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AI-Powered Resume and Career Intelligence System (ARISE)

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ABSTRACT:

Candidates are frequently rejected by Applicant Tracking Systems (ATS) because of poor keyword usage and formatting rather than a lack of skills, and most existing tools offer only job listings or basic resume checks without end-to-end guidance. This paper presents ARISE, an AI-powered full-stack platform that analyzes a candidate's resume, matches it with target job requirements, identifies skill gaps, and converts those gaps into personalized career, learning, and resume-improvement actions. ARISE accepts PDF/DOCX resumes and extracts skills, education, experience, projects, and certifications; computes an explainable 100-point ATS score using eight weighted dimensions; and semantically compares the resume with a job description using Natural Language Processing and Sentence-BERT (all-MiniLM-L6-v2) embeddings with cosine similarity. The detected matched and missing skills drive a four-phase career roadmap and course recommendations, while resume rewriting, skill tracking, resume history, and PDF/DOCX export support continuous improvement. The system is implemented with React, Flask, and SQLite and secured with JWT authentication and bcrypt password hashing. All principal modules are implemented and the major backend service paths are verified through automated functional tests.

Keywords: Resume Parsing, ATS Score, Sentence-BERT, Skill-Gap Analysis, Career Roadmap, Natural Language Processing

1. Introduction:

Recruitment today is largely mediated by Applicant Tracking Systems that automatically filter resumes before a human reads them. Candidates are often rejected because of poor keyword usage and formatting, not because they lack the required skills. At the same time, job seekers have little insight into the gap between their own profile and the requirements of the roles they target, and the tools available to them are fragmented: some provide job listings, others provide only basic resume checks, and none offers a complete path from analysis to improvement.

This paper presents ARISE (AI-Powered Resume and Career Intelligence System), an intelligent full-stack platform that analyzes a candidate's resume, matches it with target job requirements, identifies skill gaps, and converts those gaps into personalized career, learning, and resume-improvement actions. The platform brings resume parsing, ATS-oriented scoring, semantic job matching, skill-gap detection, career roadmaps, course recommendation, resume rewriting, skill tracking, resume history, and document export into a single application.

The main capabilities of ARISE are summarized below.

- It accepts PDF/DOCX resumes and extracts important information such as skills, education, experience, projects, and certifications.
- It provides an explainable ATS score to evaluate resume quality, relevance, readability, and ATS-friendly formatting.
- It identifies matched and missing skills by comparing the candidate profile with the requirements of a target role.
- It provides career roadmaps and course recommendations to help candidates improve their missing skills.
- It includes resume rewriting features to improve weak bullet points and overall resume content.
- It provides skill tracking and resume history to monitor the candidate's continuous improvement.

Problem Statement:

Candidates need a single intelligent system that can analyze their resume, evaluate ATS readiness, match it with job requirements, identify skill gaps, and provide personalized guidance for career improvement. Four specific problems motivate this work: (i) ATS blind spots, where candidates face rejection due to poor keyword usage and formatting; (ii) no skill clarity, since job seekers lack insight into skill gaps between their profile and job requirements; (iii) lack of personalized career guidance, because resume analysis alone does not provide a complete path for improving skills, finding learning resources, and continuously improving the resume; and (iv) fragmented tools, as existing platforms offer only job listings or basic checks with no end-to-end guidance.

Objectives:

1. Develop an intelligent system to analyze resumes and extract relevant candidate information.
2. Implement an ATS-oriented scoring system to evaluate resume quality and job-role alignment.
3. Integrate NLP and Sentence-BERT to semantically match resumes with target job descriptions.
4. Identify skill gaps and recommend personalized career roadmaps and learning resources.
5. Optimize resumes and track skill/resume progress for continuous career improvement.

Scope of the Project:

ARISE is intended for students and fresh graduates, who can analyze resumes, identify skill gaps, and prepare for targeted job roles; for career preparation, by generating career roadmaps and recommending learning resources based on missing skills; for resume improvement, by evaluating ATS readiness, optimizing resume content, tracking progress, and maintaining resume history; and for training platforms, by recommending skill-based learning paths aligned to market needs.

2. Literature Survey:

1. Resume parsing and information extraction :

Recent systems treat extraction from PDF/DOCX resumes as a key first step. Later scoring and matching depend on the quality of extracted text.

2. Semantic matching requires evaluation :

Sentence embeddings represent meaning beyond exact keyword overlap. Advanced papers add task-specific training or ranking stages. ARISE currently uses pretrained all-MiniLM-L6-v2 embeddings and cosine similarity, with word-overlap fallback; it does not implement contrastive fine-tuning.

3. Hybrid signals can improve interpretability :

Several works combine semantic similarity with explicit skills, section-level features or weighted scoring. This is relevant to ARISE's role skill taxonomy and eight-dimension, project-defined ATS-oriented score.

4. Career guidance extends beyond matching :

Some systems connect resume analysis with skill-gap identification, career paths and learning resources. This supports ARISE's goal of turning analysis into practical next steps, but the broad combination may already be known.

5. Reliability and fairness matter :

The NAACL 2025 observational study cautions that LLM scores are not interchangeable with human ratings. ARISE should present its ATS score as advisory and avoid claims about hiring success or fairness without validation.

3. Methodology:

ARISE follows an end-to-end processing pipeline that moves a candidate from registration to a better resume and a concrete career plan. The workflow of the system is shown in Fig 1, and each stage is described in the following subsections.

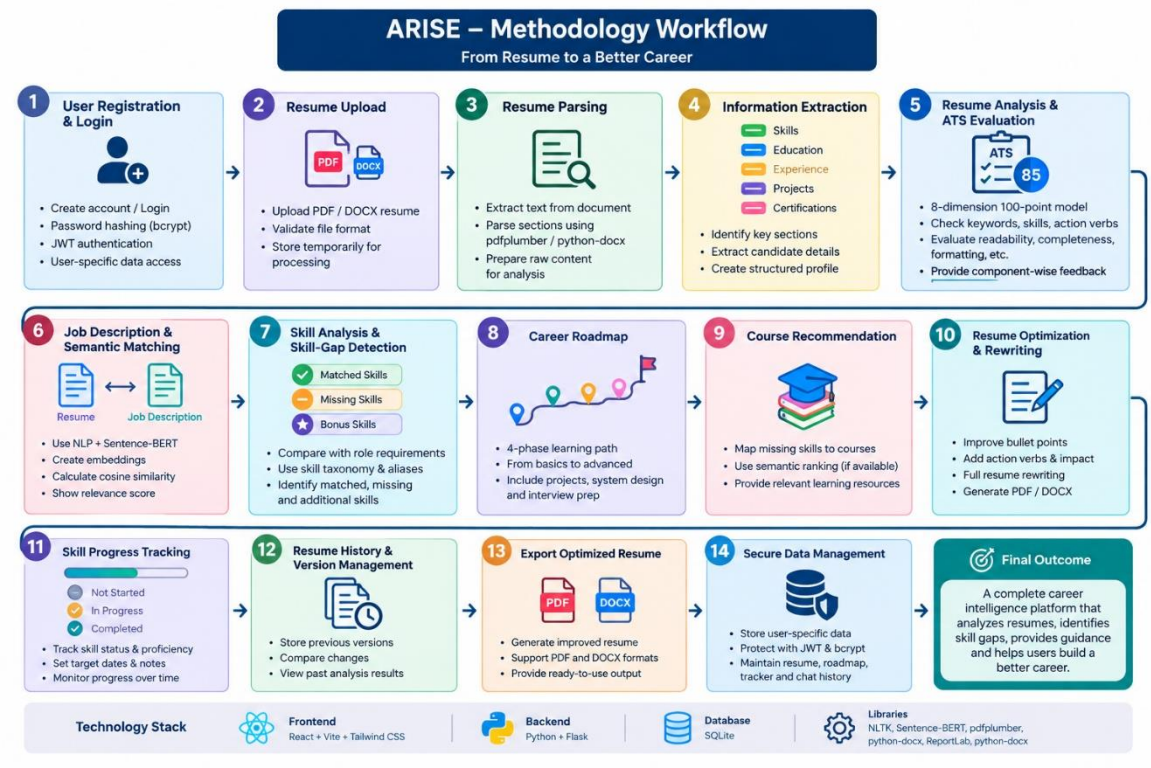


Fig 1 Methodology workflow of ARISE (from resume to a better career)

System Architecture:

The system follows a three-tier architecture. The presentation tier is a React web interface (React 19 with Vite and Tailwind CSS) that communicates with the backend through Axios. The application tier is a Flask REST API that hosts the services for parsing, ATS scoring, semantic matching, skill-gap analysis, career roadmaps, course recommendation, resume rewriting, export, and the AI coach. The data tier is an SQLite database that stores users, resumes, skill trackers, career roadmaps, chat messages, and rewritten resumes, together with the uploaded PDF/DOCX files. Protected operations use authenticated user IDs so that resume, tracker, roadmap, and chat data remain associated with the correct account. The technology stack is listed in Table 2.

Table 2 Software technology stack of ARISE

Layer	Technology	Purpose
Frontend	React 19 + Vite	Component UI and build
Styling	Tailwind CSS	Responsive modern interface
API Client	Axios	Frontend-backend communication
Backend	Python + Flask	REST API and business logic
NLP	Sentence Transformers	Semantic embeddings
Parsing	pdfplumber + python-docx	PDF/DOCX extraction
Database	SQLite	Persistent multi-user data
Export	ReportLab + python-docx	PDF/DOCX generation
Security	JWT + bcrypt	Authentication and password hashing

The platform has modest hardware requirements. The minimum configuration is a Core i3 (or equivalent) processor, 4 GB of RAM, and 5 GB of free storage; the recommended configuration is a Core i5 / Ryzen 5 or better, 8 GB or more of RAM, and an SSD with 10 GB or more of free space. A GPU is not required.

User Registration, Authentication and Resume Upload:

The process starts when a user creates an account or logs into the system and provides basic registration details. Passwords are protected using bcrypt password hashing. After a successful login, the system provides an authenticated session using a JSON Web Token (JWT), and user-related resumes, analysis results, skill progress, and history are associated with the authenticated user. This ensures that each user can securely access and manage their own resume and career information. After logging in, the user uploads a resume in PDF or DOCX format, which becomes the main input of the resume intelligence pipeline and spares users from manually entering their existing information.

Resume Parsing and Information Extraction:

The uploaded resume is processed by the backend to extract its text: pdfplumber is used for PDF documents and python-docx for DOCX documents. The extracted text (input: resume PDF; parser: extracts text; output: structured resume content) is then passed to the next stages of analysis. ARISE then identifies the important information in the resume, namely skills, education, experience, projects, certifications, and resume sections, following the sequence file type, text extraction, section detection, structured fields, and normalized candidate profile. This information is the foundation for ATS analysis, job matching, and skill-gap detection.

ATS Evaluation:

The extracted resume is evaluated using an ATS-oriented scoring mechanism. ARISE uses an application-defined scoring model with a total of 100 points distributed over eight weighted dimensions. The system checks factors such as relevant keywords and skills, strong action verbs, measurable achievements, important resume sections, readability, relevant experience, and ATS-friendly formatting. The total score is the sum of the weighted dimension scores (Eq. 2) and is reported with a grade, component-level reasons, and improvement suggestions, which makes the evaluation explainable.

Job Description and Semantic Matching:

The next stage compares the candidate's resume with a target job description or role. ARISE uses Natural Language Processing (NLP) and Sentence-BERT (SBERT) for semantic understanding, with the all-MiniLM-L6-v2 model. The resume and job-description content are converted into numerical representations called embeddings, and the cosine similarity between them (Eq. 1) determines how closely the two pieces of text are related; sentence-level comparison also gives job-description sentence coverage. When the model cannot be loaded, the system falls back to a word-overlap measure so that matching remains available.

$$\text{Cosine Similarity } (A, B) = (A \cdot B) / (||A|| \times ||B||) \qquad (1)$$

$$\text{ATS Total} = \Sigma \text{ (weighted dimension scores)} \qquad (2)$$

Skill Matching and Skill-Gap Detection:

After understanding the resume and the target role, ARISE determines which skills the candidate already has and which skills are missing. The system uses its skill taxonomy and role profiles, with exact and alias normalization, to compare candidate skills with the expected skills for the selected role. The result is divided into matched skills, which are already present or recognized in the candidate's profile, and missing skills, which are expected for the target role but not sufficiently represented in the profile; bonus skills beyond the role profile are also reported.

Career Roadmap and Course Recommendation:

Once skill gaps are identified, the system provides a structured career roadmap that converts the gaps into a learning and career-development path, organized as four-phase role-transition plans. ARISE then recommends relevant learning resources: it maps missing skills to its curated course and resource information and, when semantic matching is available, Sentence-BERT is also used to rank course relevance. Instead of only telling the user that a skill is missing, the system provides a direction for learning that skill.

Resume Rewriting, Skill Tracking, History and Export:

After analysis, the user can improve the resume using the rewriting functionality, which provides improved bullet points, stronger action-oriented wording, full resume rewriting, and better presentation of achievements and experience. A weak bullet is turned into a stronger action verb with measurable impact and a concise structure. Users can track their progress after receiving skill-gap results through a Kanban-style skill tracker, and the system maintains previous resume versions with score and skill deltas so that users can compare versions and keep improving over time. After making improvements, ARISE generates resume documents in PDF and DOCX format using ReportLab and python-docx.

AI Coach and Module Design:

An AI coach answers career questions using an external LLM (Gemini/OpenAI integration) with a heuristic fallback when no external LLM is configured. The system is organized into five modules: (1) User and Resume Management, which handles user authentication, resume upload, resume history, and user-specific resume data; (2) Resume Intelligence and ATS Analysis, which parses PDF/DOCX resumes, extracts key information, and evaluates resume quality using the ATS-oriented scoring model; (3) Job Matching and Skill Gap Analysis, which compares the resume with target job requirements using NLP/Sentence-BERT and identifies matched and missing skills; (4) Career Guidance and Learning Recommendation, which generates role-based career roadmaps and recommends learning resources; and (5) Resume Optimization and Progress Tracking, which improves resume content, tracks skill development, manages resume versions, and generates optimized PDF/DOCX resumes.

4. Results

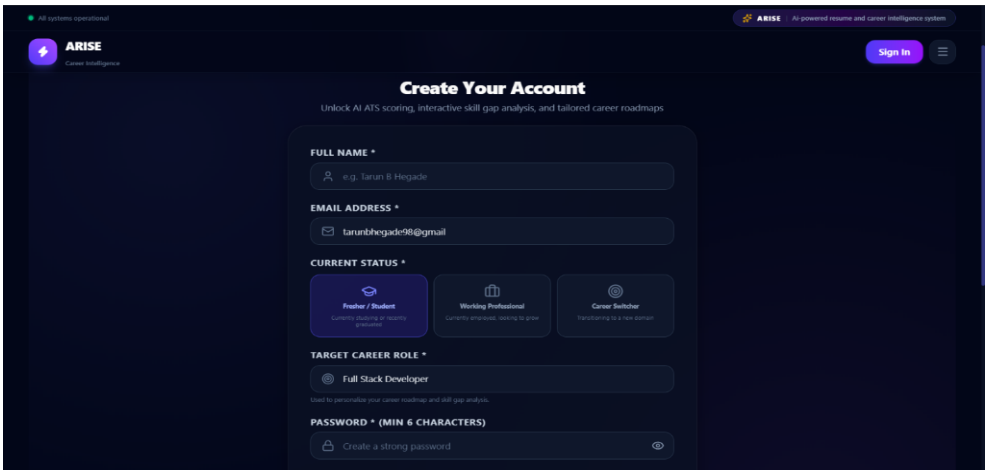
Correctness and Validation:

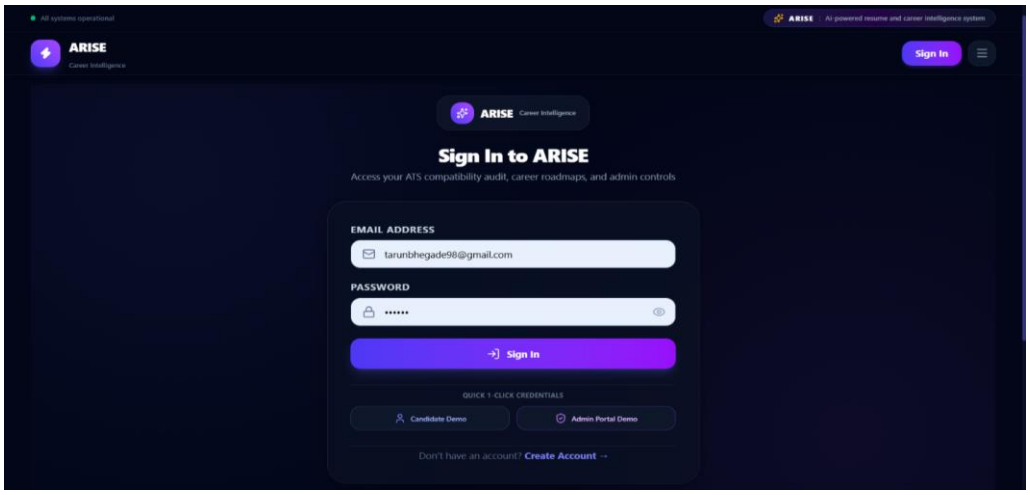
Correctness is checked through automated functional tests that exercise the major backend services and their integration points. The suite verifies ten service paths: the health endpoint (API 200 response); authentication (registration and JWT login); parser and ATS (structured parse and score); skill gap (matched and missing skills); career (roadmap generation); courses (recommendations returned); tracker (CRUD operations); rewriter (bullet and full rewrite); export (PDF and DOCX generation); and the AI coach (LLM or fallback response). The automated suite verifies the major service paths and integration behavior; this is functional validation and not a benchmark of matching accuracy.

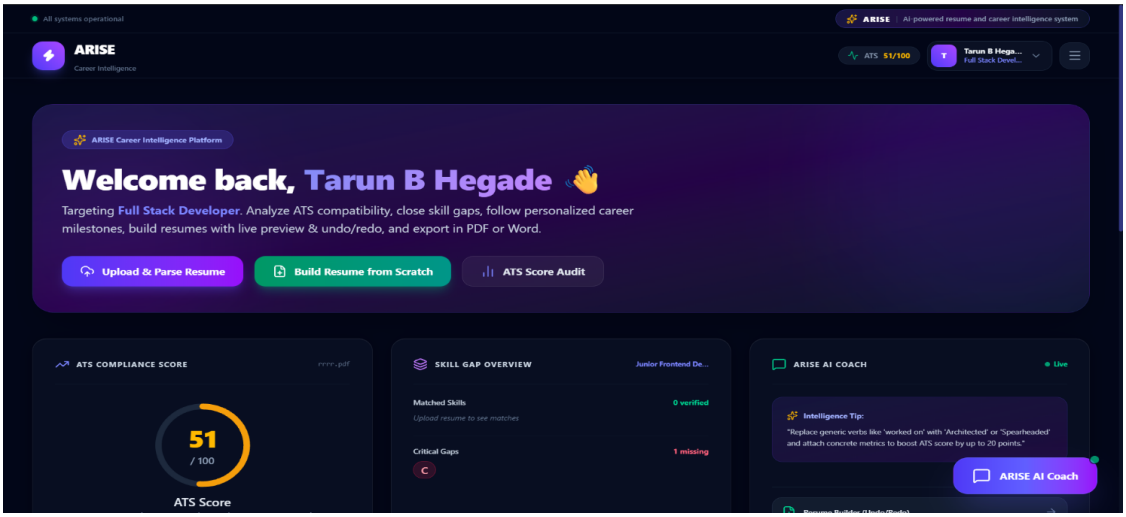
Application and Usability:

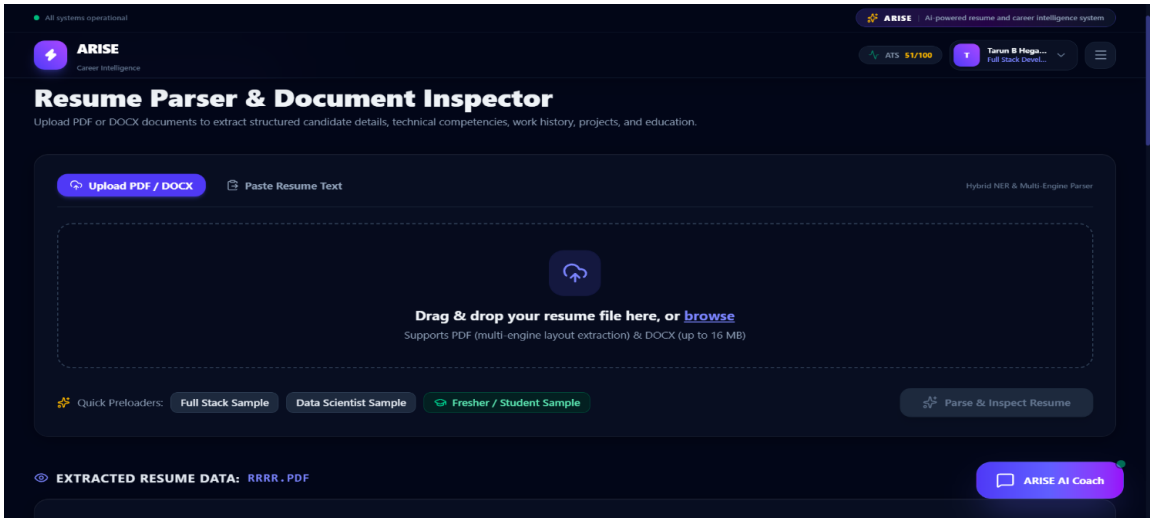
ARISE can be applied to resume analysis and improvement, job-description matching, skill-gap identification, career roadmap generation, learning-resource recommendation, and career-progress tracking, and it is particularly useful for students and fresh graduates preparing resumes for internships, placements, and entry-level job opportunities. From the usability viewpoint, the React-based interface offers simple resume upload, integrated functionality within a single application, actionable feedback, personalized role-based guidance, resume export in PDF and DOCX formats, progress management through skill statuses, proficiency levels, target dates, notes, and resume history, and secure user access through JWT-based authentication and bcrypt password hashing.

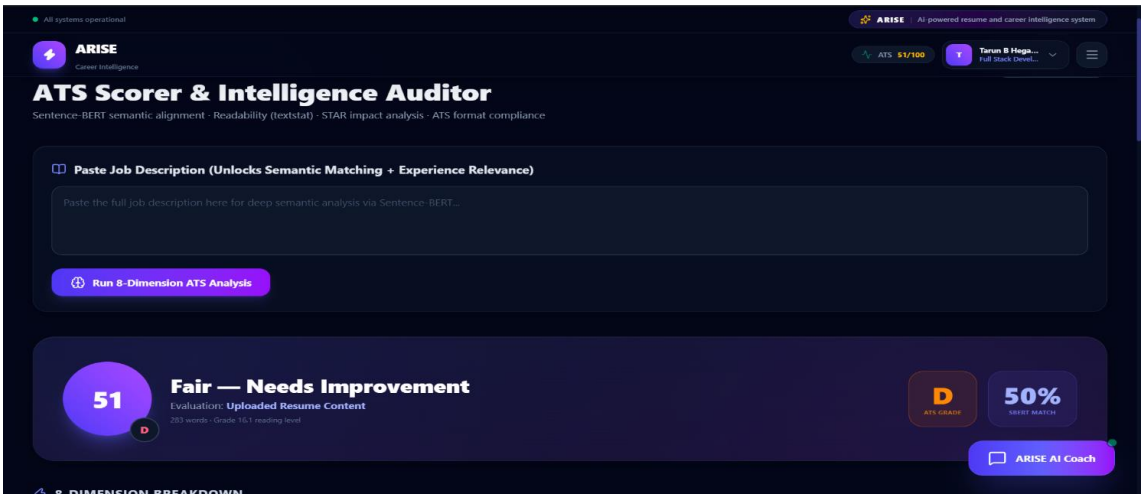
Output Images :

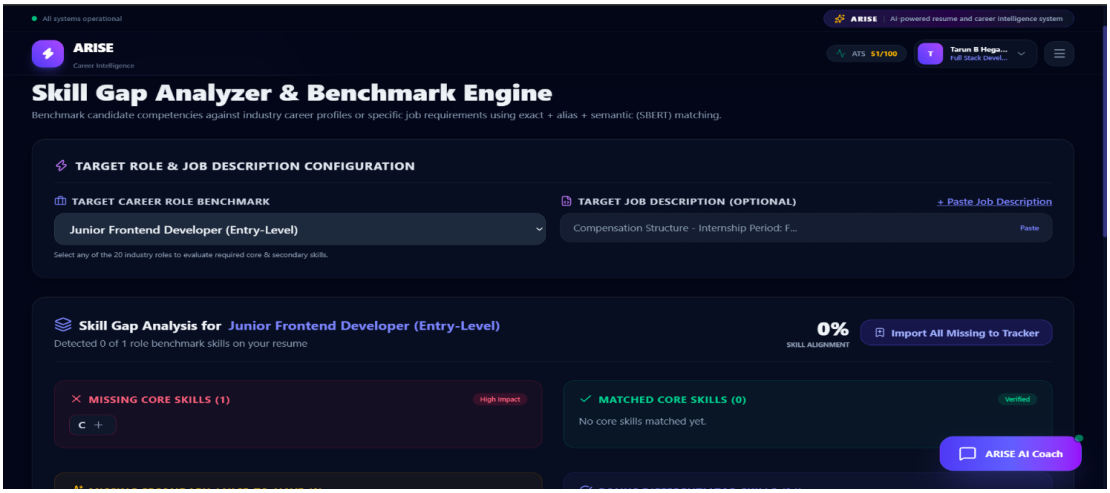


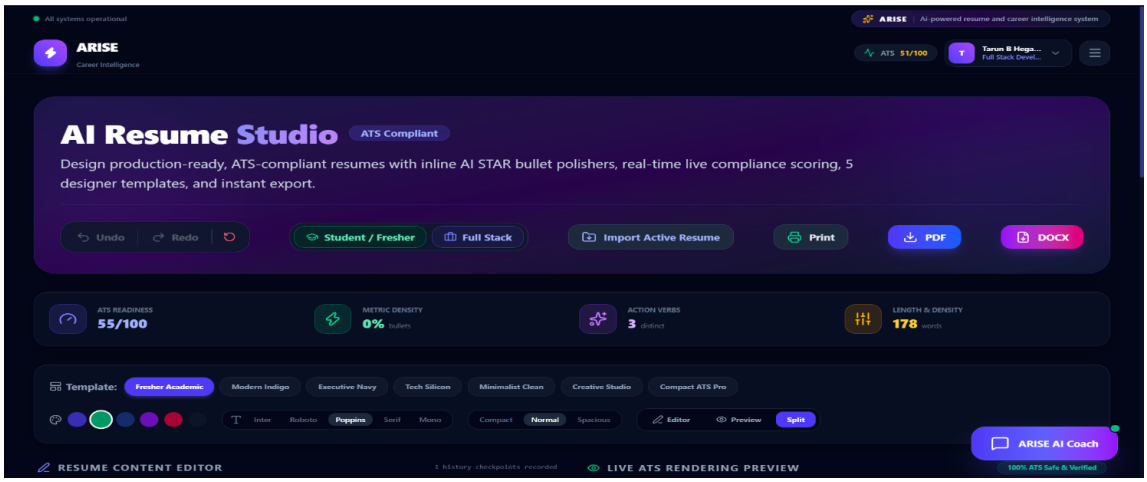


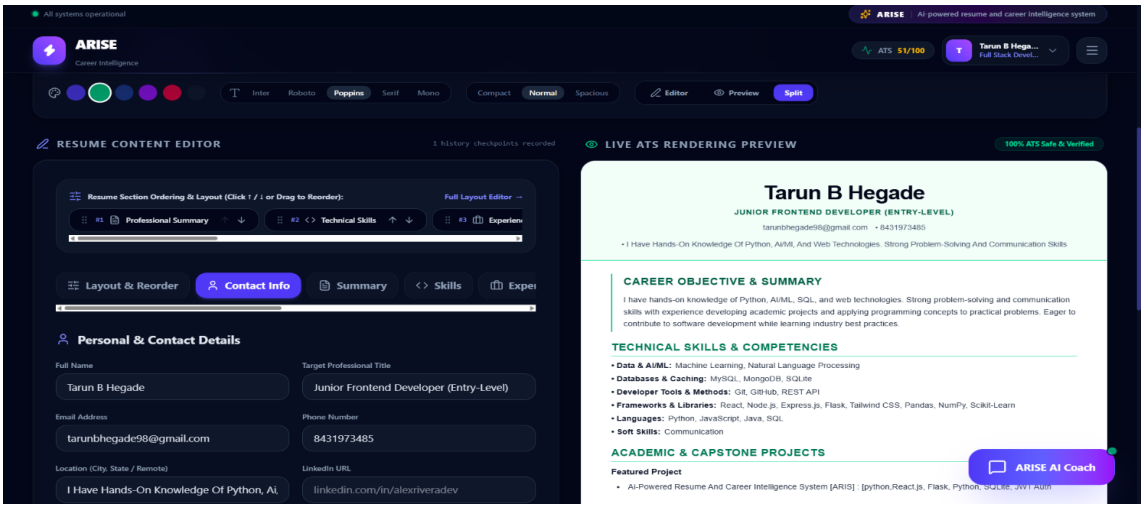

All systems operational
ARISE
Career Intelligence
ARISE | AI-powered resume and career intelligence system
ATS $1/100
Tarun B Hega...
Full Stack Devel...
ARISE Career Intelligence Platform
Welcome back, Tarun B Hegade
Targeting Full Stack Developer. Analyze ATS compatibility, close skill gaps, follow personalized career milestones, build resumes with live preview & undo/redo, and export in PDF or Word.
Upload & Parse Resume
Build Resume from Scratch
ATS Score Audit
ATS COMPLIANCE SCORE
51
/ 100
ATS Score
SKILL GAP OVERVIEW
Junior Frontend De...
Matched Skills
0 verified
Upload resume to see matches
Critical Gaps
1 missing
C
ARISE AI COACH
Live
Intelligence Tip:
"Replace generic verbs like 'worked on' with 'Architected' or 'Spearheaded' and attach concrete metrics to boost ATS score by up to 20 points."
ARISE AI Coach

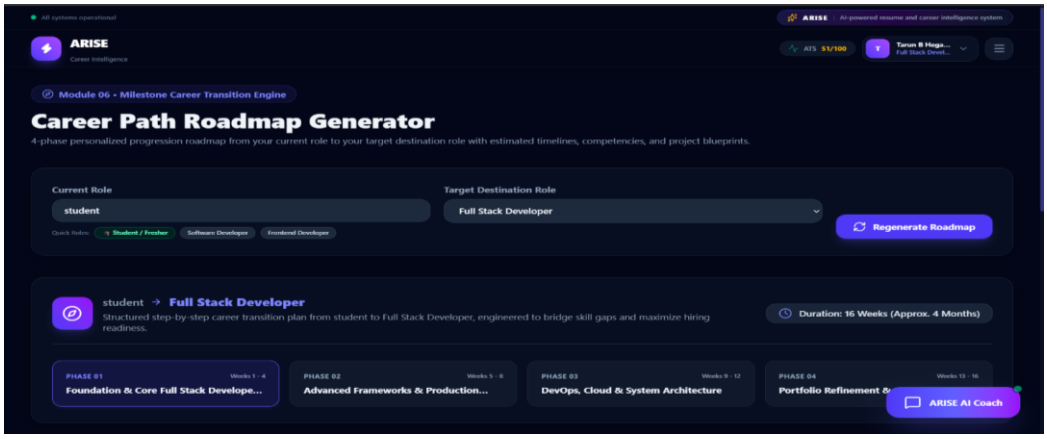

All systems operational
ARISE
Career Intelligence
ARISE | AI-powered resume and career intelligence system
ATS $1/100
Tarun B Hega...
Full Stack Devel...
Resume Parser & Document Inspector
Upload PDF or DOCX documents to extract structured candidate details, technical competencies, work history, projects, and education.
Upload PDF / DOCX
Paste Resume Text
Hybrid NER & Multi-Engine Parser
Drag & drop your resume file here, or browse
Supports PDF (multi-engine layout extraction) & DOCX (up to 16 MB)
Quick Preloaders:
Full Stack Sample
Data Scientist Sample
Fresher / Student Sample
Parse & Inspect Resume
EXTRACTED RESUME DATA: RRRR.PDF
ARISE AI Coach

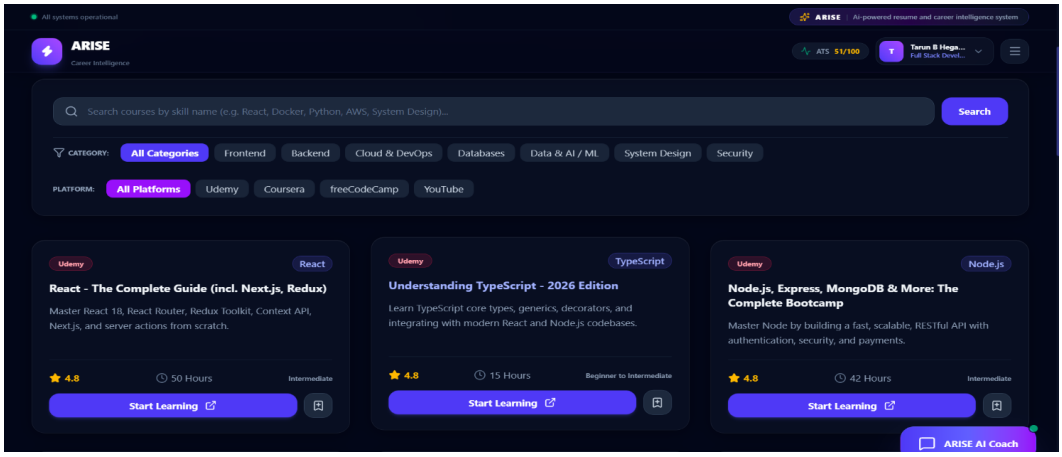

All systems operational
ARISE
Career Intelligence
ARISE | AI-powered resume and career intelligence system
ATS $1/100
Tarun B Hega...
Full Stack Devel...
ATS Scorer & Intelligence Auditor
Sentence-BERT semantic alignment · Readability (textstat) · STAR impact analysis · ATS format compliance
Paste Job Description (Unlocks Semantic Matching + Experience Relevance)
Paste the full job description here for deep semantic analysis via Sentence-BERT...
Run 8-Dimension ATS Analysis
51
D
Fair — Needs Improvement
Evaluation: Uploaded Resume Content
283 words · Grade 16.1 reading level
D
ATS GRADE
50%
BERT MATCH
ARISE AI Coach

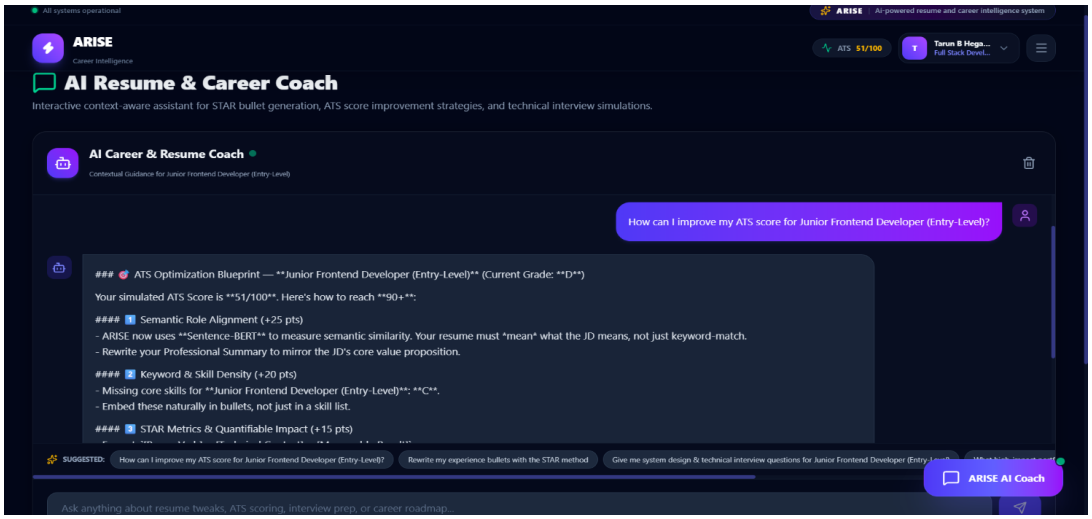

ARISE
Career Intelligence
Skill Gap Analyzer & Benchmark Engine
Benchmark candidate competencies against industry career profiles or specific job requirements using exact + alias + semantic (SBERT) matching.
TARGET ROLE & JOB DESCRIPTION CONFIGURATION
TARGET CAREER ROLE BENCHMARK
Junior Frontend Developer (Entry-Level)
TARGET JOB DESCRIPTION (OPTIONAL)
+ Paste Job Description
Skill Gap Analysis for Junior Frontend Developer (Entry-Level)
Detected 0 of 1 role benchmark skills on your resume
0%
SKILL ALIGNMENT
Import All Missing to Tracker
MISSING CORE SKILLS (1)
MATCHED CORE SKILLS (0)
No core skills matched yet.
ARISE AI Coach


ARISE
Career Intelligence
AI Resume Studio
ATS Compliant
Design production-ready, ATS-compliant resumes with inline AI STAR bullet polishers, real-time live compliance scoring, 5 designer templates, and instant export.
Undo
Redo
Student / Fresher
Full Stack
Import Active Resume
Print
PDF
DOCX
ATS READINESS
55/100
METRIC DENSITY
0%
ACTION VERBS
3
LENGTH & DENSITY
178
Template:
Fresher Academic
Modern Indigo
Executive Navy
Tech Silicon
Minimalist Clean
Creative Studio
Compact ATS Pro
Editor
Preview
Split
RESUME CONTENT EDITOR
LIVE ATS RENDERING PREVIEW
ARISE AI Coach


ARISE
Career Intelligence
RESUME CONTENT EDITOR
LIVE ATS RENDERING PREVIEW
Resume Section Ordering & Layout (Click ↑ / ↓ or Drag to Reorder):
Full Layout Editor →
Professional Summary
Technical Skills
Layout & Reorder
Contact Info
Summary
Skills
Personal & Contact Details
Full Name
Tarun B Hegade
Target Professional Title
Junior Frontend Developer (Entry-Level)
Email Address
tarunbhegade98@gmail.com
Phone Number
8431973485
Location (City, State / Remote)
I Have Hands-On Knowledge Of Python, Ai
LinkedIn URL
linkedin.com/in/alexriveradev
Tarun B Hegade
JUNIOR FRONTEND DEVELOPER (ENTRY-LEVEL)
tarunbhegade98@gmail.com • 8431973485
CAREER OBJECTIVE & SUMMARY
I have hands-on knowledge of Python, AI/ML, SQL, and web technologies. Strong problem-solving and communication skills with experience developing academic projects and applying programming concepts to practical problems. Eager to contribute to software development while learning industry best practices.
TECHNICAL SKILLS & COMPETENCIES
ACADEMIC & CAPSTONE PROJECTS
ARISE AI Coach







5. Conclusion

ARISE connects resume analysis with career action through a practical full-stack architecture. It combines an end-to-end resume-to-career workflow with a hybrid rule-based and semantic NLP approach, transparent ATS scoring and role matching, and learning and career actions linked directly to identified skill gaps. All principal modules, namely authentication and resume management, parsing and information extraction, ATS-oriented analysis, semantic matching, skill-gap detection, career roadmap and course recommendation, resume optimization and rewriting, skill tracking and resume history, PDF/DOCX export, and backend, frontend, and database integration, have been implemented and integrated.

The modular architecture allows future expansion. As future work, the matching and scoring components can be evaluated against labelled resume and job-description datasets, and the skill taxonomy, role profiles, and course catalogue can be extended to additional job roles.

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