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Tawafuq: A Skill-Based AI Matching System for Team Formation

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Abstract - *Team formation in academia is still a challenging task due to differences in individual skills, limited availability and the lack of structured matching We present the Tawafuq platform, an AI-based platform for effective and coordinated team building. The system leverages structured person profiles, such as talents and availability, to evaluate the fit between people and project requirements. The platform is designed as a web-based application, utilizing HTML, CSS, and JavaScript for the front-end, PHP for back-end processing, and MySQL for data management. Initial experimental testing with a small user group reveals that the strategy improves the relevancy of matches and enables faster team building. Keywords: AI Matching, Team Formation, Recommendation Systems, Skill Matching, Web Application.*

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1. INTRODUCTION

The success of academic and professional efforts is a key aspect in team creation. However, traditional team building procedures are often based on manual selection, personal networks or random grouping, which can lead to mismatched competencies, uneven workload distribution and low project efficiency. These difficulties highlight the need for smart systems that can assess the abilities, interests and availability of users to enable better collaboration. To tackle these challenges, we introduce Tawafuq, an AI-powered matching platform for optimizing team formation in academia. The system is built on structured user profiles and similarity-based algorithms to calculate the degree of compatibility between each individual and each project. Tawafuq automates the matching process, hence reducing the time it takes to establish teams while improving the relevance and quality of matches. The platform is a web application designed utilizing modern frontend and backend technologies, making it accessible and scalable for academic institutions.

2. Methodology

In this study, we address the problem of students having difficulties in finding compatible colleagues and projects, which often results in talent mismatches and lower team performance. The suggested Tawafuq system solves this challenge by using a systematic skill based matching strategy. It gathers students' data such as abilities, academic aspirations, and availability, assesses the project requirements, and proposes the most suitable projects. The system is created with three tier web architecture. The frontend is written in HTML, CSS and JavaScript, and the backend is developed in PHP, storing the data in MySQL. Integrates the OpenAI API to provide AI driven project recommendations. The system allows students to view projects, submit join requests and the system matches them to projects according to their talents and availability. System evaluation is performed by unit testing, integration testing and user experience testing to verify reliability and usability. The evaluation of the performance involves the measurement of the project matching precision and the collection of user input to verify the performance of the system. Future maintenance will involve repeated refinement of the recommendation algorithm, as well as the addition of additional functionalities to maintain system stability and ongoing relevance.

2.2 AI-Based Matching Algorithm

The AI based similarity analysis is the foundation of the tawafuq system matching technique. First, the system takes user profile information, including abilities, free time, and project goals essential skills are fetched.

The user profile and the project data are converted to text format and sent to the model from the OpenAI. The model calculates a similarity score in the range of 0 to 100 depending on the semantic similarity of the user

profile and the project requirements. Then projects are appraised using the similarity score. The projects with the highest score are suggested to the user.

2.3 Proposed Algorithm for Matching

Tawafuq system uses similarity based matching algorithms to suggest acceptable projects to individuals based on their talents, availability and goals. The program calculates a score of compatibility between each user and the projects accessible.

2.3.1 Matching Score Formula

Score = w1 * SkillMatch + w2 * AvailabilityMatch + w3 * GoalMatch
Where:
- SkillMatch: % of skills that match between user and project
- AvailabilityMatch: Overlap of user and project timing
- GoalMatch: User goal similarity with project goals - w1, w2, w3 are weights (e.g. 0.5, 0.3, 0.2)

2.3.2 Skill Matching

SkillMatch = Total number of matching skills Total required skills × 100

2.3.3 Matching Availability

Based on the overlaps between user availability and the project timeline.

2.3.4 Goal Alignment

Calculated based on semantic similarity utilizing the API of Open Assistant between user goals and project description.

2.3.5 Algorithm Steps (Pseudo-code)

In each project:
Compute SkillMatch
Compute AvailabilityMatch
Compute GoalMatch
Compute Score Sort projects by Score Return top matches

Example 2.3.6
If SkillMatch = 80,
AvailabilityMatch = 70,
GoalMatch = 60:
Score = (0.5×80) + (0.3×70) + (0.2×60) = 73

Results

The Tawafuq system was successfully built to offer intelligent matching for users and projects according to their talents, goals and available time. Users could register, log in, and establish personal profiles with their specified skills, personal goals, and preferred working times. Project makers could also build projects by identifying required skills, project goals and desired working hours. "To improve the matching process, we used Open AI to develop an AI-based matching functionality. The system compares the user abilities, goals and time preferences with the needs of the projects and recommends the suitable ones. The system functions such as user registration, project creating, AI-based matching, and join request were successfully tested. The system could save user data, project data and matching results in database effectively.
The results demonstrated that the system was able to generate relevant matches when user attributes aligned with project requirements.

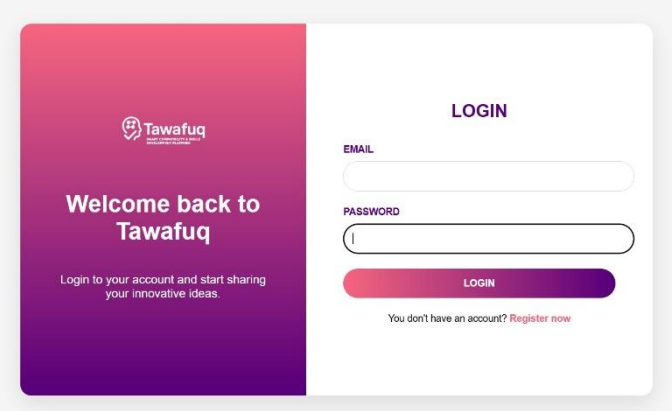

Figure 1. Login interface of Tawafuq system user .

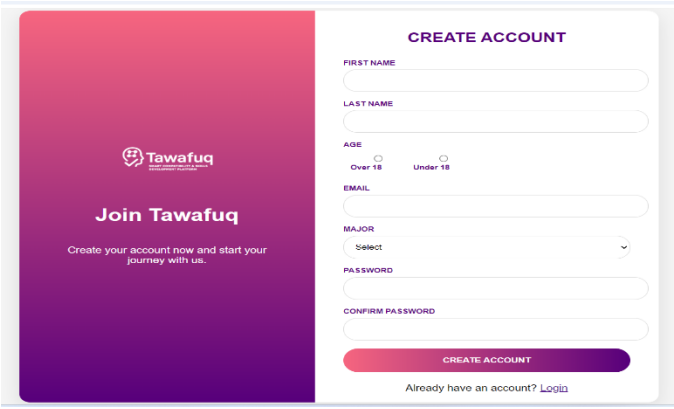

Figure 2. User signup UI for a new Tawafuq account.

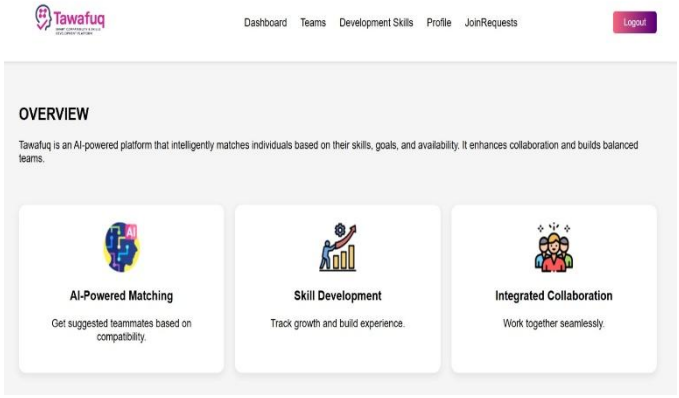

Figure 3. Dashboard page with system overview and key features.

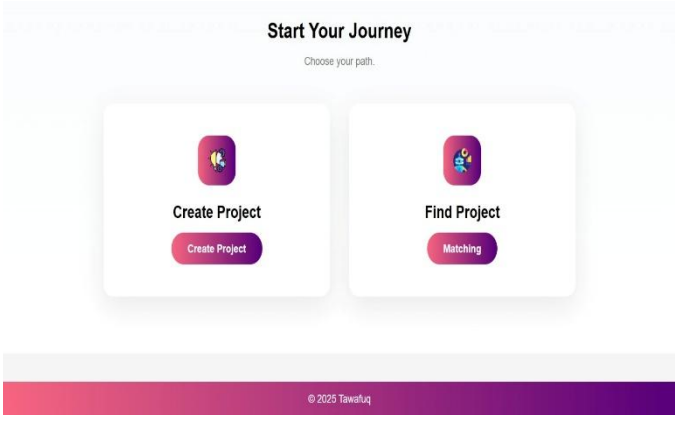

Figure 4. interface demonstrating project creation and project.

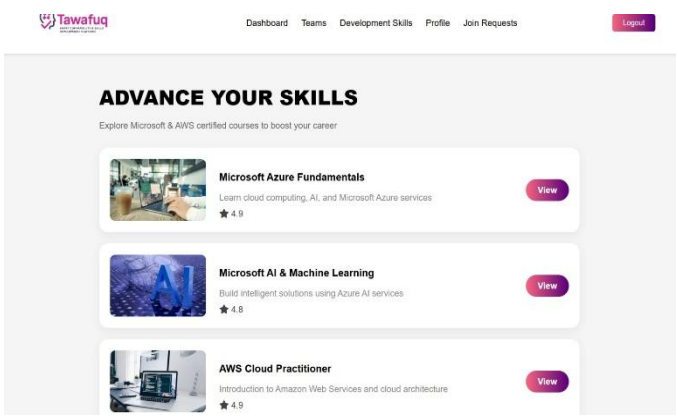

Figure 5. Development skills page with 3 recommended courses for users.

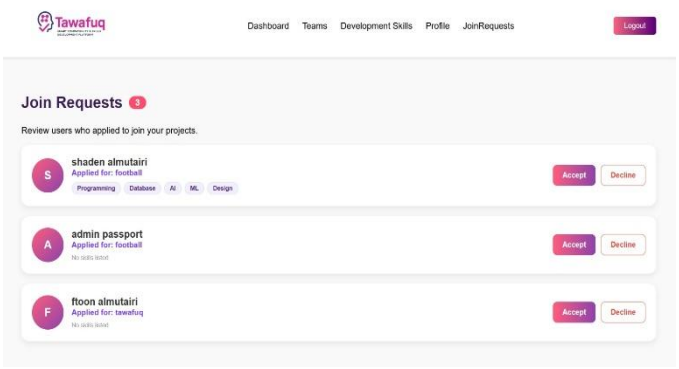

Figure 6. User applications to projects (page of joining requests).

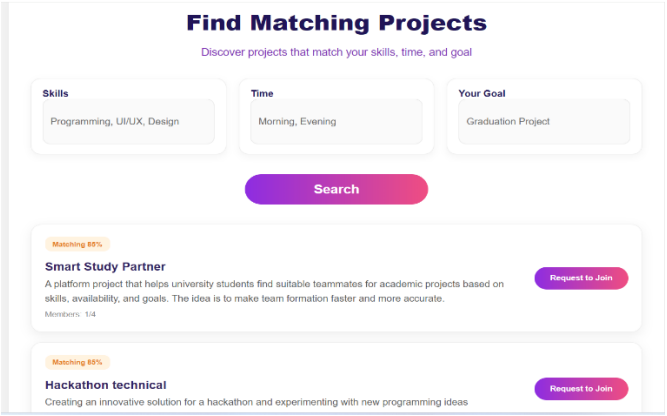

Figure 7. AI-based matching interface with recommended projects based on user input

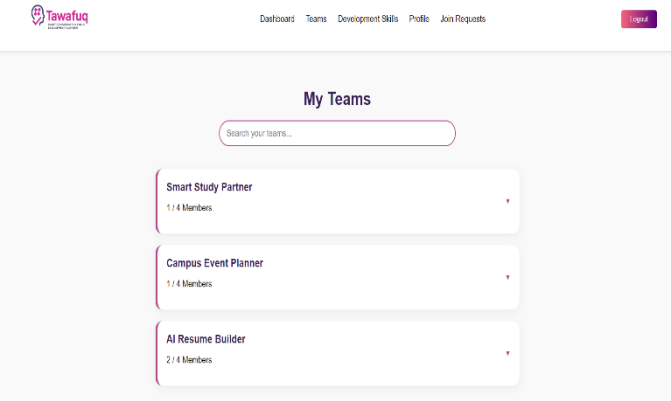

Figure 8. Teams page with users engagement in various initiatives.

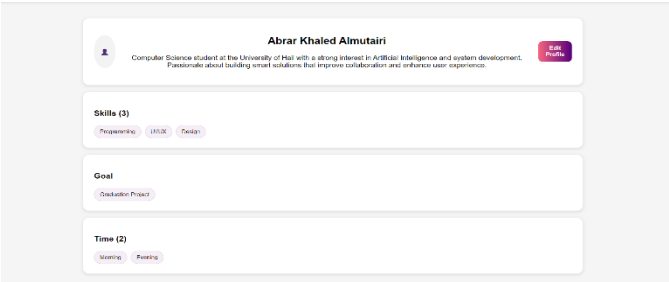

Figure 9. User profile page showing personal information, skills, ambitions and availability.

To assess the performance of the Tawafuq system, three techniques to form teams were examined: manual team creation, random matching, and Tawafuq AI-based matching. The comparison shows that Tawafuq enables more appropriate matching based on users' abilities, goals and availability and improves the efficiency of team building compared to traditional techniques.

Table -1: Comparison of Team Formation Methods

Method	Matching Criteria	Time Required	Matching Relevance	Team Compatibility
Manual Team Formation	Personal Selection or Friends	High	Medium	Medium
Random Matching	Random Assignment	Low	Low	Low
Tawafuq AI Matching	Skills, Goals, And Availability	Low	High	High

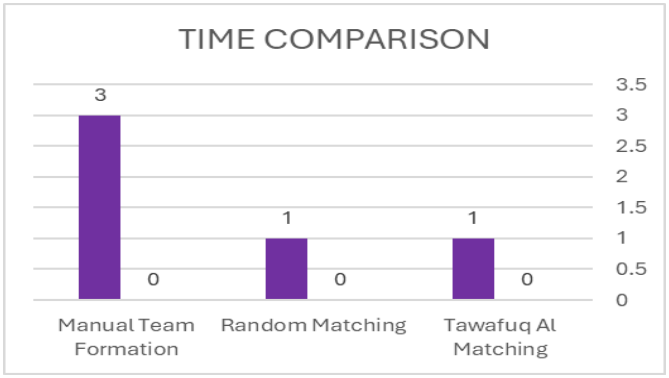

Figure10. The slowest is manual formation (3), the random and Tawafuq are faster (1).

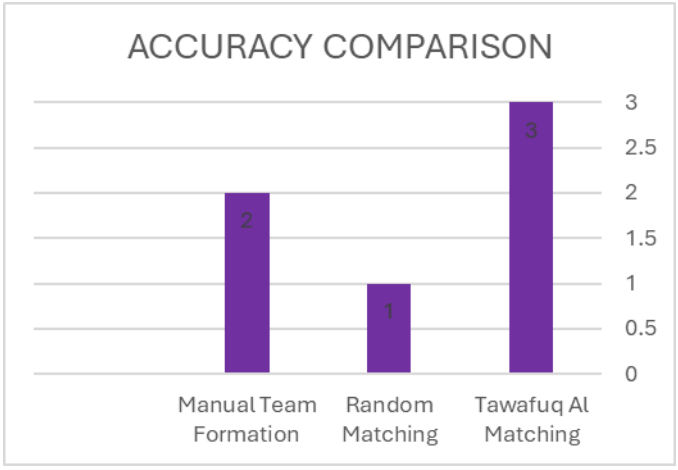

Figure11. Tawafuq obtained the best accuracy (3), followed by manual (2) and random (1).

3. Discussion

The experimental findings clearly indicate the effectiveness of the proposed Tawafuq system over manual and random team creation approaches. As regards accuracy, Tawafuq had the highest score (3 - High) compared to manual formation (2 - Medium) and random matching (1 - Low). This means that the system produces more relevant and compatible team matches . Also, the time required for team creation using Tawafuq was minimal (1) as well as random matching, but manual formation needed quite a long time (3 - High). The results reveal that Tawafuq not only increases the quality of matching but also improves the efficiency by lowering the time needed to

build teams. Although these results are intriguing, the system was tested at a small scale, which could have an impact on the generalizability of the results. Future study will focus on assessing the system with larger datasets and further enhancing the AI model for even higher accuracy and performance.

4. Conclusion

In this study, a web-based system called "Tawafuq" was introduced to improve the process of graduation projects selection and student teams formation. The method tackles the usual obstacles faced by students, such as difficulties in searching for acceptable colleagues and absence of a defined project selection procedure. The suggested solution has three-tier architecture and includes an AI-based matching mechanism that leverages the OpenAI API to assess student talents, availability, and project needs. The results indicate that the approach can successfully match students to suitable projects and improve compatibility between team members. The realization of the system (frontend, backend, database) proves that the platform is functional, scalable and suitable for future deployment. Test results also proved the stability of important functions including user authentication, profile management and data processing, But there is still room for development. Future work might be directed towards improving the accuracy of the AI matching algorithm, increasing the dataset, improving the user interface and implementing the system on a cloud platform for real-world use. To conclude, "Tawafuq" offers an effective and intelligent solution that can assist students in making better project decisions and creating more compatible and productive teams.

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