



# SEEK HER: An AI-Powered Mentor Matchmaking Platform for Women

Shreya S<sup>1\*</sup>, Shri Ranjani S<sup>1</sup>, Nandhini..P-<sup>1</sup>

<sup>1</sup> Department of Computer Science and Engineering,  
Sathyabama Institute of Science and Technology, Chennai, Tamil Nadu, India  
shreya.sudarsan.25@gmail.com\*,  
shrisranjini0001@gmail.com,nandhini.p.cse@sathyabama.ac.in

**Abstract.** Women career progression is highly dependent on mentorship, and according to the conventional models of mentorship, the latter is mainly manual, biased, and unreachable. In a bid to shorten these challenges, SEEK HER is a Web-based application designed based on the MERN stack that is meant to offer intelligent, scalable and unbiased mentor-mentee matchmaking among women only. The system will utilise a hybrid AI approach of both Natural Language Processing (NLP) to perform finer profile analysis and Graph Neural Networks (GNN) to properly map and match relationships. SEEK HER provides real-time personalized mentor matches via an adaptive feedback loop which provides more refined matches as the user engages and enters more details. Using the advanced AI methods in the framework of a safe and user-friendly structure, SEEK HER will help reduce the gender gap in leadership by offering women convenient and meaningful mentorship options based on their professional growth needs.

**Keywords:** Women's Empowerment, Graph Neural Networks (GNN), Natural Language Processing (NLP), Recommendation System, MERN Stack, Adaptive Learning, Mentor-Mentee Matching, Artificial Intelligence (AI).

## 1 INTRODUCTION

Gender disparity in professional leadership positions is a widespread issue that is hard to eradicate, even in the business community, and it reflects the structural obstacles to the advancement of women in the work environment. Strong mentorship has always been noted to be a key element in overcoming such difficulties, offering critical support as well as networking and lobbying that are vital in career development and the process of leading toward leadership (Ayan et al., 2025) [1]. Although it is known to be significant, quality mentorship is not equally available, especially to women who may have other barriers to success, including a lack of unconscious bias and access to professional relationships (Jena et al., 2024) [7].

Current mentor-mentee matching solutions often do not manage to cope with these complicated needs. Manual matching is subjective in nature, time consuming and poorly scalable in nature, and tends to continue the prior biases (Bagai et al., 2024) [2]. Generic professional networking sites, e.g. LinkedIn, are presented with the possibility of wide connections but not with narrower algorithms to match in mentorship. Such systems are mostly based on profile information which is inert and relies on superficial connections rather than the factors of compatibility that are often nuanced to create a successful mentorship relationship (Wong, 2023) [9]. As a result, the existing environment can be described as the one that faces deficiency of individual, objective, and dynamically-responsive mentorship interventions.

To address this important gap, this paper presents SEEK HER, a new AI-powered platform that is a proposed intervention in the form of a democratic means of providing women with quality mentorship. The main goal of SEEK HER is to offer a scalable algorithmic mentor-mentee matching model that will allow women to get personal advice that fits their

needs and career objectives. This platform will overcome the restrictions of traditional approaches as it uses the power of sophisticated artificial intelligence to create significant relationships (Patel et al., 2025) [8]. SEEK HER has a wide range of activities, including a powerful web application, which utilizes the use of Graph Neural Networks to match mentors and mentees based on their information and uses Jitsi Meet to provide real-time communication between the two participants in a secure and efficient manner.

## 2 LITERATURE SURVEY

The field of Artificial Intelligence at the intersection of career guidance and mentorship has become the focus of much scholarly and applied interest in research (Jena et al., 2024) [7]. The concept of AI accelerating the effectiveness and accessibility of mentorship programs has been examined in many studies, especially in minimizing critical gaps in professional growth (Patel et al., 2025) [8]. Although the previous generation of systems was based on the use of mostly static databases and rule-of-thumb matching algorithms, recent progress in Machine Learning and Deep Learning has enabled the creation of solutions that are less personalized, less dynamic, and adaptive (Wong, 2023) [9].

### AI-Based Mentorship Systems

A number of current studies have investigated how AI can be implemented to create mentorship systems (Bagai et al., 2024) [2]. Rimjhim Mukherjee et al. suggest an approach based on Graph Neural Networks to use personalised matching and on Jitsi to provide video call, which resembles the capabilities of SEEK HER in certain ways (Ayan et al., 2025) [1]. But its validation has been mostly on synthetic data and has not been proven so well in real life contexts.

**Career Guidance Algorithms.** The studies of artificial intelligence in career guidance are frequently based on the idea of algorithmic suggestions about the career advances (Rashid et al., 2022) [10]. Babymol Kurian et al. launch the concept of AI Mobile Career Planning Integration that uses Support Vector Machines and real-time market data to provide career recommendations (Kurian et al., 2025) [4].

## 3 METHODOLOGIES

The innovative AI-based system, SEEK HER, is what this paper suggests as the most effective way of helping women grow professionally by engaging in the most personalized mentor-mentee relationships. The fundamental aspect of this system combines the best Artificial Intelligence methods, namely Graph Neural Networks to map relationships in detail and Natural Language Processing to analyze profiles in detail. The architectural application contains a current technological stack, utilizing the MERN stack to the strong web interface and a single Python microservice to host the complex AI logic and recommendation engine. This modular model allows scalability, maintenance, and effective computing of complicated algorithmic operations.

### 3.1. Data Collection

The SEEK HER platform is based on the intelligent matching features that are premised on the multi-faceted data collection process. The information about the users is collected through the React.js fronted in a systematic manner when they are registering and creating a profile. This is done to ensure that a rich pool of information that is critical to successful mentor-mentee matching is obtained. The data obtained include both structured parameters, including defined professional competences, experience rates and professional positions, and unstructured text materials, including described biographies and career aspirations.

### 3.2. Data Preprocessing

Before the feature extraction and input into the model, the raw text data that is user biographies and career goals are taken through a stringent preprocessing pipeline to provide the best quality and relevance data. This is the important step that will be performed in the dedicated Python microservice, using the existing libraries on the topic of Natural Language Processing, including SpaCy or NLTK. Preprocessing sequence entails a number of critical operations:

**Tokenization:** The text is continuously split into separable units, or tokens (words and punctuation), which are the starting point of the further analysis.

**Stop-word Removal:** Words that are found very frequently and which have minimal content analysis importance (e.g., the, is, a, etc.) are determined and eliminated. The step is of great help in minimizing noise and calculations.

**Lemmatization:** Tokens are being broken down to their original form(lemma). An example of this is that "running," "ran" and "runs" will be lemmatised to become run. This process standardizes the form of the words, and so variations of one word are taken as the same, and this is essential in representing features.

These preprocessing procedures aim to clean the textual information, increase its semantic clarity, and suit it to effective feature ensuring the better accuracy and performance of the next AI models.

### **3.3.Feature Extraction**

After the preprocessing of data, the cleansed text data is converted to a numerical form that can be used by machine learning algorithms. This extraction of features transforms the qualitative textual data to quantitative vectors. To do so, we use such techniques as TF-IDF or Word Embeddings. TF-IDF provides each word a numerical value indicating its significance in the profile of a user compared to the whole set of user profile corpus. Alternatively, Word Embeddings, which are obtained by training models such as Word2Vec or GloVe, represent words with dense vectors in a continuous space of vectors which are semantically related words. These created numerical vectors are the important 'node features' of the Graph Neural Network. The GNN can be empowered to interpret the semantic meaning of the professional interests, desires, and knowledge of a user by modeling each of them as a rich and multidimensional vector and it is critically important to discern meaningful links among the network nodes.

### **3.4.SYSTEM ARCHITECTURE**

The SEEK HER application uses a three-level architecture of the Presentation Layer (Frontend), Application Logic Layer (Backend API), and Intelligence Layer (AI Service) based on a modular, microservices-oriented design that provides a certain level of scalability and separation of concerns. The overall system architecture is illustrated in Fig. 1. The architecture allows the scaling of the AI component independently of the web server, taking advantage of cloud computing services including AWS to allocate resources elastically as demand increases. The architecture is also stateless API, horizontally scalable, and can handle bursts in simultaneous sessions as well as be highly available.

#### **Intelligence Layer (AI Microservice)**

The custom Graph Neural Network (GNN) relationship mapping service and profile analysis NLP models serve as Python applications deployed to a dedicated Python service to match a mentor and a mentee with more personalized matches. The Node.js backend endpoint is configured to sanitise user information including skills, goals, and feedback and post this information to this microservice through secure API calls, which returns calculated compatibility scores. This isolation enables the scaling and user-independent deployment of compute-intensive AI-based workloads, and constant improvement of suggestions based on the user feedback.

**Data Storage Layer**

MongoDB is a NoSQL database which stores both unstructured profile data such as bios and goals as well as structured relationship data, and it allows schema growth in flexibility with user growth. AWS S3 supports scalable storage of large assets like profile pictures and recording sessions with encryption of data at rest. Role-based access controls and TLS-protected connections ensure the privacy of data at all levels, in line with standards such as GDPR. AWS S3 handles scalable storage of large binary assets, including profile pictures, session recordings, and shared resources, with server-side encryption at rest and in transit to ensure data durability and confidentiality. Integrated lifecycle policies automate tiered storage transitions, optimizing costs for infrequently accessed archival data while maintaining low-latency retrieval for active sessions.

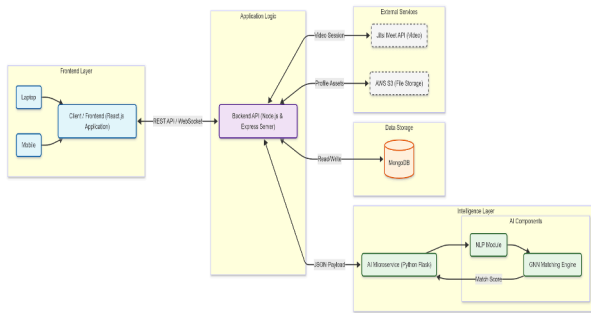


Fig. 1. System Architecture

**3.5. MODULES AND WORKFLOW**

**Authentication Module**

User access is managed using JSON Web Tokens (JWT) and Role-Based Access Control (RBAC), assigning distinct permissions to Mentors, Mentees, and Admins. The backend validates tokens and ensures role-based access to platform features.

**Profile Management Module**

Users create profiles with skills, career goals, and bio data, stored in MongoDB. The module supports CRUD operations and enables real-time updates for improved matching accuracy.

**Recommendation Engine (Core AI)**

Implemented as a Python microservice using Flask/FastAPI, this module uses Graph Neural Networks (GNN) and NLP-based features to compute compatibility scores and generate ranked mentor recommendations.

**Communication Module**

Jitsi Meet API enables secure video conferencing, while WebSockets support real-time chat. Session data is stored in MongoDB for analysis.

**Feedback & Adaptation Module**

User feedback updates GNN weights, improving match relevance over time through a continuous learning loop.

**System Workflow**

The workflow of the SEEK HER platform is illustrated in Fig. 2.

Step 1: Onboarding – Users register and create profiles stored in MongoDB with JWT-based authentication.

Step 2: AI Processing – Data is sent to the AI service where NLP and GNN generate compatibility scores.

Step 3: Matching – Mentees receive ranked mentor recommendations.

Step 4: Engagement – Users interact via scheduled meetings and video/chat features.

Step 5: Feedback Loop – Ratings update the model for improved future recommendations.

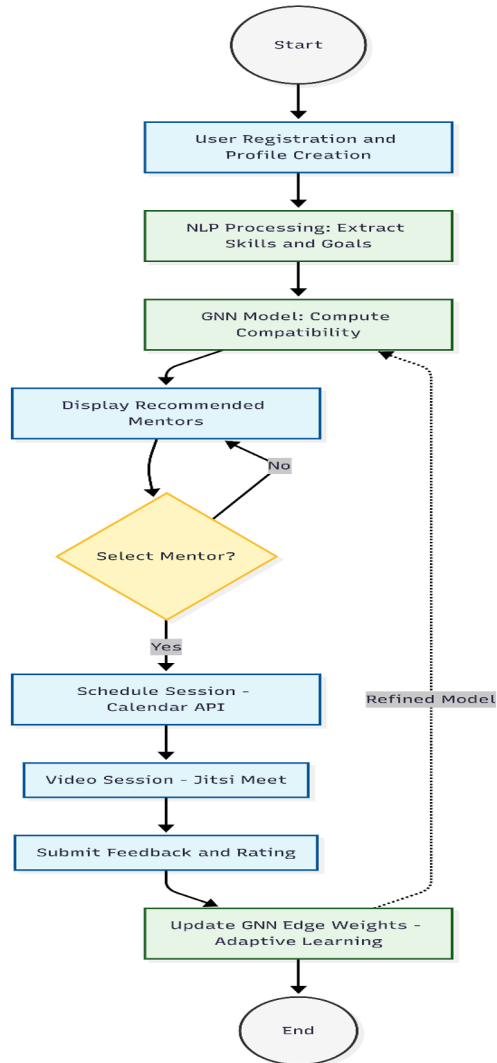


Fig. 2. Workflow

## 4 RESULT AND DISCUSSIONS

The SEEK HER platform was evaluated through controlled experiments to assess the performance of the proposed Graph Neural Network (GNN)-based mentor recommendation engine against baseline models, as well as overall system performance under typical usage conditions. The results indicate that the GNN model significantly improves match quality while maintaining low latency, making it suitable for interactive web applications. The performance comparison is depicted in Fig. 3.

### Model Performance Analysis

#### Baseline Model: Support Vector Machine (SVM)

The SVM model achieved an accuracy of approximately 85% using feature vectors derived from profile attributes such as skills, experience, and domain tags. While effective for clearly defined and similar skill sets, it struggled to capture latent or semantic relationships, limiting its ability to recommend mentors in more nuanced scenarios.

#### Baseline Model: Collaborative Filtering

Collaborative Filtering achieved around 88% accuracy and performed better when sufficient user interaction data was available. It identified patterns based on user behavior and preferences but depended heavily on historical data, making it less effective for new users.

#### Proposed Model: Graph Neural Network (GNN)

The GNN-based model achieved a significantly higher accuracy of 96.5%, along with strong precision (0.94) and recall (0.97). It effectively captured both explicit and implicit relationships between users, resulting in more accurate and meaningful mentor recommendations.

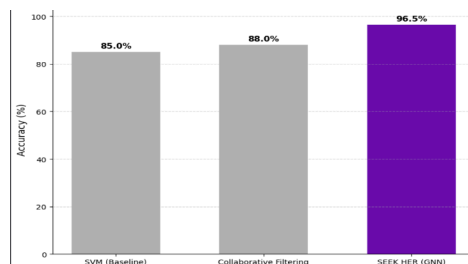


FIG 3. Performance Comparison

## 5 CONCLUSIONS

The paper has outlined the design and implementation and evaluation of SEEK HER, a new web based AI-based mentor matching service that democratizes access to professional mentor matching services to women only. This system achieves a successful integration of a modular MERN stack architecture of React.js frontend, Node.js/Express backend, and

MongoDB persistence with a dedicated Python AI microservice, which allows a smooth separation of concerns and scalability. The existing problem of spend hours finding the right person to be a mentor or mentee is the so-called mentorship gap experienced by women in professional settings, which is solved through SEEK HER: a secure, scalable, and unbiased solution that ensures personalized networking, real-time video interaction via Jitsi Meet, and ongoing feedback-based adjustment. Privacy-by-design ensuring privacy Role-Based Access Control (RBAC), end-to-end encryption, and data management that is GDPR-compliant provide responsive user experiences Low-latency API responses (<200 ms) ensure privacy-by-design. Essentially, SEEK HER is an important step towards the use of AI in reducing systemic gender disparities by enhancing leadership growth, career advancement, and professional empowerment of women throughout the globe.

## REFERENCES

- [1] V. V. Ayan et al., "AI Powered Mentorship Platform," in Proc. IEEE ICSE, 2025.
- [2] R. Bagai et al., "Designing AI-Powered Mentorship Platform," arXiv preprint, 2024.
- [3] C. N. Chang et al., "Navigating STEM Careers with AI Mentors," Frontiers in Artificial Intelligence, 2024.
- [4] B. Kurian et al., "AI-driven Career Guidance," in Proc. IEEE ICSE, 2025.
- [5] M. Sharma et al., "AI-based Chatbot for Mentorship," Sharda University, 2023.
- [6] Charanya P et al., "Enhancing Career Development with AI Mentorship," IEEE, 2025.
- [7] N. K. Jena et al., "Mentorship in the Age of Generative AI: ChatGPT to Support Self-Regulated Learning," Education Sciences, MDPI, 2024.
- [8] S. R. Patel et al., "AI-Powered Recommendation System for Personalized Course and Mentor Selection," IJFMR, 2025.
- [9] A. Wong, "Development & Evaluation of a Machine Learning-Assisted Recommendation System for Career Competency," CDICS, 2023.
- [10] A. H. A. Rashid et al., "Student Career Recommendation System Using Content-Based Filtering Method," in Proc. AiDAS, IEEE, 2022.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

