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Svitlana Nykyporets
Vinnytsia National Technical University, Vinnytsia

APPLICATIONS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING IN ENGINEERING AND TECHNICAL FIELDS: A LINGUISTIC PERSPECTIVE

The integration of Artificial Intelligence (AI) and Machine Learning (ML) into engineering and technical domains has spurred transformative advancements. This article examines the applications of AI and ML in these fields, emphasizing the linguistic dimensions and the pivotal role of language in facilitating human-machine interaction.

Key applications

1. Natural Language Processing (NLP) for technical documentation. NLP techniques enable automated extraction of critical information from vast volumes of technical documents, facilitating efficient knowledge management and retrieval. Sentiment analysis aids in understanding user feedback, while machine translation breaks language barriers.

2. Chatbots and virtual assistants for technical support. AI-powered chatbots and virtual assistants provide instant responses to technical queries, offering round-the-clock support and improving customer satisfaction. These systems rely heavily on NLP to comprehend user intent and generate accurate and contextually relevant replies.

3. Predictive maintenance and anomaly detection. ML algorithms analyse sensor data to predict equipment failures and identify anomalies, reducing downtime and optimizing maintenance schedules. This involves interpreting data patterns and translating them into actionable insights, often presented in linguistic reports.

4. Design optimization and generative design. AI aids in optimizing designs by simulating various scenarios and generating new design alternatives. Engineers use language to communicate design requirements, constraints, and objectives, while AI systems present optimized designs with linguistic explanations.

5. Autonomous systems and robotics. AI enables the development of autonomous systems and robots that can perform complex tasks with minimal human intervention. Natural language instructions and voice commands facilitate seamless interaction between humans and machines.

Linguistic considerations

1. Precise terminology and domain-specific language. Effective communication between humans and AI systems necessitates a clear understanding of domain-specific terminology [1]. Engineers need to train AI models to recognize and interpret technical jargon accurately.

2. Ambiguity and context. Technical language can be ambiguous, and AIsystems must be adept at understanding context to interpret instructions and questions correctly.Linguistic analysis plays a crucial role in disambiguating phrases and resolving references.

3. User intent and sentiment. Interpreting user queries and commands goes beyond mere keyword recognition. NLP techniques like sentiment analysis help gauge user intent and emotional state, leading to more personalized and empathetic responses.

4. Explanations and interpretability. As AI systems become more complex, providing clear explanations for their decisions is crucial. Linguistic generation techniques allow AI to articulate its reasoning in a manner comprehensible to humans.

Conclusion.AI and ML are revolutionizing engineering and technical fields, and language serves as the bridge between human expertise and machine capabilities [2]. By addressing linguistic challenges and harnessing the power of language, engineers can leverage AI and ML to drive innovation, optimize processes, and create a more collaborative and efficient future.

References:

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