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Application of artificial intelligence in career development of women in STEM field: Counseling, network construction and recruitment

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Abstract: With the rapid development of science and technology, the application of artificial intelligence (AI) in STEM (science, technology, engineering and mathematics) is increasingly extensive, which provides a new idea for solving the challenges of women's career development in STEM. This paper deeply discusses the application of AI in counseling, network construction and recruitment of women's STEM career development, aiming at promoting gender equality and women's career growth. In career counseling, AI technology provides customized career advice and development path for women through deep learning and big data analysis. According to personal education background, skill level, hobbies and career goals, the system intelligently recommends suitable career directions, and updates industry trends and job market data in real time to help women make more informed career choices. The AI tutoring system also enhances women's professional self-confidence through functions such as simulated interviews and career planning exercises. In terms of network construction, AI helps women to expand their professional networks more effectively through intelligent recommendation system. Based on user behavior data and preferences, AI accurately recommends industry seminars, technical exchange activities and online communities to promote women to establish contacts with like-minded professionals. AI also assists women in managing and maintaining network relationships, ensures the continuity of network interaction through intelligent reminding functions, and identifies key nodes and influential people to enhance network quality. In the recruitment process, AI technology reduces gender bias and improves the fairness and transparency of recruitment through automatic resume screening, standardized interview process and competency-based evaluation model. AI system can analyze a large amount of data, accurately match the skills and job requirements of female candidates, and improve the employment rate of women in STEM field. At the same time, through transparent algorithm decision-making process and fairness check, the potential gender bias problem in AI algorithm is overcome. The research in this paper provides theoretical support and practical guidance for using AI technology to promote women's career development in STEM field, and helps to build a more equal and inclusive scientific and technological working environment.

Keywords: *Artificial intelligence, Career development, Counseling, Network construction, Recruitment, STEM.*

1. Introduction

With the rapid development of science and technology, artificial intelligence (AI) has become a hot topic in today's society, and its application in various fields is also increasingly extensive. The field of STEM (science, technology, engineering and mathematics), as an important force to promote the progress of social science and technology, is increasingly receiving global attention and attention [1]. However, despite the huge development potential in the field of STEM, the participation of women in it is relatively low, which has aroused widespread concern from all walks of life.

The low participation of women in the field of STEM may be due to the comprehensive effect of many factors. The influence of traditional ideas, the existence of gender bias and the imbalance between

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family and career of women may all be the reasons for this phenomenon [2-3]. In addition, women's lack of sufficient support and resources in the field of STEM also limits their career development. Therefore, how to take effective measures to promote women's career development in the field of STEM has become an urgent problem [4]. In recent years, the rapid development of AI technology provides a new way to solve this problem. AI technology can not only help women get more personalized career counseling, but also help them get more opportunities and resources in the process of career network construction and recruitment. Through intelligent data analysis, women can be provided with more accurate career planning and recommendation, thus enhancing their competitiveness in the field of STEM.

The purpose of this study is to deeply explore the application of AI in the career development of women in STEM field, such as counseling, network construction and recruitment. By analyzing how AI technology can help women achieve better career development in the field of STEM.

2. Application of AI In Career Counseling for STEM Women

With the continuous progress of AI technology, its application in STEM women's career counseling has become increasingly important. STEM field is both a challenge and an opportunity for women. However, due to various reasons, including social prejudice, unequal educational resources, and unclear career orientation of women in this field, women's participation in the STEM field is relatively low [5-6]. The introduction of AI technology provides more accurate and personalized career counseling for women, which helps them to better plan their career development path Figure 1.

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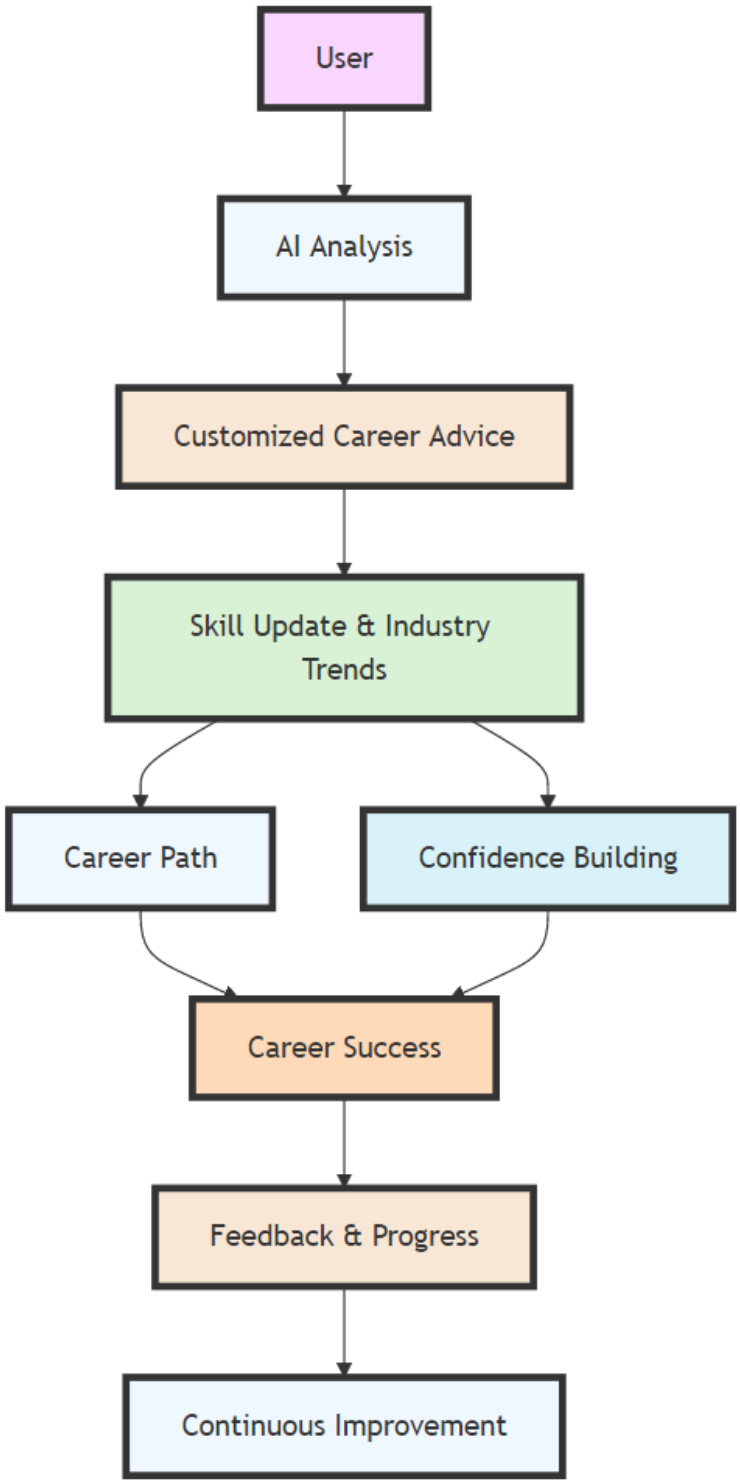

Figure 1.
Career development path suggested by users according to AI.

AI technology can provide customized career advice for every woman through deep learning and big data analysis. The system can intelligently recommend the appropriate career direction and

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development path according to the individual's educational background, skill level, hobbies and career goals [7-8]. This personalized counseling method can not only help women understand their strengths and potentials more clearly, but also guide them to find career fields that may be of interest but have not been considered before.

The AI tutoring system can update industry trends and job market data in real time, and provide the latest career information for women. This is especially important for women who are seeking career opportunities or want to change careers. Through the AI system, they can know in time which skills are most popular in the current market and which industries are experiencing rapid growth, so as to make more informed career choices. AI tutoring system also plays an important role in improving women's professional self-confidence. The system can help women to enhance their self-presentation and communication skills and improve their competitiveness in job hunting through functions such as simulated interview and career planning exercises. At the same time, through regular feedback and progress tracking, women can clearly see their growth and progress, and thus more firmly believe that they can succeed in the field of STEM. The application of AI in STEM women's career counseling not only provides more accurate and personalized career development advice for women, but also helps them to better understand industry trends and market demand and enhance their career confidence.

3. The Role of AI in the Construction of STEM Women's Network

In the field of STEM, the importance of network construction for career development is self-evident. Especially for women, having a strong professional network can not only provide a platform for knowledge sharing and experience exchange, but also help to find more opportunities for cooperation and development. AI technology can help STEM women to expand their professional network more effectively through intelligent recommendation system [9]. Based on users' behavioral data and preferences, AI can accurately recommend relevant industry seminars, technical exchange activities and online communities, so that women can more conveniently reach out to like-minded professionals, thus establishing valuable contacts.

The application of AI in social media and online platforms has also greatly promoted the interaction and communication between STEM women. Through intelligent matching algorithm, AI can help women find people with similar research interests or professional backgrounds, and then form a close social network Figure 2. This kind of network not only provides a platform for women to share experiences and solve problems, but also helps to stimulate innovative thinking and cooperative projects.

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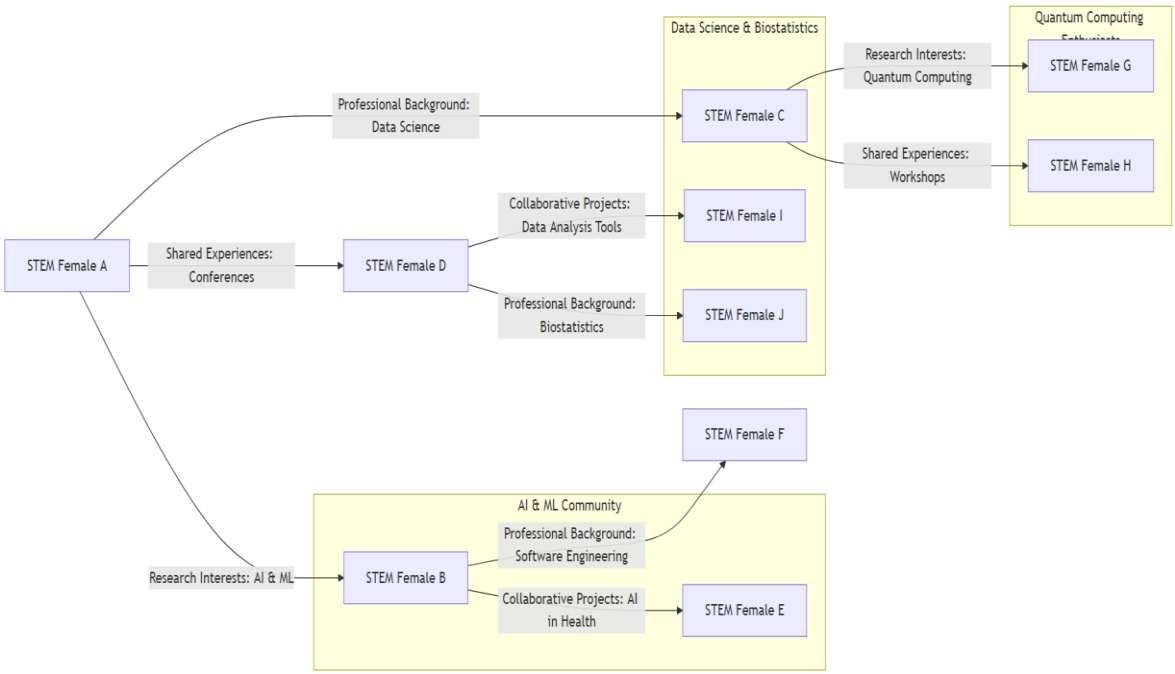

Figure 2.
Network construction support.

AI technology can also assist STEM women to manage and maintain their professional networks. For example, through the intelligent reminder function, women can follow up the interaction with contacts in time to ensure the continuity and deepening of online relations. AI can also analyze the information flow pattern in the network, help women identify key nodes and influential people, and thus establish and develop network relations more pertinently.

AI plays an important auxiliary role in the construction of STEM women's network, which not only improves the efficiency of network expansion, but also enhances the quality and depth of the network. With the further development of AI technology, it will play an increasingly important role in helping STEM women to establish a broader and closer professional network.

4. Application of AI in STEM Female Recruitment

At present, women face multiple challenges in the recruitment process in STEM field, including gender bias and the opacity of the recruitment process. Gender bias may lead to unfair treatment of female candidates in resume screening, interview evaluation and promotion opportunities [10]. The opacity of the recruitment process makes it more difficult for women to get equal opportunities, because they may not fully understand the job requirements and evaluation criteria.

The introduction of AI technology is expected to improve the current situation of female recruitment in STEM field. By automatically screening resumes, AI can reduce gender-based prejudice and ensure that candidates' qualifications and skills are the only criteria for evaluation. Standardized interview process and competency-based evaluation model can improve the fairness and transparency of recruitment. In addition, the AI system can identify and match the skills and job requirements of female candidates by analyzing a large amount of data, thus improving the employment rate of women in the STEM field.

AI system can automatically analyze resume content, extract key information, and intelligently match with job requirements, reducing the influence of human bias. By designing intelligent personality test systems, AI can comprehensively and accurately evaluate candidates' personality characteristics, which are usually based on psychological theory and big data analysis Figure 3. AI technology can accurately evaluate a candidate's skill level by online skill testing or analyzing his work experience.

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These evaluations are based on big data and algorithms, reducing subjective judgment. AI interview system can record the interview process in real time, analyze the candidates' language expression and emotional reaction, provide objective interview evaluation report and reduce the bias in the interview process. AI system can recommend suitable positions according to candidates' abilities and interests, achieve accurate matching between talents and positions, and avoid job recommendation based on gender stereotypes.

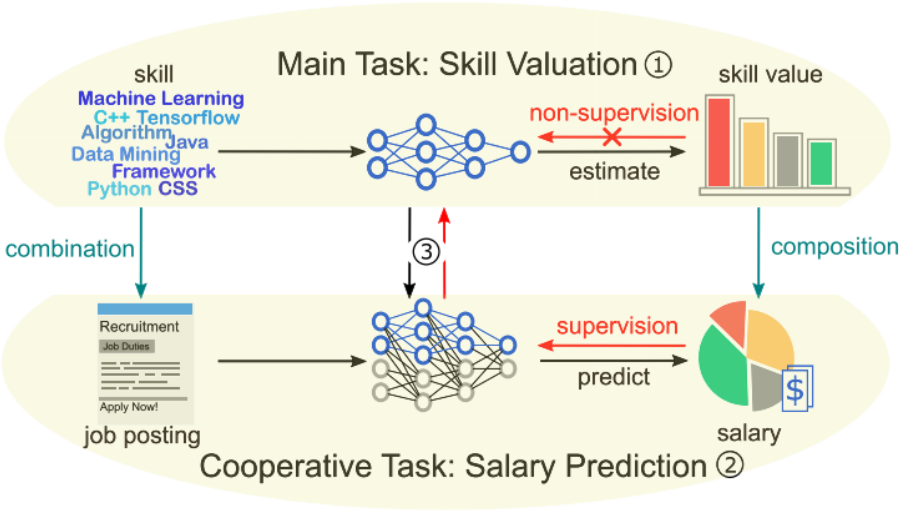

Figure 3.
AI technology application.

Through text analysis, AI system can identify the key skills of candidates and the requirements in job descriptions. This involves keyword matching, semantic analysis and machine learning models, which can learn the relevance between skills and the specific needs of positions. The system will apply matching algorithm to evaluate whether the candidate's skill combination meets the needs of a specific position. This includes rule-based systems, collaborative filtering, or more complex machine learning models, such as deep learning networks, which can consider multiple factors and provide matching scores. AI system will continuously optimize its algorithm according to the results of historical matching. Through machine learning, the system can learn from each matching and improve the accuracy of future matching. In this process, the AI system will consider the data of all candidates, and will not make discriminatory matching based on personal attributes such as gender. The goal of the system is to find the candidate who best meets the job skills requirements and ensure the fairness and efficiency of the recruitment process.

By extensively collecting and integrating multi-dimensional data of different genders, races and ages, the diversity and representativeness of model training data are ensured and potential bias is reduced [11]. In the evaluation stage of the model, fairness indicators, such as Gini coefficient and equal opportunity difference, are added to quantify the performance difference of the model in different groups and adjust and optimize it in time. Interpretable AI technologies, such as LIME or SHAP, are adopted to enhance the transparency of the decision-making process of the model and facilitate the analysis and correction of possible bias factors Figure 4.

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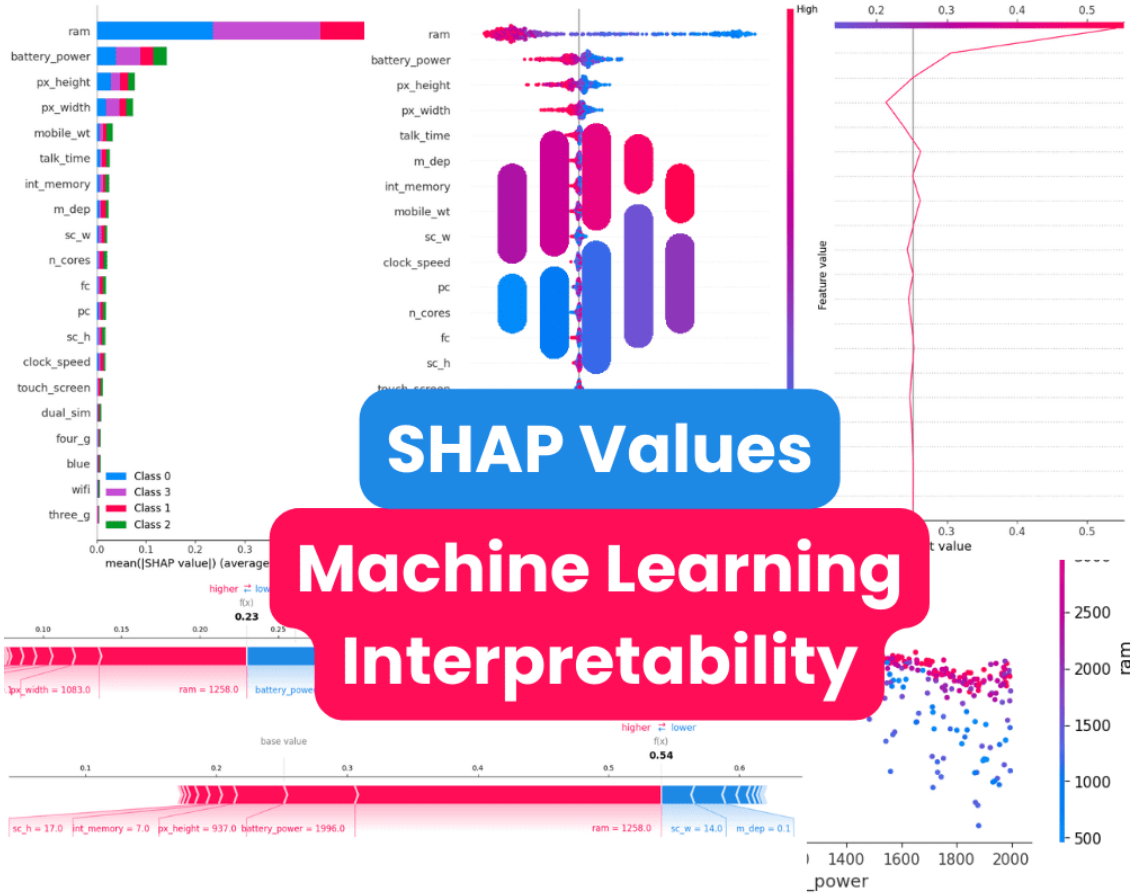

Figure 4.
Interpretable AI technologies.

AI technology brings innovation impetus to the STEM field, and enhances women's employment opportunities and career development space in the technology industry through intelligent analysis and prediction. AI algorithm may imply gender bias, which leads to unfair screening of female job seekers [12]. It is necessary to overcome this problem through transparent algorithm decision-making process and fairness check. Combining the advantages of AI technology with humanistic care, we should formulate targeted strategies, such as developing STEM education programs, encouraging more women to participate in technology research and development, and promoting gender equality.

Enterprises should formulate clear gender equality policies, improve employees' awareness of gender diversity through training, and ensure the fairness and transparency of the recruitment process. Create an environment that supports women's career development, including flexible work arrangements, parenting support and leadership development plans to reduce the gender gap in the workplace. Advocate the recognition of gender equality from all walks of life, publicize successful cases in the media, and encourage more organizations and individuals to participate in actions to promote gender equality.

5. Existing Challenges

AI systems often rely on historical data when dealing with recruitment and career development suggestions. Due to the low representation of women in the STEM field in history, the AI system may inherit and amplify gender bias, which is not conducive to the recruitment and development of women. In the professional network of STEM field, men tend to dominate. The network construction tools recommended by AI may aggravate this phenomenon, because they recommend contacts based on

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existing network relationships, which makes it more difficult for women to break gender barriers and establish beneficial professional contacts. The AI tutoring system usually adopts a "one size fits all" approach, which does not fully consider the special challenges and needs faced by women in the STEM field. As a result, the career development advice provided to women may not be appropriate or useful. In some cases, women may not have access to the latest AI tools and resources due to socio-economic factors, which limits their use of these tools to enhance their career development opportunities [13]. Women may be worried about the privacy and security of personal data when using AI career development tools, especially considering the risk that gender data may be abused.

In the future, it is necessary to consciously collect more diversified and balanced data sets, reduce gender bias in the AI system, and make it serve all genders more fairly. Design an AI algorithm that can identify and correct gender bias to ensure equal opportunities in career counseling and network construction. Develop a more personalized AI tutoring system, taking into account the unique challenges and opportunities of women in the STEM field, and provide tailor-made career advice and support. Ensure that all groups, regardless of gender, economic status or geographical location, can access and use AI career development tools equally. Develop more secure data processing and storage methods to protect user data from abuse, and at the same time improve transparency and let users know how their data is used. Create and promote AI tools aimed at breaking gender barriers, and encourage women to join and be active in professional networks in the field of STEM. Establish a continuous monitoring and evaluation mechanism to regularly check the impact of AI tools and applications on women's career development in practice to ensure that they are developing in a more fair and inclusive direction.

6. Conclusion

AI has played an important role in the career development of women in STEM field. Through personalized career counseling, effective network construction and fair recruitment process, it has significantly promoted women's participation and development in this field. AI technology can provide customized career advice, help women better plan their career paths, and enhance their career confidence through real-time updated industry trends. In terms of network construction, AI assists women to expand their professional networks through intelligent recommendation system, improving the quality and depth of the network. In the recruitment application, AI reduces gender-based prejudice and improves the transparency and fairness of the recruitment process. Although there are challenges, such as gender bias in historical data and male dominance in network construction, measures such as collecting diversified data, designing unbiased algorithms and ensuring data security can further optimize the AI system and promote gender equality and inclusive development.

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