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AI revolution: productivity boom and beyond :

In 2023, the surge in excitement around generative AI, marked by the dominance of terms like "authentic" and "hallucinate," led to a boost in AI-related stocks. Despite expectations of the initial buzz fading, recent AI advances are anticipated to significantly enhance productivity. The accessibility and versatility of AI technologies, exemplified by tools like ChatGPT, accessible to anyone without specialized programming knowledge, set them apart. These tools, applicable across various disciplines, can handle diverse tasks and sectors, combining text, images, video, audio, and even robotic functions.

Research suggests that approximately 80% of the US workforce engaged in information and knowledge work could be affected by Large Language Models (LLMs). The broad applicability of General AI (GenAI) may encounter fewer obstacles than previous technological advances, potentially boosting goods and services production. A well-balanced policy mix at the regulatory and enterprise levels is crucial to unlock AI's full potential and mitigate negative effects.
AI holds promise in addressing challenges faced by both aging and emerging economies. Developed economies could benefit significantly from an AI-led boom, potentially offsetting capacity loss due to aging. For aging countries like Germany, Japan, and Italy, substantial increases in labor productivity growth would be required. Emerging economies, with expanding working-age populations, might leverage AI to shift into service industries, potentially experiencing productivity gains.

The article emphasizes the influential role of policies adopted by companies, industries, and regulators in determining the success and equitable distribution of AI benefits. Key points include challenges within companies, low returns on AI investments initially, the expected "J-curve" pattern of AI adoption, and the importance of AI complementing, rather than replacing, labor. Surveys indicate that security, privacy, and ethical concerns pose barriers to the effective use of generative AI. Policies need to focus on creating a sustainable governance framework, although the specific areas where policies should concentrate remain unclear. Initiatives like the AI Alliance, a global network addressing responsible AI development, highlight collaborative efforts in maximizing AI benefits for society.

The IBM Institute for Business Value's August 2023 survey of 3,000 C-suite executives revealed optimism among business leaders regarding AI's role in the workforce. The majority believe that AI will augment, not replace, human labor, with variations across functions. The potential for AI to transform the employee experience is acknowledged, emphasizing the automation of repetitive tasks, skills development, and the creation of new job roles.
In 2023, 'The AI Alliance' was established through collaboration between international technology firms, universities, non-profits, and research and government organizations. The alliance focuses on open source foundation models and practices, with objectives ranging from responsible AI development to global skills building and public discourse.
A case study featuring McCormick & Company illustrates the transformative impact of AI. The collaboration with IBM resulted in SAGE, an AI system trained on extensive flavor-related data. SAGE significantly reduced the trials needed to produce flavors, enabling less experienced food scientists to match senior colleagues' performance. McCormick sees AI as a tool to enhance creativity and explore new flavor territories, providing suggestions that might not have been discovered otherwise.
The adoption of AI alone is deemed unlikely to yield significant benefits. The integration of AI with new ways of working, staff reskilling, and a culture of innovation is crucial for generating

measurable value. Best-in-class AI performers focus on six key areas in a holistic manner, with trust at the core. Additionally, the integration of AI into intelligent workflows and ethical management contributes to amplifying its value impact.
In conclusion, the detailed exploration of AI's multifaceted impact, from economic and workforce perspectives to governance and case studies, provides a comprehensive understanding of the current landscape and future potential of AI.
Artificial Intelligence-Based Methods for Business Processes: A Systematic Literature Review

Business Process Management (BPM) involves the design, measurement, and configuration of business processes. It has evolved from historical influences and has adapted to the challenges of the digital era. Artificial Intelligence (AI), particularly in machine learning and swarm intelligence, has significantly transformed business processes, offering quicker and more accurate solutions. The integration of AI enables organizations to focus on strategic decision-making, leading to mature and scalable operations.

Despite the transformative impact of AI, executing AI solutions for business optimization poses challenges, leading to a systematic literature review (SLR) that aims to explore AI-based methods. The paper focuses on answering the question of which AI-based methods in the literature automate business processes and support decision-making. Notably, the review excludes multiple databases and emphasizes the association of AI with methods. The paper concludes with discussions, limitations, and considerations for future work.
The SLR involved analyzing 387 papers, identifying 21 relevant ones. The keyword co-occurrence network analysis revealed prevalent subjects, with computer science and mathematics dominating. Six categorized AI-based methods were identified: discovery, conformance, support, security, decision support, and enhancement. The methods utilized various techniques, including ant colony optimization, graph representations, and statistical language models.

The classification of AI-based methods for business processes draws from existing categories. It includes discovery methods for creating process models, conformance methods for comparing models with actual occurrences, security methods ensuring customer data safety, support methods preprocessing logs for quality enhancement, and decision support and enhancement methods focusing on empowering business specialists and improving processes, respectively. Examples of specific methods within these categories include bio-inspired ant colony optimization for process discovery, differential privacy and mutual information for security, and statistical approaches for filtering infrequent behavior in support methods. Decision support and enhancement methods involve algorithms supporting decision-making and improving business processes.
The systematic literature review identified a rising trend in intelligent techniques within business process methods, with a focus on incorporating advanced AI techniques like transformers for prediction tasks. Practical implications include providing a systematic source for researchers and aiding developers and decision-makers in visualizing AI-based methods. Limitations include the use of only two academic databases and the potential misuse of the term "method" by some authors. Future research directions involve exploring the alignment between IT and business fields and developing a multi-criteria decision model for prioritizing process automation.

Leveraging Artificial Intelligence for Business Process Management (Extended Abstract) A Contribution to Reference Model Mining, Predictive Process Monitoring, and Process Discovery

Digitization, considered the megatrend of the 21st century, driven primarily by Artificial Intelligence (AI), has significant implications for various aspects of human life. AI is expected to revolutionize work, learning, communication, consumption, and daily living. While offering great potential for businesses, it also poses substantial risks, as evidenced by the outperformance of more digitized competitors leading to losses or bankruptcy for some companies. Despite awareness among business leaders, there is uncertainty about leveraging AI for their processes, creating a continuous need for AI research and practical implementation.

Business Process Management (BPM), central to modern and digitized processes, is an ideal domain for AI application due to its data-centric nature. Most current research in AI focuses on process execution, but BPM encompasses tasks beyond, presenting opportunities for AI to automate laborious tasks, provide new insights, and enhance decision-making. This thesis explores the application of AI technologies in three BPM subtopics: Reference Model Mining (RMM), Predictive Process Monitoring (PPM), and Process Discovery (PD), each at different maturity stages.

For RMM, the focus is on enhancing existing methods to foster practical adoption. Challenges in inductive reference model development are addressed by widening the scope of RMM techniques, deriving models from instance-level data. "Situational Reference Model Mining" is introduced to align the chosen RMM approach with the intended purpose, combining automated techniques with manual effort.

In PPM, the research question centers on using deep learning for next-event prediction. A novel approach demonstrates higher precision values and is prototypically applied in the DFKI-Smart-Lego-Factory demonstrator. An AI system, based on a trained neural network, autonomously develops an implicit understanding of process structure, allowing predictions based solely on process logs.

PD, unlike the other two, investigates the validity of process discovery evaluations. Addressing influences threatening validity, including unobserved process behavior, the study reveals the impact on quality assessments. Potential mistakes during process discovery evaluations are identified, leading to the proposal of process discovery guidelines to mitigate threats and enhance validity.

While not directly creating new AI systems, the PD research aims to establish a common notion of process discovery quality, facilitating the development of new AI-based methods and enabling human process miners to compare and improve their approaches.

The thesis underscores the diverse opportunities AI presents in BPM, offering new methods, advancing the state-of-the-art, and contributing to the development of AI-based solutions. However, it acknowledges limitations, such as the need for substantial training data and the inability to handle unknown situations and "soft factors." Despite these challenges, the research emphasizes the potential of AI to contribute to the advancement of business processes.

ProcessGPT: Transforming Business Process Management with Generative Artificial Intelligence

The text discusses the transformative impact of generative Artificial Intelligence (AI) on business operations, particularly in the realm of Business Process Management (BPM). It highlights how tools like Github Copilot and models such as the generative pre-trained transformer (GPT) are reshaping various industries. The focus is on understanding and analyzing business process-related data across different information systems and services, leading to a shift in traditional BPM methodologies.

Generative AI, represented by models like GPT, is described as a revolutionary force capable of automating content creation tasks, enhancing customer service, and reshaping industries such as software development. It emphasizes the potential for maintaining process models in ad-hoc processes, where knowledge workers may struggle to determine the best next step.

The paper introduces ProcessGPT, a model designed for data-centric and knowledge-intensive processes. It explains the architecture, including key components like Process Data Space, Process Data Lake, Process Knowledge Lake, and the Process Knowledge Graph. The model aims to automate tasks, enhance process efficiency, and empower knowledge workers by providing insights and recommendations for process improvement.

The feedback loop in ProcessGPT is highlighted as a crucial element for continuous improvement. If a Knowledge Worker is dissatisfied, the Process Co-pilot sends feedback to Generative AI Services, contributing to the refinement of the Process Knowledge Graph. Various generative AI methods, including graph neural networks and generative adversarial networks, can be employed for maintaining the knowledge graph.

The text envisions the application of ProcessGPT in diverse fields such as health, banking, and education. Examples include assisting doctors in diagnosing patients more efficiently, suggesting fraud detection models in banking, and aiding teachers in analyzing students' creativity patterns. The automation of business processes is seen as vital for efficiency, cost reduction, and productivity enhancement.

In specific scenarios, the implementation of ProcessGPT is illustrated. In a banking scenario, ProcessGPT streamlines the process of updating complex data management processes. In education, it is proposed for automating exam marking, providing benefits such as time savings, unbiased grading, and immediate feedback to students. The text suggests extending ProcessGPT's use to detect plagiarism in exams, ensuring academic integrity.

The transformative shift in workflows due to generative AI is discussed, with ProcessGPT presented as a hybrid model combining automation and augmentation. The example of law enforcement workflows showcases how ProcessGPT can automate data aggregation, evidence gathering, and analysis while augmenting human decision-making with its knowledge base.

The paper concludes by proposing the utilization of GPT technology, particularly ProcessGPT, in generating new processes and aiding decision-making in data-centric and knowledge-intensive processes. It outlines ongoing works and future directions, including improving natural language understanding, incorporating domain-specific knowledge, and enhancing decision support with probabilistic reasoning. Ethical considerations, privacy-preserving techniques, integration with existing systems, and continuous learning are also highlighted as areas of focus.