

Analysis of Interdisciplinary Research Trends in the Field of Artificial Intelligence in EI Conferences

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Abstract: In recent years, interdisciplinary research on artificial intelligence (AI) has increasingly emerged as one of the most prominent topics in EI conferences. By deeply integrating AI with various disciplines such as medicine, materials science, sociology, ecology, and beyond, AI not only facilitates technological advancements within these fields but also offers novel perspectives and methods for addressing complex global challenges. Interdisciplinary research leverages synergistic effects to enhance the practical application of AI technologies, demonstrating particularly significant potential in domains such as healthcare, climate change mitigation, and urban planning. However, despite the promising advancements, several challenges remain in the research process. These include underdeveloped mechanisms for interdisciplinary collaboration, relatively low rates of research translation into practical outcomes, insufficient allocation of resources, and a lack of robust policy support. To address these issues, this paper proposes several optimization strategies, such as fostering the development of collaboration platforms across disciplines, accelerating the translation of scientific research into practical applications, and improving the allocation of resources and policy frameworks. Through these measures, the depth of interdisciplinary AI research can be further enhanced, thereby increasing its value and effectiveness in solving real-world problems.

Keywords: Artificial intelligence; interdisciplinary research; EI conference; collaboration mechanism

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Introduction

With the rapid advancement of artificial intelligence (AI) technology, single-discipline research is increasingly insufficient to address today's complex societal challenges. Interdisciplinary research, which integrates knowledge and techniques from diverse fields, has become a key driver of innovation in AI. At the global academic platform of EI conferences, AI research is showing a clear trend of interdisciplinary convergence. This trend not only broadens the application scope of AI but also creates new development opportunities for various disciplines. For instance, the integration of AI with biomedical engineering has significantly enhanced the accuracy of disease diagnosis, while in climate studies, the fusion of AI with meteorology and ecology has improved climate prediction capabilities. By analyzing the current state of interdisciplinary AI research presented at EI conferences, this paper aims to explore the advantages and challenges of such research in driving technological innovation, and proposes strategies for optimizing its development to further advance the field.

1. The Importance of Interdisciplinary Research in Artificial Intelligence

1.1. Promoting the Integration of Technology and Applications

The deep integration of artificial intelligence (AI) with other disciplines has not only driven technological advancements but also accelerated its practical applications. In fields such as medicine, finance, and manufacturing, AI enhances efficiency and fosters innovation through its data processing and analysis capabilities. By facilitating interdisciplinary collaboration, AI can effectively address complex problems that single disciplines alone cannot solve. For instance, in medical image processing, the combination of AI with biomedical engineering significantly improves diagnostic accuracy and efficiency. Similarly, AI's integration with materials science accelerates the discovery and optimization of new materials, thereby advancing technological innovation. This convergence of technologies also expands application scenarios, enabling rapid growth in emerging industries such as autonomous driving and smart manufacturing. Throughout

these developments, interdisciplinary collaboration has promoted the complementarity and synergy of various technologies, revealing AI's vast potential for application across a broader range of industries^[1].

1.2.Addressing Complex Social Issues

Many complex social issues, such as climate change and public health crises, often span multiple fields, making them difficult to address through single-discipline research approaches. In interdisciplinary research environments, artificial intelligence (AI) demonstrates enhanced capabilities for analyzing and solving such problems. For instance, in addressing global climate change, the integration of AI with meteorology and ecology offers more precise climate models and environmental assessment tools. In healthcare, the deep fusion of AI with clinical medicine and genomics has advanced personalized medicine, improved diagnostic accuracy, and promoted efficient allocation of medical resources. Moreover, AI exhibits robust decision-support functions in areas like urban planning and social governance, providing data-driven tools for intelligent analysis of complex issues. Through interdisciplinary collaboration, AI not only broadens the scope and depth of research but also strengthens the ability to tackle global challenges, contributing to the achievement of sustainable development goals^[2].

1.3.Driving Innovation and Future Technological Development

The interdisciplinary research model of artificial intelligence (AI) not only facilitates the innovation of existing technologies but also serves as a driving force for the development of future technologies. Interdisciplinary collaboration offers researchers a diverse range of perspectives and methodologies, enabling AI to break down traditional disciplinary boundaries through cooperation with fields such as physics, chemistry, and neuroscience. This collaborative approach has led to the generation of more innovative outcomes. For example, the integration of quantum computing with AI presents a novel framework for solving complex computational problems that have long challenged traditional methods, and it holds the potential for groundbreaking technological breakthroughs in the future. Moreover, cutting-edge research in areas like brain-computer interfaces, situated at the intersection of AI and neuroscience, has achieved significant progress, laying the foundation for the development of future intelligent devices. Through this kind of interdisciplinary interaction and collaboration, AI continues to foster technological innovation while simultaneously driving the evolution of research methodologies and experimental approaches. This dynamic synergy not only propels the rapid advancement of technology but also ensures that the underlying tools and methods of scientific inquiry evolve to meet the demands of emerging technologies. Interdisciplinary collaboration has thus become one of the core forces driving both technological progress and societal transformation, acting as a critical catalyst for the sustained development of future innovations. The capacity of AI to adapt, evolve, and thrive within a multidisciplinary framework highlights its pivotal role in shaping the future of research and technology, ensuring that it remains at the forefront of addressing complex global challenges^[3].

2.Challenges in Interdisciplinary Research on Artificial Intelligence

2.1.Collaboration Barriers in Interdisciplinary Research

Interdisciplinary research often involves experts and teams from multiple fields, posing a significant challenge in achieving effective collaboration. Researchers from different disciplines possess distinct terminologies, research methodologies, and modes of thinking, which frequently lead to communication barriers. In the field of artificial intelligence (AI), for instance, computer scientists, physicists, and biologists have varying focal points, resulting in knowledge gaps during interdisciplinary collaboration. Additionally, discrepancies in the depth of understanding and methodological approaches between disciplines can lead to disagreements, potentially delaying project progress. For example, some disciplines emphasize theoretical analysis and model construction, while others prioritize experimental validation and practical application, creating difficulties in aligning research objectives and fostering collaboration. Insufficient synergy among team members exacerbates communication costs, significantly reducing the efficiency of interdisciplinary research. Further challenges arise in the allocation and utilization of research resources, as researchers from different fields often have divergent priorities and needs, complicating project management. These collaborative obstacles in interdisciplinary research directly impact the depth and breadth of AI studies, hindering the full realization of

potential innovative opportunities.

2.2. Insufficient Application of Research Outcomes

In interdisciplinary research within the field of artificial intelligence (AI), the practical application of research findings faces numerous challenges, leading to a disconnect between theoretical research and real-world needs. Although interdisciplinary research often yields innovative outcomes, these results are frequently difficult to implement quickly, resulting in prolonged translation cycles. One key issue in the translation process is that researchers tend to focus on technical details and theoretical innovations, while overlooking market demands and industrialization requirements. Many interdisciplinary AI research achievements perform well in laboratory settings but fail to scale in real-world applications due to high costs, immature technologies, or unclear application scenarios. This disconnect limits the commercialization process and hampers the widespread adoption of related technologies in society. Furthermore, interdisciplinary research results often lack standardized evaluation criteria, making it difficult to accurately assess their commercial value and practical utility. Different disciplines place varying emphases on the evaluation of research outcomes, leading to discrepancies in project reviews and assessment systems, which further impede the translation and application of research findings. The insufficiency of practical application and commercialization hinders the potential value of interdisciplinary AI research, leaving many research achievements confined to the theoretical stage and unable to make substantive contributions to industrial development and societal progress^[4].

2.3. Specific Challenges of Interdisciplinary Research at EI Conferences

In EI conferences, interdisciplinary research in the field of artificial intelligence faces multiple challenges, with a notable issue being the differences in research paradigms between disciplines. These differences hinder the development of a unified research framework during collaboration. For instance, engineering emphasizes practicality and precision in results, while social sciences focus on qualitative analysis and theoretical explanations. This divergence in approaches often leads to inconsistencies in research goals and methodologies, making collaboration more difficult. Moreover, interdisciplinary research requires a high degree of integration of knowledge systems. However, researchers typically specialize deeply within their own fields, resulting in insufficient cross-disciplinary knowledge accumulation. The knowledge gap between disciplines means that researchers often lack a systematic understanding and the necessary tools when entering unfamiliar fields, reducing both the efficiency and depth of collaboration. A common language across fields is still underdeveloped, and there remain significant barriers in concepts, terminology, and methodologies between disciplines. Additionally, limited resources and insufficient support further challenge interdisciplinary research. Such projects are complex, often requiring longer research cycles and more funding. However, existing research resources are typically allocated to traditional single-discipline projects, placing interdisciplinary research at a disadvantage in resource acquisition. This funding and policy constraint further exacerbates the difficulties in advancing interdisciplinary research.

3. Optimization Strategies for Interdisciplinary Research in Artificial Intelligence

3.1. Strengthening the Mechanisms for Interdisciplinary Collaboration

The key to interdisciplinary research lies in establishing effective collaboration mechanisms. To enhance cooperation across disciplines, it is essential to develop dedicated interdisciplinary research platforms. These platforms provide regular opportunities for researchers from various fields to engage, facilitating knowledge exchange and integration. Regular interdisciplinary forums and seminars allow researchers to stay informed about advancements in other fields, sparking new research ideas. Such exchanges not only broaden research perspectives but also address challenges that are difficult to overcome within a single discipline through the complementarity of knowledge. The successful advancement of interdisciplinary collaboration also depends on cultivating cross-disciplinary talent. Research institutions should strengthen graduate and postdoctoral training in interdisciplinary fields, encouraging students to participate in projects spanning multiple disciplines. Building research teams with diverse academic backgrounds promotes the flow of knowledge between fields. By enhancing collaboration among disciplines, team members can leverage their respective strengths, creating synergistic effects that boost research innovation. Additionally, improving incentive mechanisms for interdisciplinary

cooperation is crucial for ensuring smooth collaboration. Given the unique nature of interdisciplinary research, academia and related institutions should establish specific evaluation standards and incentive policies to encourage greater participation. In areas like tenure review and research awards, recognition of interdisciplinary achievements should be emphasized, providing tangible career development incentives for researchers engaged in cross-disciplinary work. This would foster the sustainable development of interdisciplinary research.

3.2. Accelerating the Translation of Research Outcomes into Applications

To realize the societal value of interdisciplinary research in the field of artificial intelligence, the rapid translation of scientific outcomes into practical applications is crucial. Strengthening the collaboration between academia and industry is essential to reduce the time it takes for research results to move from the laboratory to real-world use. Close cooperation between research institutions and enterprises can integrate theoretical research with practical needs, ensuring that research outcomes align with market and industry demands. From the outset of a project, market needs should be incorporated into research design to enhance the relevance and efficiency of technology transfer. Another key strategy for promoting the translation of research results is to strengthen patent protection and intellectual property (IP) management. By improving patent application processes and related legal frameworks, the intellectual property of interdisciplinary research can be safeguarded, thereby encouraging innovators to bring their research to market. Effective IP protection not only provides economic returns to research institutions and researchers but also attracts more enterprises and capital to engage in interdisciplinary research, driving further technology transfer and application. Moreover, establishing innovation incubators and technology transfer platforms is another important approach to facilitate the commercialization of research outcomes. These platforms provide researchers with resources, funding, and industry connections, helping transform research into products or services more swiftly. Through incubators, research can not only be rapidly industrialized but also continuously refined based on market feedback, improving the practicality and competitiveness of the technology. A well-established collaborative innovation system between academia, industry, and research institutions will accelerate the translation of interdisciplinary AI research outcomes and foster the integration of science and industry for mutual development^[5].

3.3. Optimizing Resource Allocation and Policy Support for Interdisciplinary Research

Resource allocation and policy support are critical to the successful conduct of interdisciplinary research. However, current funding distribution mechanisms are often discipline-oriented, making it difficult for interdisciplinary projects to secure sufficient financial support. To address this issue, research management agencies should establish dedicated funding programs specifically for interdisciplinary research. The evaluation mechanisms should move beyond traditional disciplinary boundaries and adopt a comprehensive assessment based on the interdisciplinary nature of the projects, ensuring that those with practical value and innovative potential receive adequate funding. In resource allocation, it is also essential to enhance resource sharing and collaboration across different fields. For example, open access to research facilities, databases, and technological platforms can significantly reduce the costs of interdisciplinary research and improve its efficiency. Research management bodies should facilitate cooperation between institutions across various disciplines, promoting the joint development of open research infrastructure and establishing resource-sharing mechanisms. This would enable researchers from different fields to more easily access necessary resources, reducing barriers to research and improving the quality of the outcomes. Policy guidance is another important tool for promoting interdisciplinary research. Governments should provide clear policy directions through strategic plans and policy documents that encourage universities, research institutes, and enterprises to actively engage in interdisciplinary projects. Particularly in the establishment of major research initiatives and the allocation of national research funds, policies should prioritize interdisciplinary research to ensure that resources are directed toward projects with genuine innovative value. Furthermore, policies should encourage the free movement of researchers across different fields, reduce administrative barriers, and foster interdisciplinary talent mobility, injecting new energy into interdisciplinary research.

4. Conclusions

Interdisciplinary research in artificial intelligence (AI) has demonstrated immense potential and broad application prospects at EI conferences, particularly through its integration with fields such as medicine, climate change, and social governance. AI technology offers innovative solutions to complex problems. However, current interdisciplinary research faces challenges such as inadequate collaboration mechanisms, low rates of research translation, and insufficient resource allocation. To advance this field, it is essential to strengthen interdisciplinary collaboration platforms, improve mechanisms for translating research into practice, and optimize resource and policy support to ensure that projects receive adequate funding and technical backing. In the future, interdisciplinary AI research will continue to be a driving force for technological progress and social transformation, bringing innovation and change to an even wider range of fields.

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