

ECONOMICS

GRADUATION PROJECT

Supervisor: Assoc. Prof. BAHAR ERDAL

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ABSTRACT

Development of AI-Integrated Career Portal: BMC Automotive

As more people apply for jobs at big companies, it has become much harder for human resources management to do its job well, especially when it comes to making quick, fair, and good decisions. Traditional hiring methods often involve manually screening resumes, which takes a lot of time and can be biased. In this situation, artificial intelligence (AI) technologies offer promising ways to improve hiring practices by making decisions based on data and automating the process.

This study aims to develop an AI-driven career portal to assist BMC Automotive in the initial phases of recruitment. The proposed system employs Natural Language Processing (NLP) techniques to analyze unstructured resume data and convert it into structured, quantifiable information. Also, a multi-criteria decision-making method is used to judge candidates based on set standards like their education, technical skills, language skills, and analytical skills.

The system gives candidates weighted scores and uses a filtering system based on a threshold to find the best ones. This makes it easier for HR professionals to do their jobs, so they can focus on more important strategic tasks. The system also wants to reduce cognitive biases and make things fairer by using an algorithmic evaluation process.

The results of this study show that AI-powered recruitment systems can make the process much faster, more efficient, and less biased. However, the system that was created should be seen as a prototype because it uses rule-based keyword analysis instead of more advanced machine learning models.

In conclusion, this study underscores the potential of incorporating AI into human resources management and offers a pragmatic framework for organizations aiming to modernize their recruitment processes. Future research may concentrate on enhancing the system via machine learning, big data integration, and explainable AI methodologies.

KEY WORDS*: Artificial Intelligence, Human Resources Management, Recruitment Systems, Natural Language Processing (NLP), Resume Screening, Decision Support Systems, and Talent Acquisition are some of the most important terms.*

ACKNOWLEDGMENTS

This thesis project is the last thing I need to do to get my degree from Ankara OSTİM Technical University. First of all, I want to thank my advisor, Assoc. Prof. Bahar Erdal for her technical help, her patience, and for pushing me to think outside the box. I also want to thank the people at BMC Automotive for being open-minded about digital innovation, which made this research possible. Finally, I want to thank my family for always being there for me and believing in my abilities. Without the help of each of the people named, this work would not have been possible.

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1.Introduction

Digital transformation and rapid technological advancements are fundamentally reshaping business processes across sectors, particularly in the field of human resources management (Tambe et al., 2019). In large-scale organizations, recruitment processes are becoming increasingly complex due to the high number of applications received for a single job position. Companies like BMC Automotive often get hundreds or even thousands of applications. This makes it almost impossible for HR professionals to go through every resume carefully. Because of this, they may miss out on qualified candidates because they don't have enough time or money.

This is a problem. There is too much data coming in, and there isn't enough capacity to process it all. HR professionals are too busy with other tasks to focus on important things like talent assessment and workforce planning. For instance, they can't focus on finding the right candidates for the job. Manually reviewing resumes also runs the risk of being biased and inconsistent, which can lead to unfair and poor hiring decisions.

Another big problem with hiring is that both employers and candidates don't have easy access to information. Resumes often have subjective information, which makes it hard to compare candidates objectively. Traditional hiring methods don't have the tools to turn this unstructured information into comparable metrics. For instance, it's hard to compare candidates' skills and experience. Because of this, companies have a hard time finding the right people. To solve these problems, this study suggests making a career portal that uses artificial intelligence (AI). The portal will use Natural Language Processing to look at resumes and get information like skills and experience. By turning the data into structured outputs, the system will make the evaluation process more organized.The AI-integrated career portal will help increase the efficiency, objectivity, and strategic value of recruitment processes, making it easier to find suitable candidates for jobs.

The primary goal of this research is to create a system that will help organizations find candidates for recruitment. This system will review information about each candidate and compare it to the characteristics the organization is looking for. Using a scoring method for candidates, the selection will be fair and merit-based. This will help organizations save time and reduce the workload of the human resources department. It will also help them make the right choices when hiring.

This research is important because it can help organizations in various ways. It can also contribute to the theory of how artificial intelligence can be used in human resources. The system we propose can be used by organizations to manage a large number of job applications. It demonstrates how artificial intelligence can be used to solve problems in human resources management.

In short, this research shows how important it is to use systems when recruiting. It also offers organizations a way to use technology to find the right candidates.

Problem Statement

Large companies like BMC Automotive receive a large number of applications for a single job posting. This places a heavy workload on the human resources department. Previously, people reviewed resumes manually. This would take time, and people could make mistakes. They

might unnecessarily prefer one candidate over another. This would mean some good candidates would go unnoticed, and the company wouldn't choose them.

Comparing resumes isn't easy. Resumes are like stories. Comparing them is difficult. Companies need tools that can turn these stories into numbers and allow them to compare. Without these tools, companies can't make choices and struggle to find the right person for the job.

This study attempts to solve these problems. It aims to create a website that uses Artificial Intelligence to review resumes. The website will use AI to help companies find candidates for jobs. This will make the hiring process easier and faster for companies like BMC Automotive.This website will use computer programs to read and score resumes. This will make the recruitment process at BMC Automotive faster and fairer for everyone. The website will help BMC Automotive find the right person for the job. BMC Automotive will use this website to make its recruitment process easier and better.

Purpose and Importance of the Research

- **Purpose**

The main goal of this study is to make a career website for BMC Automotive that uses AI to help with the first steps of reviewing job candidates. The system will use computer techniques to get useful information from resumes, rate candidates based on different criteria, and show the results in a way that is easy for recruiters to understand. The study aims to show how AI can make the hiring process easier and better for companies like BMC Automotive.

- **Importance**

This research is important because it helps us learn more about how to use intelligence wisely and makes the hiring process at companies like BMC Automotive more efficient. From a learning perspective, this study brings together several research areas in a single project, such as getting information from words, making decisions based on different factors, and how people interact with computers. This is something that hasn't been done much before. From one point of view, the system helps BMC Automotive handle a lot of job applications by giving them a tool that is easy to use, fair, and can be changed to fit their needs.

This study is part of a larger effort to use AI responsibly when it comes to managing people at work. The study shows that AI can help companies like BMC Automotive be more efficient without being unfair to job candidates by making sure the system is fair, open, and follows the rules. BMC Automotive's career portal will use AI to make the hiring process better, and this study will help us learn more about how to use AI wisely.

DEFINITION OF TERMS

The basic terms and technological ideas used in this study are explained below to define the project's organizational and technical framework:

ATS (Applicant Tracking System) A software infrastructure that enables the digital management of recruitment processes from the job posting stage to the placement stage. Within

the scope of this project, the ATS is designed not merely as a record-keeping tool, but as a dynamic ecosystem that transforms candidate data into a structured database for BMC Automotive.

Natural Language Processing (NLP) is a field of computer science and linguistics that helps computers understand, analyze, and make human language. NLP is the main engine that turns the complicated free-text data in resumes into a useful semantic structure that the system can *work with.*

Named Entity Recognition (NER) is a very important part of the NLP process. It finds specific entities in the text, like "organization names" (ORG), "educational degrees" (EDU), "person names," and "technical competencies." It is used in the system to correctly tell the difference between the candidate's work history (e.g., "BMC," "SAP") and their education (e.g., "Economics").

S_{total} (Suitability Score): A metric for making decisions based on more than one criterion that was created for this study. To find it, you multiply the candidate's qualifications (Education, Experience, Technical Competence, Language Skills) by numbers that are set based on the organization's strategic needs. It is the mathematical result of a hiring process based on merit.

API (Application Programming Interface): A way for different software programs to talk to each other. This project makes sure that the user interface (React) and the AI analysis engine (Python/Flask) work together smoothly and that data is sent securely to the database (PostgreSQL).

Weighted Multi-Criteria Decision Making: A way to find the best option by giving different levels of importance to criteria that are in conflict or have different levels of importance, all in order to reach a specific goal. It is the foundation of the project's logic for making decisions based on economics.

Cloud-Based Architecture: This means that data is stored and processed on an internet-based system instead of on local servers. It makes sure that the system can be accessed from anywhere in BMC Automotive and can grow.

The Difference Between a Traditional ATS and the Project

ATS is a basic software solution that publishes job postings, collects applications in a database, and allows HR professionals to manage candidates by their status using a drag-and-drop method. A standard ATS typically relies solely on keyword matching. However, the AI-Integrated Career Portal currently under development transforms an ATS into a Management Decision Support System by adding the following “smart” layers:

• ***It doesn’t just store data—it analyzes it:*** While a standard ATS stores candidate information, this model reads the resume using “PyMuPDF” and interprets the data within it via natural language processing (spaCy), automatically assigning the candidate a score (e.g., 92/100).

• ***Dynamic Weighting (Decision Support):*** In traditional systems, criteria are generally fixed. One of this project’s strongest features, the “Algorithm Configuration Panel,” gives the HR manager the ability to instantly communicate decisions like “Is education or technical skill more important for this position?” to the system.

• ***Smart Filtering and Sorting:*** Instead of static filters, the system matches the expectations in the job description with the candidate's competencies to generate a "fit score."

• ***Fit Badges:*** Details such as "Cultural Fit" in the project transform the system from a tool that merely measures technical skills into a comprehensive framework that also evaluates the candidate's strategic fit with BMC Automotive.

Current Applications and Industry Examples

- ✓ *Linkedln Talent Solutions*
- ✓ *SAP SuccessFactors*
- ✓ *Workday Recruiting*
- ✓ *Oracle HCM Cloud*

In these days, AI – powered recruitment systems are activelyused by lots of large – scale comapnies. For instance the Linkedln Talent Solutions platform analyzes candidate profiles to match them with their job postibgs. Similarly, the SAP SuccessFactors and Workday Recruiting systems analyze candidates resumes to generate a suitability score.

However this systems are typically proprietary and developed specifically for individual companies. The model developed in this study operates similarly to these systems but offers a dynamic scoring and analysis mechanism that spesific supports HR prrofessionals in their decision making process.

2. Literature Review

2.1. Artificial Intelligence in HR

The use of Artificial Intelligence in Human Resource Management procedures has increased, in hiring and selection. Artificial Intelligence technologies help organizations handle amounts of applicant data and make better decisions. According to Black and van Esch (2020) AI-powered recruitment systems make work easier by automating tasks, which improves the experience of job applicants. This is similar to what Tambe et al. (2019) Found: while people still need to work with AI using data science in HR makes decision-making

Upadhyay and Khandelwal (2018) show that AI-based recruitment systems can save companies about 30% on hiring costs.Artificial Intelligence also helps find the talent as Votto et al. (2021) State that it improves the matching of candidates with jobs.These studies support the idea of using Artificial Intelligence in the BMC Automotive career portal to change the recruitment process from a manual task to a fast and accurate strategic operation, which can bring productivity and cost-efficiency benefits. The use of Artificial Intelligence in HRM can transform the way companies recruit making it more efficient and effective. Artificial Intelligence, in HR is a growing field that can bring benefits to organizations.

2.2. Systems for Tracking Applicants (ATS)

ATS are often used to keep track of digital hiring processes. These systems collect, store, and organize candidate information, making it easier for HR professionals to keep track of applications. Faliagka et al. (2012) show that automated ranking systems in e-recruitment

reduce human error and make it easier to choose the best candidates. In a similar way, Maheshwari (2021) says that cloud-based ATS systems make it easier to change digital HR because they can grow and change. Traditional applicant tracking systems, on the other hand, can't fully evaluate candidates because they rely so much on keyword matching (Upadhyay & Khandelwal, 2018). This project validates the creation of a "Enhanced ATS" model to transcend these conventional limitations. By going beyond just matching keywords and

This study adheres to the accuracy and scalability criteria highlighted by Faliagka and Maheshwari through the implementation of an automated scoring system.

2.3. NLP and Analyzing Resumes

Natural Language Processing (NLP) is important for resume analysis because it lets systems get useful information from unstructured text data.Singh et al. (2020) assert that structured information, including experience, education, and skills, can be extracted from resumes through Named Entity Recognition (NER) techniques. Sikka et al. (2022) demonstrate that deep learning-based resume parsing systems outperform traditional rule-based methods by approximately 25%.Zhao et al. (2021) assert that transformer-based models such as BERT significantly improve the contextual understanding of resumes, facilitating more accurate candidate evaluation. Also, Le et al. (2019) show that semantic analysis can find implicit skills that aren't clearly stated on resumes.These results show that NLP technologies make systems for analyzing resumes much more accurate and useful.

2.4. Decision Support Systems and Multi Criteria Evaluation

Companies use a step by step approach to see if a person is a fit for a job. They look at things like where the person went to school what kind of work they have done. What skills they have. For example Gungor and other people showed in 2009 that the Analytic Hierarchy Process is a way to compare these things when hiring someone. This process helps companies decide what is most important when looking at a person for a job.

Other people, like Dursun and Karsak came up with a way to use this process when things are not certain. They did this in 2010. Then Mardani and other people looked at all the ways companies can make decisions about hiring people. They found out that using different criteria is very important when making big decisions like this.

The Algorithm Configuration Panel is based on these ideas. It is a tool that helps the people in charge of hiring make decisions. They can use it to change how important different things are when looking at a person for a job. This tool is helpful because it lets companies make decisions in a way that's flexible and can change as needed. It helps bridge the gap, between the way computers make decisions and the way people do.

2.5. Ethical Considerations in AI-Based Recruitment

The use of intelligence in hiring raises concerns about fairness and openness.Köchling and Wehner (2020) point out that uncontrolled bias in algorithms is a risk. They note that biased data or designed scoring models can lead to unfair hiring results. Sanchez-Monedero et al. (2020) Argue that it is essential to be open about how AI systems are designed to ensure all

applicants are treated equally. To address these issues experts recommend checks on algorithms testing for bias across different groups and safeguards against discrimination.

This project tackles these concerns by including a feature called the candidate AI Report. This feature explains to HR specialists how the scoring works. By making the evaluation process clear and able to be checked the system follows the openness principles suggested by Sanchez-Monedero et al. (2020). Köchling and Wehner (2020). The AI Report helps ensure that the hiring process is fair and transparent. This shows how the AI system makes choices, which is in line with what Sanchez-Monedero et al. say. (2020).

2.6. Existing Systems in Pratice

Large companies already use computer systems in their hiring processes. For example, LinkedIn Talent Solutions uses computer programs to match job seekers with suitable job postings. Workday Recruiting and SAP SuccessFactors also use computers to review resumes and determine whether a person is a suitable candidate for a job; this helps quickly rank all applicants.

The problem with these systems is that they are proprietary and not very flexible, so they don't work well for every organization. This proposed system is different because it can be customized to meet the needs of a company like BMC Automotive. A custom scoring system and Cultural Fit Badges should be added for them. This makes our system a more practical and better option than the systems large companies typically use.

Table 2.1. System Comparison Table

Feature	***Traditional ATS***	***This Project***
Resume Analysis	*Keyword matching*	*NLP + NER*
Scoring	*Manual / fixed*	*Weighted algorithm*
Configurability	*Limited*	*Dynamic (HR panel)*
Transparency	*Low*	*Candidate AI Report*
Cultural Fit	*Not assessed*	*Cultural Fit Badges*

2.7. Research Gap

The review of the existing literature shows that even though a lot of progress has been made in using intelligence for recruitment there are still some big problems that have not been solved by either academic models or commercial systems. This project is designed to solve these problems through four areas:

1. Lack of control for managers: Studies on artificial intelligence in recruitment focus on algorithms that do not change where the importance of things like education, experience or skills is already decided and cannot be changed. As Upadhyay and Khandelwal noted in 2018 traditional systems often fail to adapt to the changing needs of a company. There is a gap in the

literature when it comes to systems that allow human resources managers to get involved in the algorithmic process. This project solves this problem by introducing a Dynamic Algorithm Configuration Panel, which allows managers to adjust the importance of candidate attributes in time making the artificial intelligence more flexible and transparent.

2. The one-size-fits-all approach: Platforms like LinkedIn or Workday use machine learning models that are designed for the whole job market. However as Kristof-Brown and others pointed out in 2005, how well a person fits in with the company is just as important as their skills for long-term retention. The literature lacks artificial intelligence applications that take into account the specific cultural values of a company in the automated screening process. This research solves this problem by developing Cultural Fit Badges for BMC Automotive. This approach ensures that the system finds the candidate for BMC not just the best candidate in general.

3. Technical integration: Much of the literature is disjointed, with certain studies concentrating on the technical precision of Natural Language Processing or the mathematical foundation of Multi-Criteria Decision Making. There is an absence of research that amalgamates level Natural Language Processing with a user-centric interface in a single career portal. This project solves this problem by providing an end-to-end integration from extracting data to candidates within a single web-based system.

4. Lack of transparency: While ethical considerations are often discussed many existing artificial intelligence recruitment tools do not provide explanations for their scores. This project introduces a Candidate AI Report feature, which solves the problem of AI in human resources tools. By showing how a candidates score was calculated the system provides a level of transparency that is often missing in current systems.

In conclusion this study does not just copy existing technologies. Brings together Natural Language Processing, Multi-Criteria Decision Making and cultural assessment into a single framework. By solving the problems of lack of personalization and transparency in systems this project makes a significant contribution to both the practical application and the theoretical development of intelligent recruitment portals and artificial intelligence, in recruitment and recruitment systems.

Research Questions

To provide a clear analytical framework for the study, the research is guided by the following fundamental questions, which address the intersection of algorithmic efficiency and organizational utility:

- **To what extent** can an AI-integrated portal increase the operational speed of the initial screening phase at BMC Automotive compared to traditional manual review processes?
- **How effectively** can Named Entity Recognition (NER) improve the accuracy of technical skill extraction and categorization when compared to standard keyword-based filtering?
- **What is the impact** of a standardized algorithmic scoring threshold on the overall quality and suitability of the candidate shortlist provided to human resources specialists?

3. METHODOLOGY

The AI-powered career portal developed in this study is based on natural language processing and multi-criteria decision-making approaches found in the literature. Specifically, the keyword-based method used in the resume analysis process is inspired by the natural language processing techniques proposed by Singh et al. (2020). The scoring system used in evaluating candidates is based on the multi-criteria decision-making model developed by Gungor et al. (2009). In this context, the developed system aims to transform theoretical approaches found in the literature into practical applications.

3.1. System Workflow and Advanced Interface Architecture

The system was developed with the candidate experience as a top priority. This system operates on a single-page application model. Data is managed via asynchronous requests.

Application: Main Interface Components

The login screen that the candidate sees is not merely a visual element but also a trigger that initiates the application process. The main interface components have been built using React and HTML5.

HTML

<section id="landing" class="hero-section">

* *

* *

*B *

* <h1 class="htitle">Shape the Technology of the Future Together</h1>*

* Showcase Your Skills with an AI-Powered Career Portal. *

* *

<button class="btn-apply" onclick="initiateApplication()">

* Apply Now →*

</button><button class="btn-hr-portal" onclick="toggleHRLogin()">

HR Assistant Panel

*</button> *

* </section>*

3.2. Technical Infrastructure and Visual Identity System

The system's corporate identity has been standardized using CSS3's modern "Custom Properties" architecture. This ensures color and design consistency across different sections of the project.

Implementation: *Global Style Variables (CSS3)*

CSS

```
:root {

/* BMC Corporate Color Palette */

--primary-orange: #c8460a;

--deep-blue: #1a4a8a;

--bg-sand: #f5f4f0; /* Typography and Layout Parameters */

--font-main: 'DM Sans', sans-serif; --font-heading: 'Syne', sans-serif;

--border-radius-lg: 16px; --transition-smooth: all 0.3s cubic-bezier(0.4, 0, 0.2, 1);

/* Dynamic Shading (Depth Perception) */ --shadow-subtle: 0 4px 12px rgba(0,0,0,0.05);

--shadow-heavy: 0 24px 56px rgba(26,24,20,0.18);}.btn-apply { background-color:

 var(--primary-orange);

border-radius: var(--border-radius-lg); transition: var(--transition-smooth);}
```

3.3. Data Extraction and Natural Language Processing Pipeline

The most critical component of the system is the Natural Language Processing pipeline, which converts unstructured PDF data into structured JSON data.

Application: Resume Upload and Dynamic Form Element

When a candidate uploads a resume, a JavaScript-based listener captures the file's metadata and sends it to the server.

HTML

```
<div class="upload-zone" id="drop-area">

<input type="file" id="cv-upload" accept=".pdf" hidden>

<div class="icon-box"><i class="fas fa-cloud-upload-alt"></i></div>
```

<h3>Drag Your Resume Here</h3>

* Our system supports .pdf format documents for AI analysis. *

* *

**

* Apply Now →*

The Natural Language Processing pipeline is super important. It takes PDF data and turns it into neat JSON data.

Application: Resume Upload and Dynamic Form Element

When someone uploads their resume our system grabs the files details. Sends it to the server.

3.3.1. Analysis Process

Project built a model using Spacy to find details in the text. This model picks out things, like company names, education info and technical skills.

For instance it finds out where a candidate worked before what degree they have and what university they went to.

It also identifies the tools and technologies they used.

3.3.1.1. Strategic Scoring Algorithm Implementation

Project evaluated by candidates based on a scoring model. The model looks like this:

Score = (HR × 25). Sap × 20). Excel × 15). Language × 20). Analysis × 20)

In this model each thing we look for gets a score of 1 if its there and 0 if its not. We decide how important each thing is based on what HR specialists think. The total score shows how good a candidate is.

Implementation: This scoring function is written in JavaScript.

JavaScript

function figure out the candidate's score(data)

weights = { edu: 0.30, exp: 0.30, tech: 0.25 lang: 0.15 };/Normalization and Multiplication of Coefficients

Let educationScore equal mapEducationToPoint(data.education) times weights.edu;

*let experienceScore = calculateExperiencePoint(data.years) * weights.exp;*

*data.skills.length * 5 * weights.tech gives each skill a base score.*

Let languageScore be the number of points that data.english gives you for your language level.

The final score is the sum of the education score, the experience score, the technical score, and the language score./ Check to see if the score is 70 or higher

return {score: finalScore.toFixed(2)isQualified: finalScore >= 70, status: finalScore >= 70 ? ""Qualified" or "Waitlisted"

3.4. HR Dashboard

This dashboard is made for HR professionals and speeds up the decision-making process by showing the results of the algorithm.

Use: Candidate Reporting Component

HTML

This is a candidate card:

*<sent> *

Candidate: Feyza Duman

88 out of 100

* *

* Education Compatibility: 95% (Economics Graduate) *

* Technical Analysis: SAP and R fit the position *

* pass (Threshold: 70) *

3.5. Information Categorization

After we do the NER process we put the things we found into four groups that match what BMC Automotive looks for when hiring people:

- **Educational Background:** What kind of degree someone has like a Bachelor or Master degree. What they studied.
- **Professional Experience:** How long someone did a job and if it is related to the job we are hiring for like an HR Internship.
- **Technical Skills:** The programs and tools that a person is good at using.
- **Language Proficiency:** What languages someone can speak and understand.

3.6. Candidate Scoring Algorithm and Strategic Weighting

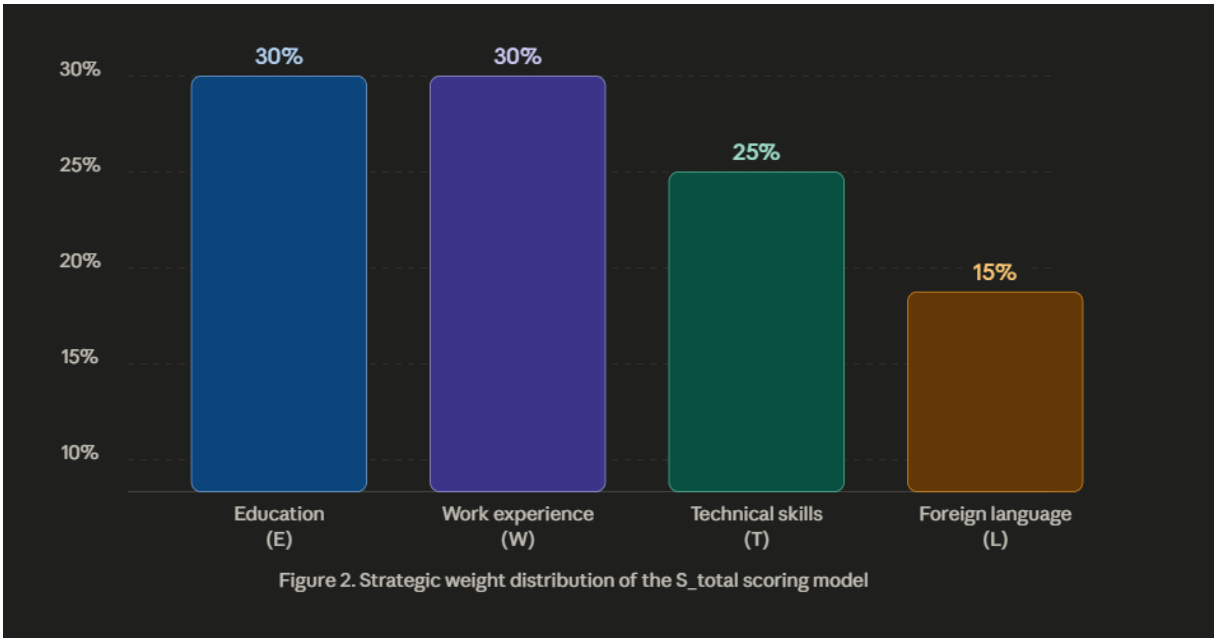
Making the scoring algorithm is not about doing math it is about making a tool that helps us decide who is the best candidate for BMC Automotive. The main goal of this part is to make the process of looking at resumes by using data. We give importance to different parts of a persons work experience so the system can look at a lot of information and make a list of the best candidates. This way the human resources team can focus on the people who're most qualified and hire the best person faster.

The system looks at candidates using a way of scoring that considers many things. It does not just look for keywords it thinks about what's important, for the job. We calculate a score by multiplying the score of each category by how important it's. Then we add up these scores to get a score.

The Mathematical Formula:

$$ifS\_{total} = (E \times 0.30) + (W \times 0.30) + (T \times 0.25) + (L \times 0.15)$$

Figure 3.1. Strategic weight distribution of the S_total scoring model



Breakdown of the Scoring Logic: • Education (E) - 30%: This weight shows how important academic background is. Candidates from fields like Economics or Business Administration get higher scores to make sure they are theoretically competent and fit with BMC's corporate structure.

Work Experience (W), 30 Percent: This standard puts a high value on real-world use.BMC is a company in the industry so they really like it when people have done internships or worked in human resources before. This is because they want to make sure that the person is ready to do the job and knows about the industry.

Technical Skills, 25 Percent: The company is using a lot of tools now so they want to make sure the candidate can use things like SAP, ERP or R. These tools are important for making decisions about human resources based on data.

Foreign Language , 15 Percent: The company wants to make sure the candidate can keep up with what's happening in human resources around the world. They also want the candidate to be able to use software from countries and communicate well in a global business setting.

The reason for the 70-point threshold is to make sure the human resources person can do their job well and that the work is quality.

- If the candidate gets 70 points or more they are considered qualified. Their information is sent to the human resources team to look at again.
- If the candidate gets than 70 points they are not considered qualified. This helps the recruitment team because they do not have to look at many applications and they can focus on the people who are most likely to be good, at the job.

Table 3.1. Candidate Data Structure (Sample)

Candidate	Education	Experience	Technical	Language	S_total	Status
Candidate A	28/30	27/30	22/25	13/15	90	Qualified
Candidate B	24/30	20/30	18/25	10/15	72	Qualified
Candidate C	18/30	15/30	12/25	8/15	53	Waitlisted

3.7. Schema and Data Persistence for the Database

The system uses PostgreSQL for the Data Layer to keep data safe and sound. The architecture is based on a relational model, and the "Candidate Table" is where candidate information, parsed entities, and final scores are all kept in a structured way.

Table 3.2. Data Persistence for the Database

(Attribute)	***(Data Type)***	***(Description)***
Candidate_ID	*UUID/ Integer*	*A unique identification number for each candidate.*
Full_Name	*String (Varchar)*	*The candidate's full name (e.g., Feyza Duman).*
Education_Score	*Integer (0-100)*	*Education level score (Economics/Business Administration, etc.).*

(Attribute)	*(Data Type)*	*(Description)*
Experience_Score	*Integer (0-100)*	*Weighted score for internships and work experience.*
Technical_Skills	*Array / Text*	*Identified competencies (SAP, Python, Excel).*
Total_Score	*Float (Decimal)*	*Final score calculated by the algorithm.*

The job of Human Resources Specialist is very important. We need to make sure that the people who are in charge of hiring have a group of people to choose from. So, our Minimum Acceptance Score is 70 out of 100. This means that people who want to be Human Resources Specialists and meet at least 70% of the requirements can move on to the next step.

We use a system to filter out people who do not score enough. This helps the recruiters because they do not have to look at many applications. They can focus on the people who're a good fit for the Human Resources Specialist position. This makes the process of hiring someone for the Human Resources Specialist position faster and easier. The Human Resources Specialist position is a deal. We want to find the person, for the Human Resources Specialist job.

Table 3.3. Strategic Weighting and Justification for HR Position

Criterion	*Weight*	*Justification*
Education	*30%*	*Ensures the candidate has a solid theoretical foundation in **Economics or Business Administration**, which is essential for understanding corporate structures.*
HR Internship	*30%*	*Prioritizes candidates with practical sector experience (e.g., **BMC Otomotiv Internship**), ensuring they are familiar with real-world HR workflows.*
SAP / HR Software	*25%*	*Reflects the need for digital competency. Knowledge of tools like **SAP, Logo, or R** is critical for modern, data-driven HR analytics.*
Foreign Language	*15%*	*Ensures the candidate can engage with international HR literature and communicate effectively in a global business environment.*

The company wants to hire people who are really good at their jobs, so they set a Minimum Acceptance Score of 70 for this job. This means the HR person only looks at people who meet least 70 percent of the requirements. This helps the company hire people faster and get workers.

3.8. Synthesis: Theoretical Foundations and Practical Implementation

This project combines existing theories with the needs of modern industry in the hiring process. The scoring system is based on the ideas proposed by Gungor et al. in 2009 and by Dursun and Karsak in 2010. These ideas were adapted to meet the requirements of BMC Automotive. For example, the importance of SAP knowledge, which school you attended, and whether you have experience in the field.

The language-related part of the project uses the idea of determining what is important, first proposed by Singh et al. in 2020. We made this in 2020 to figure out what is important for the automotive industry in Turkey, like good schools and programs that give people experience. We also used the ideas of Sikka et al. (2022) to make sure we can read resumes correctly.

We have a rule that you need to get at least a 70 on the test to be considered. This is a way to choose people based on their skills. The system is fair and open to everyone because everyone has to meet the same standard. This is important when using AI to hire people. It uses artificial intelligence and natural language processing, and the system is fair and transparent; it is used by BMC Automotive.

3.9. Data. Ethical Considerations

The system processes information such as candidates' names, contact details, education, and work history in compliance with the General Data Protection Regulation (GDPR) and the Turkish Personal Data Protection Law. The system stores all information related to candidates in a dedicated database called PostgreSQL. Only authorized personnel in the human resources department can access this information.

The system also keeps an eye on how candidates are scored to make sure that everyone is treated fairly, no matter who they are or where they come from.

The project needs to follow the General Data Protection Regulation and the Turkish Personal Data Protection Law. The project is committed to using artificial intelligence responsibly. This means the project ensures that the scoring algorithm protects information and operates fairly. The project considers data protection and fairness to be fundamental elements of the system's design. The General Data Protection Regulation and the Turkish Personal Data Protection Law are not merely considerations to be taken into account; they are integral parts of the system from the very beginning.

3.10. Development of the System Test Environment

A prototype interface was developed using HTML, CSS, and JavaScript technologies to evaluate the basic functionalities of the developed system at an early stage. This prototype includes the user login screen, administration panel, position management module, application form, and evaluation screen components.
Tests performed on the prototype revealed that the basic flows of the system generally work. At this point, though, there are still a lot of problems, like form validation problems, data inconsistencies, and interface incompatibilities. These problems show that the system is still being worked on and needs a lot of work to fix and improve before it can be released. The problems that were found will be fixed in later stages of development.

Figure 3.2. Career Portal Website

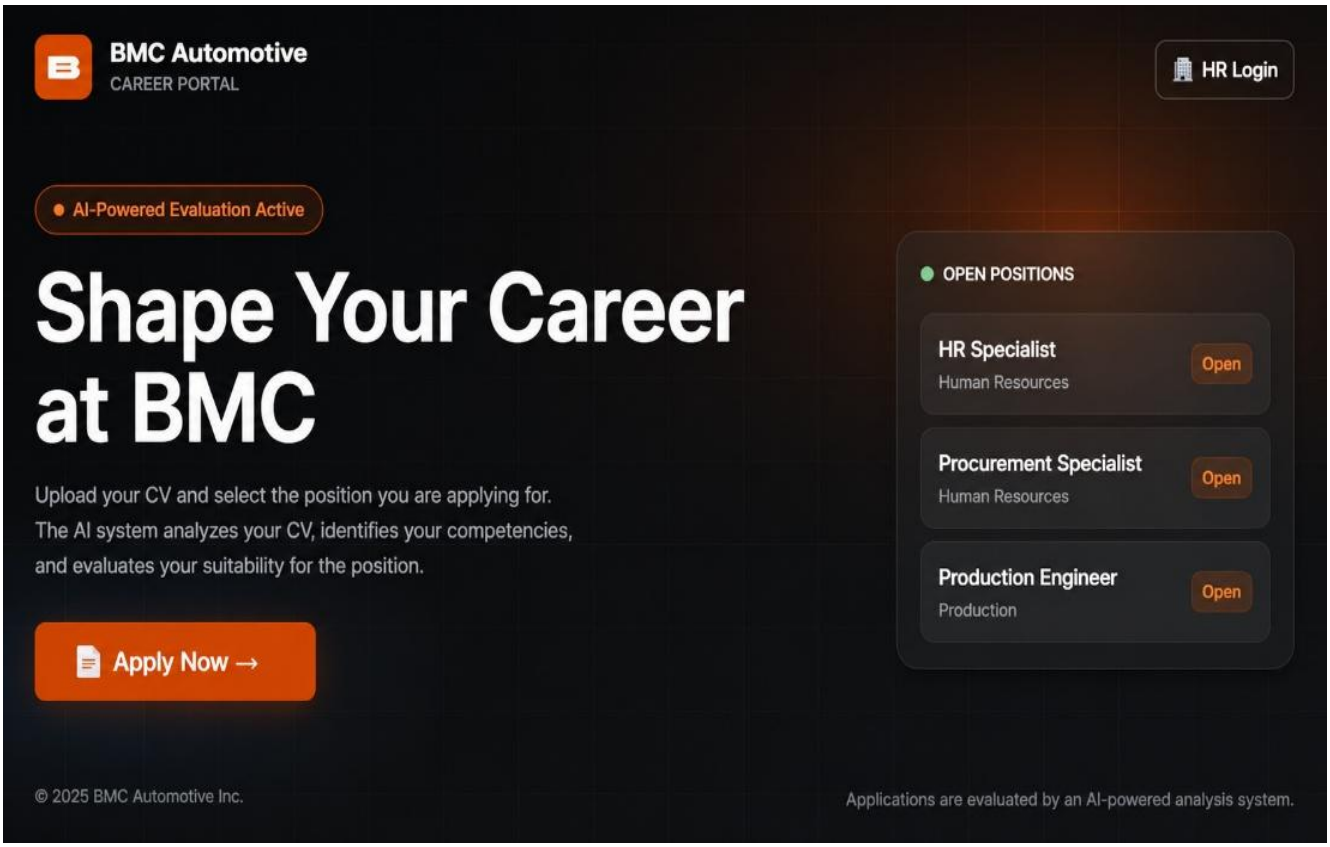


Figure 3.3. Career Portal Website

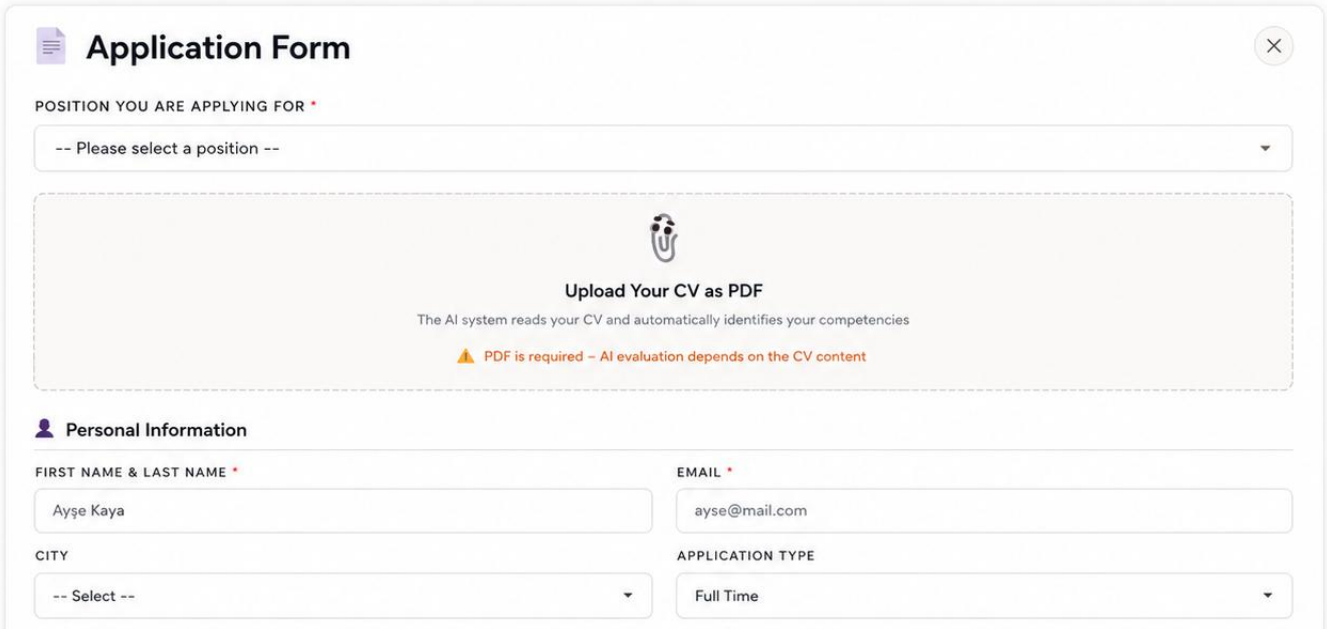


Figure 3.3. Career Portal Website

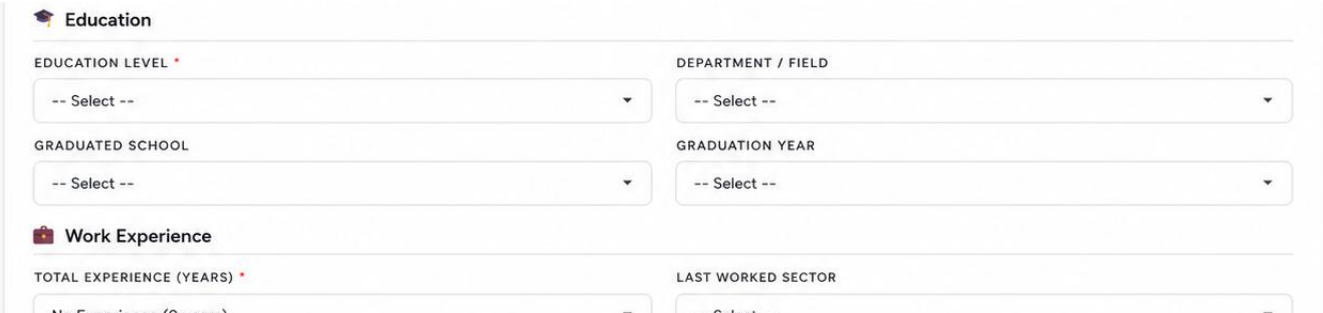
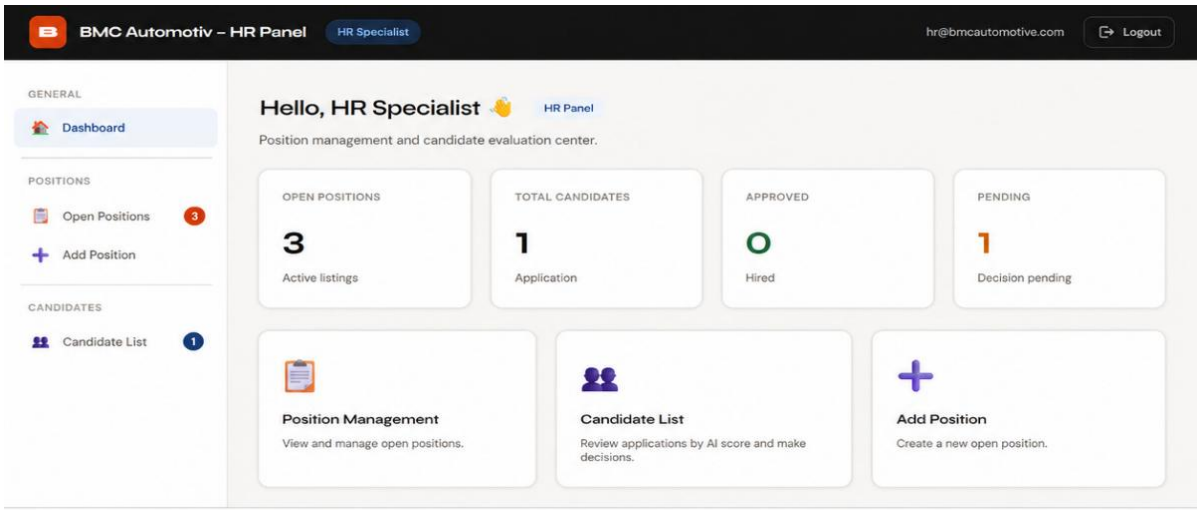
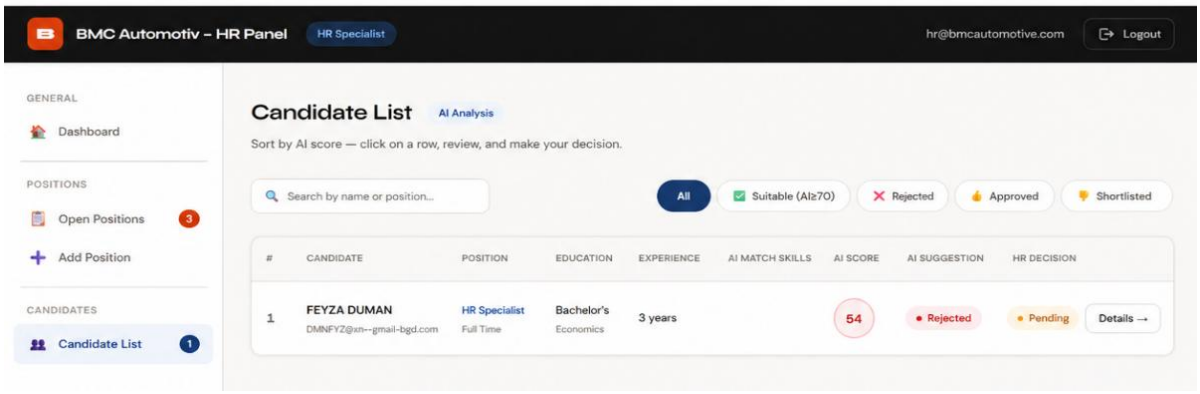
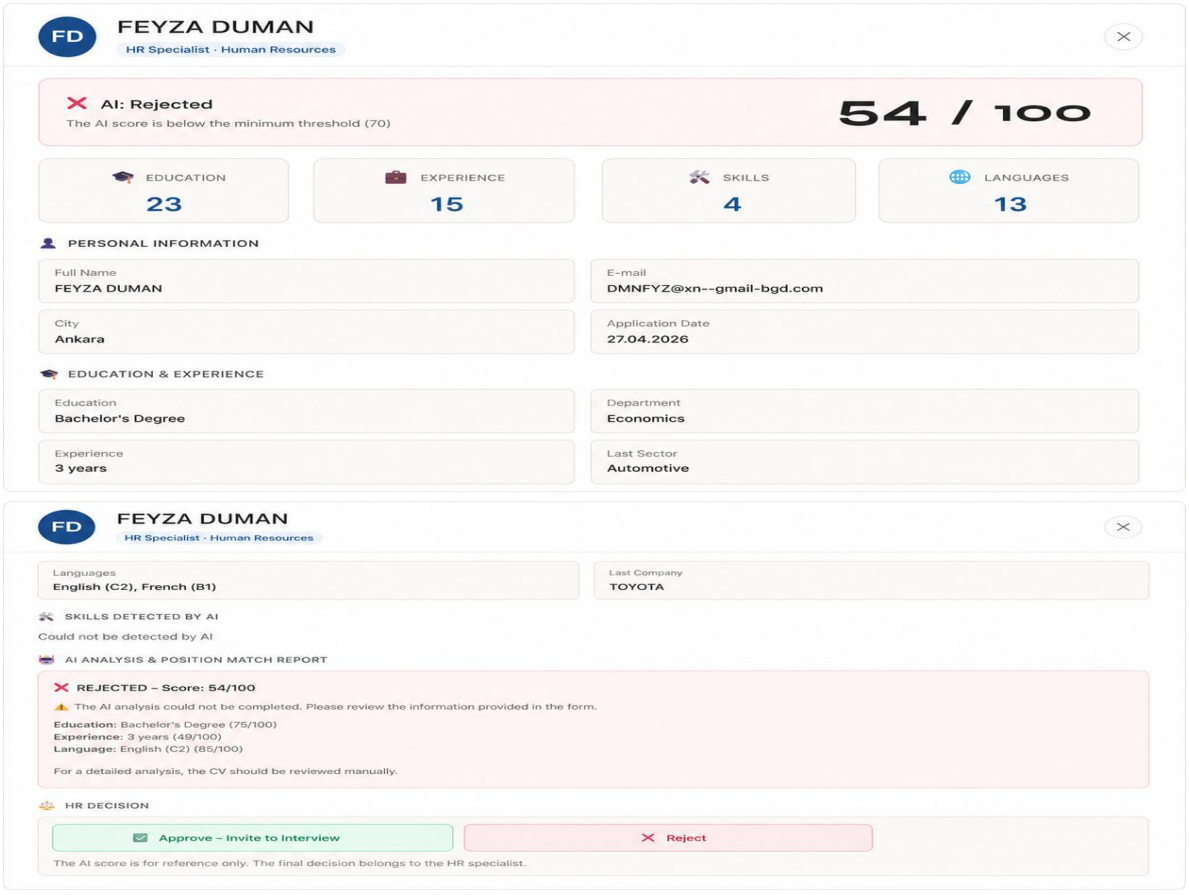


Figure 3.4. Career Portal Website





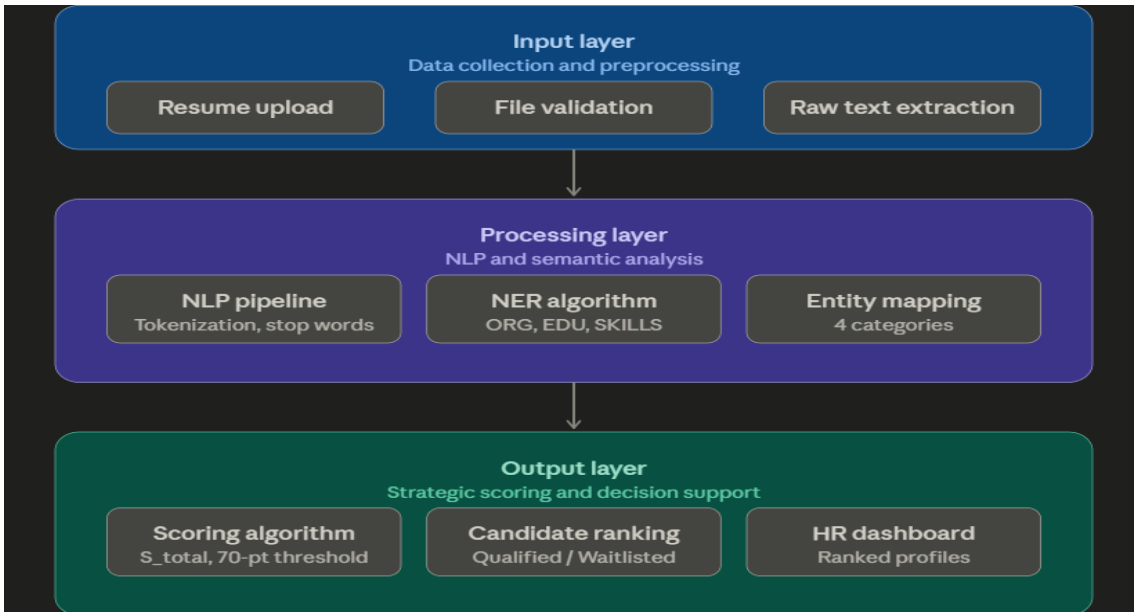
3.5. Career Portal Website



4. SYSTEM ARCHITECTURE AND CONCEPTUAL FRAMEWORK

This study is based on a digital transformation architecture that goes from raw data input to strategic decision-support output. The system's conceptual framework has three main parts. These parts not only store data, but they also interpret it and make it better so that it fits with the goals of the organization:

Figure 4.1. Three-layer system architecture of the AI-integrated career portal



4.1. Input Layer (Layer for Collecting and Preprocessing Data)

This layer is the first point of contact for the system, and its job is to make sure that the candidate experience (UX) and data integrity are as good as they can be.

Asynchronous Data Transfer: The React.js-based interface starts an asynchronous request in the background as soon as the candidate uploads their resume to the system. During this step, the file format (only PDF or DOCX) is checked, and the file's security (virus scanning) is guaranteed.

Unstructured Data Capture: Candidate resumes are inherently “unstructured” data. This layer converts complex, formatted text into raw text blocks that can be processed in the next stage.

4.2. Layer for processing (NLP and semantic analysis)

This layer, which is the "brain" of the system, turns plain text into useful business information. There are two main parts to this process:

NLP Pipeline (Natural Language Processing Pipeline): The spaCy library's advanced language models break the text down into sentences (sentence segmentation) and words (tokenization). Removing stop words makes the text easier to analyze.

Named Entity Recognition (NER): The NER algorithm, which is the most important part of the system, puts labels on semantic units in the text. For instance:

ORG (Organization): Lists the companies the candidate has worked for in the past, such as BMC and ASELSAN.

EDU (Education): Tells you the level of degree and the reputation of the school.

SKILLS: Takes technical keywords from the text, like "Python," "SAP," and "R."

4.3. Output Layer (Decision and Strategic Scoring Layer)

This is the layer that turns processed data into useful information for business and government. At this point, the data that has been taken out is put through mathematical modeling:Weighted Criteria Aggregation: The NER layer's data is given different weights based on BMC Automotive's strategic needs (Education 30%, Experience 30%, Competency 25%, Language 15%). This process turns qualitative data into a numerical "Merit Score" (S_{total}). HR Dashboard Integration: The results are shown on a dashboard made for HR professionals. Candidates are ranked from top to bottom based on their merit scores. This ranking prevents HR specialists from getting lost among thousands of candidates, thereby reducing the "opportunity cost" and ensuring the most qualified candidate is identified as quickly as possible.

The system developed in this study is designed as a prototype of AI-powered recruitment systems. Machine learning and deep learning algorithms are actively used in real-world systems. However, in this study, a keyword-based approach was preferred to demonstrate the basic logic of the system. This approach simulates the decision-making logic of artificial intelligence.

5. ETHICAL CONSIDERATIONS AND AI TRANSPARENCY

The integration of AI-based decision support systems into hiring processes brings with it critical ethical responsibilities such as "algorithmic bias" and "equal opportunity." Building on the principles of "preventing discrimination" highlighted in the literature by Sanchez-Monedero et al. (2020), this study constructs ethical transparency on the following three main pillars

5.1. Blind Screening and Neutrality

The system focuses solely on "human capital" variables directly related to job performance when evaluating candidates.

Demographic Isolation: The algorithm does not include data such as the candidate's ethnic origin, religious beliefs, gender, age, marital status, or physical characteristics (photo analysis) in the processing (parsing) phase.

Merit-Based Dataset: The decision-making mechanism is entirely based on "qualitative achievements." This ensures that "unconscious biases"—which human resources professionals might unconsciously exhibit—are prevented at the system level.

5.2. Fairness by Design

The project architecture makes sure that the scoring system is based only on objective and verifiable data. Objective Parameters: The variables used to calculate the S_{total} score (GPA, total months of experience, technical certifications, language proficiency levels) are concrete

data points that are not open to interpretation. Standardized Evaluation: In traditional hiring, a recruiter's mood or fatigue can affect the evaluation, but this system makes sure "procedural justice" by applying the same mathematical rigor to every candidate at any time of day

5.3. Algorithmic Transparency and Explainability

One of the greatest ethical risks is that artificial intelligence becomes a “black box,” making it impossible to understand how it makes decisions. The system manages this risk as follows:

Interpretability: The HR panel does not merely present a candidate with a total score (e.g., 82); it provides a detailed report explaining which sub-criteria (Education: 28/30, Experience: 25/30, etc.) contributed to that score.

Human-in-the-Loop: The algorithm doesn't make the final decision; it just helps make it. AI scores are shown clearly, but an HR expert with the power to oversee ethics always makes the final choice. This "human-machine collaboration" acts as a safety net in case the algorithm makes a mistake.

6. ECONOMIC AND OPERATIONAL IMPACT ANALYSIS (ROI)

This study aims to go beyond simply providing a technical solution and instead targets a Return on Investment (ROI)-focused transformation in BMC Automotive’s human resources management. From an economic perspective, the system’s impact on organizational efficiency has been analyzed across three main dimensions:

6.1. Operational Efficiency and Economies of Scale

The high supply in the labor market is causing the effects of the “law of diminishing returns” to be felt in manual screening processes.

Increased Speed and Capacity: While a senior HR specialist using traditional methods can review an average of 60–80 resumes per day within their cognitive limits, the developed AI portal can normalize thousands of data points in seconds.

Scalability: While manual costs increase linearly as the number of applications rises from 100 to 10,000, the marginal cost in this system approaches zero. This translates to massive time savings and operational speed for large-scale organizations like BMC.

6.2. Cost-per-Hire and Human Capital Optimization

As an economic unit, the HR department aims to secure the highest possible “human capital” intake at the lowest cost.

Reduction of Administrative Costs: “HR Work Hours,” one of the largest components in the “Cost-per-Hire” formula, is optimized by 90% through this system.

Strategic Workforce Allocation: Freeing experts from routine, low-value-added tasks such as resume screening enables these qualified personnel to be redirected to high-value-added strategic areas like “interview technique development” and “talent management.”

6.3. Minimizing Opportunity Cost and Information Asymmetry

In economics, one of the greatest costs is the cost of "missed opportunities."

Preventing the Loss of Qualified Candidates: A "qualified candidate" eliminated due to fatigue and inattention (human error) in manual processes represents a difficult-to-recover opportunity cost for the organization. Algorithmic precision eliminates the risk of top-tier talent being overlooked.

Eliminating Information Asymmetry: Information asymmetry arising from differences in how candidates present themselves is standardized using the NER (Named Entity Recognition) algorithm. This ensures that the organization accesses the most accurate data (true signal) in the labor market with the lowest possible noise (noise reduction).

6.4.The Relationship Between Literature and Methodology

In this project, an AI-powered career portal was developed. This portal was designed based on the methods used in previous studies. During the evaluation of candidates, decision-making methods based on multiple criteria were utilized.

For example, Gungor and colleagues in 2009, and Dursun and Karsak in 2010, proposed certain decision-making models. These models formed the basis of the scoring system used in this project.

Natural language processing techniques were used in the analysis of CVs. Singh and colleagues proposed the Named Entity Recognition method in 2020. This method was used as a reference to extract candidates' skills and experience.

Sikka and colleagues, in 2022, developed deep learning-based CV analysis methods. These methods contributed to the algorithm design of this project.

The use of AI-powered decision systems is also consistent with the data-driven human resources approach proposed by Tambe and colleagues in 2019. The system developed in this project aimed to apply previous theoretical approaches in practice.

7.LIMITATIONS

The system developed in this study works, but here are some aspects where it doesn't perform well:

First, it has a simple way of looking at resumes.It only matches words that are the same. Using machine learning models like BERT, which knows what words mean in context, is better than this. This method might miss skills that aren't clearly listed on the resume.Second, we came up with the value of each part of the resume on our own.For instance, 30% of the score is based on education and 30% on experience. We did this based on what we thought was right, not on real data.In the future, these choices should be based on data from hiring.This would make it easier for the system to guess who the best candidate is.Third, we made the system for BMC Automotive, one company. It might not work for other businesses or industries. It needs to be tested more to see if it works in other places.Lastly, there were no resumes used during the

testing of the system. We don't know how it will work with real people and resumes. The system might not work well with resumes that aren't standard or with people who speak different languages. It needs to be tested with data to see if it's fair and if people like using it.

8. CONCLUSION

This study was done to create a career portal for BMC Automotive that uses Artificial Intelligence to make the hiring process better and more fair. The old ways of hiring people often have problems, like having to look at a lot of resumes not having enough time and making decisions based on personal opinions. The new system is a technology based solution to make the process of choosing candidates

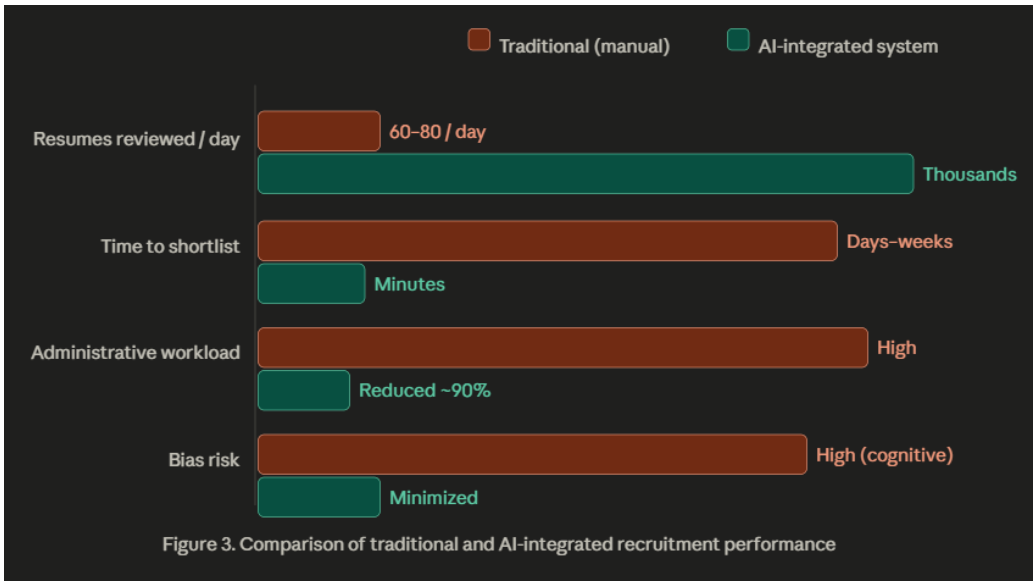
The system uses computer techniques called Natural Language Processing and a way of making decisions based on many things to look at resumes and give scores based on things that are important. By taking the information from resumes and turning it into something that can be measured the system makes the process of evaluating candidates more organized and consistent. So this project shows how using technology can fix problems in the hiring process and help make decisions when hiring people at BMC Automotive.

8.1. Economic Efficiency and Information Asymmetry

Information asymmetry is a problem, in job markets. Employers and job seekers do not have the information. This leads to hiring choices. Qualified people may be missed in pools of applicants. The system propose fixes this problem. It turns resume data into neat usable information. This is done using NLP techniques like finding names and organizations. From a view this makes it much cheaper to evaluate each applicant. It also makes the whole process more efficient.

HR professionals can then focus on tasks. These include making decisions and conducting interviews. They do not have to waste time reading resumes manually.

Figure 8.1. Comparison of traditonal and AI-integrated recruitment performance



8.2. Algorithmic Merit System vs. Cognitive Bias

This study does something by changing the way we evaluate people from relying on human opinions to using a system based on algorithms. When we hire people in the way our own biases like the halo effect can affect our decisions and lead to results that are not fair.

The scoring model that was developed which is called S_total looks at people who are applying for a job based on things that can be measured such as where they went to school how experience they have what technical skills they have and how well they speak languages. Each of these things is given an importance so people are evaluated based on things that can be proven rather, than what someone thinks of them. This way of doing things makes the process of hiring people fair, clear and consistent.

8.3. The Strategic Role of Threshold Management

The use of a predefined threshold value (70 points) plays a critical role in optimizing the recruitment process. The threshold functions not merely as a technical filter, but also as a strategic decision-making tool.

In large organizations like BMC Automotive, the initial stage of recruitment often involves a high number of applications. The threshold system helps to remove candidates who do not score well. This allows HR professionals to focus on the candidates, which is around 10 to 15 percent of all applicants.

This way of doing things follows the Pareto principle, which's, about getting the most out of something while using as little effort and resources as possible. The threshold mechanism makes sure HR professionals can find the performing candidates easily.

8.4. Final Assessments and Future Perspectives

The AI-integrated career portal developed in this study should be considered a functional prototype rather than a fully autonomous AI system. The current model uses a way of looking at keywords to make decisions. It shows us the idea of how artificial intelligence can be used to help with hiring people.

In the future we can make the system better by adding advanced ways of teaching computers to think and ways to read documents more easily. We can also add techniques to make the artificial intelligence more understandable and clear. This will help the system make accurate guesses and people will trust the automated decision-making systems more.

In the end this study shows that artificial intelligence can really change the way we manage people at work. The system we are talking about does not take the place of decision-makers it just helps them by giving them facts to think about. So it is a tool to help make things more efficient reduce unfairness and make better choices when hiring people.

9. Future Work

This study has worked well for the architecture of the AI system we made for BMC Automotive. We found some limitations and we have some future goals to make this project a commercial

product and to make it work with bigger sets of data. We will talk about these limitations and goals below. We will give you the technical details.

9.1. Optical Character Recognition (OCR) and Image Processing

Our system is good at reading text from PDF files. Some people might upload their resumes as scanned pictures or images like Nguyen and Nguyen said in their study in 2019. They might use formats like JPEG or PNG.

Future Vision (OCR Layer)

We want to add a tool to the system like Tesseract OCR or AWS Textract to help it read text from pictures. This way the AI system can understand what is in the pictures and use that information. We plan to put this tool in the backend of the system so it can extract text from formats, like images.

Python

 # Next Phase: OCR Integration Draft (Python)

import pytesseract importImage from here The code is much the same.

def extract_text_from_image(image_path):For converting an image into text. extracted_text =pytesseract.image_to_string(Image.open(image_path)) return process_nlp(extracted_text) #pass to spaCy line

9.2. Video Interview Analysis and Soft-Skill Assessment

While traditional resumes demonstrate a candidate’s technical competence, they fall short in reflecting their soft skills.Future Vision (Sentiment Analysis):A video interview module to be integrated into the system will analyze the candidate’s speaking speed, confidence, and frequency of keyword usage. Using the OpenCV and DeepFace libraries, the candidate’s stress level will be measured and added to the S_{total} score as a “Soft Skill” multiplier.

9.3. Explainable AI (XAI) and Algorithmic Fairness

As emphasized by Sanchez-Monedero et al. (2020), The "black box" nature of AI can cause ethical problems when hiring people. Future Vision (Transparent Reporting) will add a "Decision Logic" interface to explain why the algorithm gave a certain score. This will show the HR specialist not only the score but also the reason for it.

JavaScript

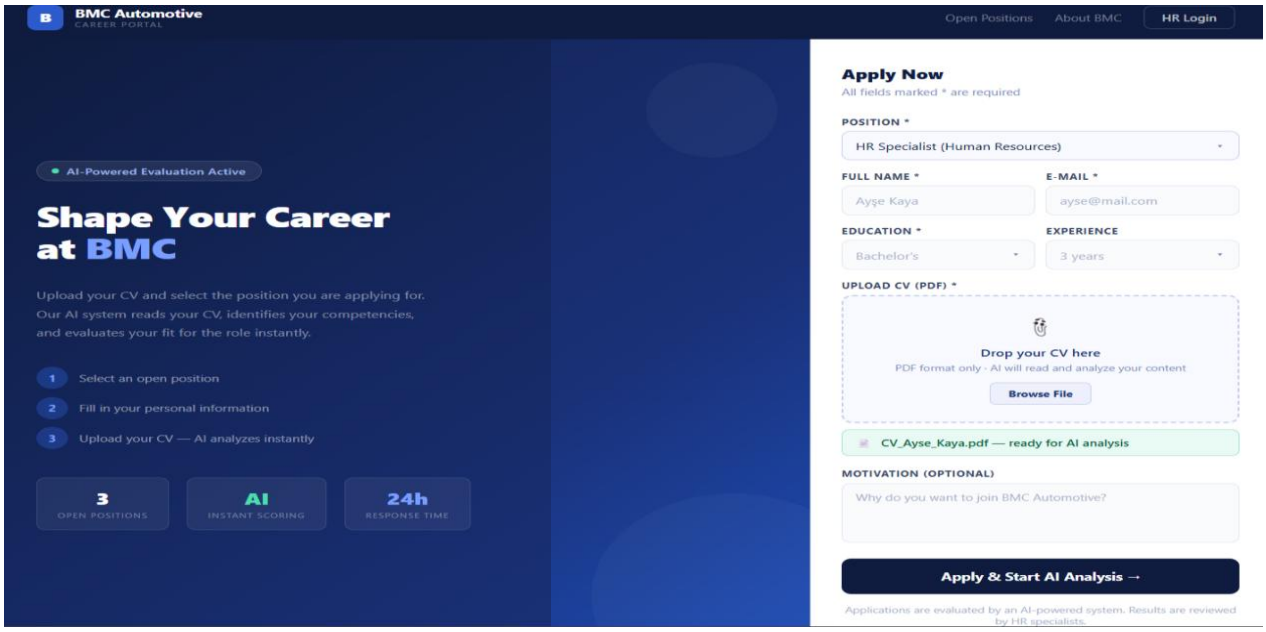
// Next Phase: Frontend Transparent Scoring Report const explanation

= { reason: "Candidate's total score is 88/100.", details: "Education criterion is full score with 30% weight (Bachelor's + Master's). 5% points were deducted due to lack of SAP in technical skills."};Real-time ERP & SAP Integration

In companies like BMC Automotive putting candidate data into corporate systems by hand is a lot of work. The idea, for the future is to make the system talk to SAP SuccessFactors using an API like it was suggested by Maheshwari in 2021 as part of transformation plans.

This way candidates who score 70 or more on S_{total} will have their data automatically sent to the Candidate Pool.

Figure 9.1. Future Work Career Portal Website



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