

Preface of the 2nd Italian Workshop on Artificial Intelligence and Applications for Business and Industries

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1. Background and Motivations

The 2nd Italian Workshop on Artificial Intelligence and Applications for Business and Industries (AIABI) is co-located and held within the 21th International Conference of the Italian Association for Artificial Intelligence (AIxIA 2022) at Udine and organized by Social Thingum, an Italian notable AI scale-up company and private research and technology-transfer center, located in Milan, Lombardy, University of Milano Bicocca, Polytechnic University of Marche and University of Macerata. The workshop is also sponsored by Assintel, the National Association of ICT Companies of Confcommercio, as well as by InnovUp, the Italian Innovation & Startup Ecosystem. This edition is held in hybrid modality and the program of the meeting is available on the official workshop website <https://www.aiabi2022.com/workshop-program/>. The workshop is focused on the current technological scenario of Artificial Intelligence (AI) for business in heterogenous fields and industries. Among the editions of the AIxIA annual International Conferences, this edition of the workshop focused on the current technological scenario of AI for business in heterogenous fields and industries. The workshop mainly aims at allowing organizations, academics, researchers and specifically firms, decision-makers and practitioners to share and analyze heterogenous research works and business case studies dealing with AI in business fields. The idea behind this workshop is the opportunity to share knowledge and experience in how AI is actually and currently affecting business cases and intelligence. Companies will share specific case studies as well as their current issues AI is solving in their organizations. Researchers will provide scientific works and studies to contribute in the advancement of the many synergies between AI and business models and organizations. The final aim of the workshop is contributing in depicting the overall scenario and framework of the exploitation, advantages and current issues of AI in business. Artificial Intelligence (AI)



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is becoming crucial in every business field. AI is currently reshaping organizations and how technologies affects management and business (Haefner et al., 2021). AI has the power to transform business and society, in a transversal and pervasive way, due to its ability to extract and manage knowledge potentially in every industry. Researchers and scientists are aware that AI is transforming business models of all industries, by reshaping existing organizational processes (Brynjolfsson and McAfee, 2017; von Krogh, 2018). Moreover, AI has the potential to provide higher quality, greater efficiency, and better outcomes than human experts (Agrawal et al., 2018a). AI is actually able to foster evolution in society, emerging as transversal and powerful technological paradigm and giving rise to the so-called fourth industrial revolution. Andrew Ng, former chief scientist at Badu and Cofounder at Coursera, said in a keynote speech at the AI Frontiers conference in 2017 that AI is really the new electricity: a disruptive, pervasive and enabling technology, empowering technologies and processes in potentially any field or domain. In the organizational and business framework, AI can provide assistance to decision-makers and technicians beyond the scope of humans (Groves et al., 2013; Wamba et al., 2017). Indeed, both academics and practitioners agree that AI may substantially impact firms' innovation processes (Bughin et al., 2018; von Krogh, 2018). Organizations have long exploited AI-based solutions to automate routine tasks in operations and logistics. Recent advances in computational power and resources, the exponential increase in data availability, and new machine-learning techniques now allow organizations to also exploit AI-based solutions for managerial tasks (Brynjolfsson & McAfee, 2017). For example, AI-based solutions play important roles in Unilever's talent acquisition process (Marr, 2018), in Netflix's decision-making processes regarding movie plots, directors, and actors (Westcott Grant, 2018), and in Pfizer's drug discovery and scientific development activities (Fleming, 2018). In the industrial field, there is a wide use of vision tools for the automation of quality control procedures by the means of AI tools that focus on the quantitative and deterministic analysis of a product, in order to ensure that it complies with the requirements expressed by the customer. Moreover, there is also the need for software tools which could allow the modeling and generalization of quantitative analyses that aim to determine the value of a product or material according to aesthetic standards. These operations are still carried out by specialized technicians, thereby the traditional process is slowed down by the huge waste of time and human resources required, as well as by a performance limit mainly due to the high intrinsic variability among the different annotators. For these reasons, it is not surprising that the quality control task has rapidly established itself as a relevant use case for AI in the field of Industry 4.0.

2. Topics of Interest

- Artificial Intelligence in Business
- Application of AI in industries and market
- AI use-cases in heterogeneous business contexts
- ML applications to Quality Control
- Transfer learning and domain adaptation for industrial applications
- Anomaly and defect detection
- Zero defect manufacturing

- ML for flexible manufacturing
- Decision support systems to supply chain monitoring
- AI potential in leveraging Education and training of company stakeholders
- Explainable, Interpretable and Trustworthy AI in business
- Strategies to exploit the AI potential to leverage business competitive advantages
- Theoretical aspects of AI potentialities for business
- Evaluating AI Systems and AI impact in real business scenarios
- Ethics for AI in companies and industries

3. Accepted Papers

We believe that the program provides a good balance between the different topics related to the area of AI for Business and Industries. Moreover, the program is further enriched through different chance to interact with the speaker both remotely and in presence. All the speaker provided a real application of AI in the Business and Industry use case.

Also this edition confirms how, among the works accepted, there is a specific focus on technology-transfer projects and positive accounts of fruitful collaborations between universities, research centers and companies. Such projects are particularly fundamental especially for the growth of innovation in the business and industry sectors. Then, this focus on the technology-transfer projects is also an appropriate and key reported result, especially considering public concerns by the Italian government, and also the level of innovation required by Cluster 4 of Horizon Europe: “The overarching vision behind the proposed investments under Cluster 4 is that of Europe shaping competitive and trusted technologies for a European industry with global leadership in key areas, enabling production and consumption to respect the boundaries of our planet, and maximising the benefits for all parts of society in the variety of social, economic and territorial contexts in Europe.”

The call for papers attracted 6 submissions by 26 different authors. After the review process, 6 of 6 papers were accepted for publication (acceptance rate: 100%). The accepted papers range from the definition of methodologies or frameworks to apply in AI-based recommender system to empowering organization process to specific machine learning or deep learning approaches applied in the context of predictive maintenance and pollution forecasting. Going into details, accepted papers address several topics from different perspectives. In the following, we provide a short overview of such works, grouping them by topics.

Four papers proposed specific AI tools and applications usually embedded in a recommender system for improving social relationship and business organization. In particular Ali et al. proposed a modified CNN model for age and gender recognition at real time. Age and gender information are essential for many real-world applications, such as social intelligence, biometric identity verification, video surveillance, human-computer interaction, digital consumer, crowd behavior analysis, online marketing, item recommendation, and many more. Siváková et al. proposed a quantification of user preferences during decision making by using a fully probabilistic design approach. Their paper provide representative evidence behind the quantification of preferences. Guerranti et al. proposed the use of machine learning and artificial intelligence methods to predict the likelihood of resignation of an employee. In their paper

they showed how machine learning models can indeed play a crucial role as decision support systems, identifying the best decisions to be made and providing data-motivated explanations. Marconi et al. provided an overview of Explainable AI in the field of recommender systems. As a general consideration to conclude their study, they definitively agree that the evolution of recommender system systems necessarily involve a synergy between the empowerment of the models' performances and the emergent human-AI interaction perspective.

Two paper focused on the Industry process domain. D'Agostino et al. investigated the prediction capabilities of neural sequence models for the prediction of the remaining useful life of a machine component for predictive maintenance task. Their experiments were performed on a public dataset from particle filtration systems. The evidences presented in their paper highlighted the accuracy of some of these models when modelling the evolution of the health state of the analyzed machine. Nonetheless, the qualitative analysis shows that this prediction is less accurate when the fault is far away. Finally Roitero et al. proposed a novel approach based on large language causal models to perform the task of time-series forecasting. In particular they used the proposed approach based on transformers to effectively forecast the concentration of polluting substances in a water treatment plant; they addressed both short- and mid- term forecasting. Their empirical results provided evidence that large language models are more effective than state-of-the-art forecasting systems for solving this type of task, and that they can be practically used in time-series forecasting tasks.

4. Committee

As a final remark, the co-chairs would like to thank all the members of the Program Committee (listed below), the organizers of the AI*IA 2022 Conference, the Italian Association for Artificial Intelligence, the University of Milano – Bicocca, the University of Udine, the Marche Polytechnic University and the University of Macerata as well as the sponsors, Assintel, the Italian National Association of ICT Companies, and InnovUp, the Italian Italian Innovation & Startup Ecosystem.

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