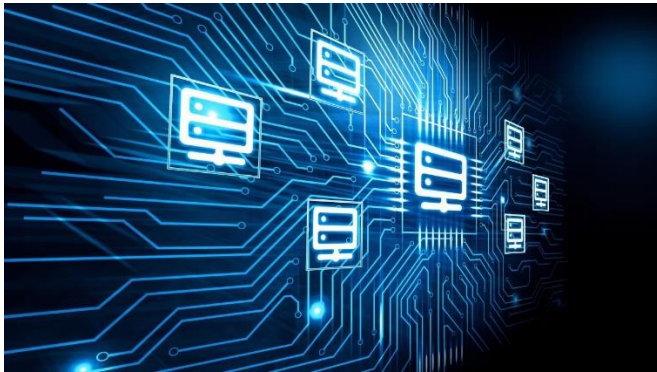**Pushing Boundaries: NTU's Pioneering AI Research**

Alita Sharon

Artificial intelligence (AI) has become an integral part of daily life, powering everything from voice assistants to tailored streaming recommendations. Researchers at Nanyang Technological University (NTU) are pushing the boundaries of AI, exploring both its potential and its challenges.

The vast amount of online information makes it challenging to extract actionable insights. AI's ability to perform sentiment analysis – interpreting online sentiments – proves valuable for political campaigns and customer feedback. SenticNet, developed by Assoc Prof Erik Cambria at NTU's School of Computer Science and Engineering (SCSE), advances sentiment analysis by integrating machine learning with human-like understanding. Meanwhile, Assoc Prof Lee Chei Sian focuses on refining AI accuracy by incorporating contextual knowledge to enhance the precision of sentiment analysis.

Assoc Prof Sun Aixin's method at SCSE enhances video searchability by treating videos as text passages, improving the accessibility of long video content. This innovation supports various applications, from surveillance to education, and significantly boosts the effectiveness of content retrieval.

With the rise of facial manipulation technologies, verifying digital content is crucial. Asst Prof Liu Ziwei's Seq-DeepFake algorithm detects manipulated images by identifying digital fingerprints. Additionally, Assoc Prof Tan Chee Wei, in collaboration with NTU's Lee Kong Chian School of Medicine, is exploring how AI can analyse

information to identify biases and inaccuracies, especially in rapidly evolving contexts like pandemics.

In finance, AI is revolutionising trading. NTU's Prof An Bo has developed machine learning models that analyse diverse datasets for improved intraday trading. These models use reinforcement learning to enhance decision-making and risk management, offering investors a competitive edge in the financial markets.

AI is transforming education by personalising learning experiences. Assoc Prof Chen Wenli from the National Institute of Education (NIE) highlights how AI tools provide real-time feedback and analytics, enhancing learning efficiency. However, concerns about academic integrity arise with the potential misuse of AI tools for cheating, prompting the need for robust assessment strategies.

AI is also advancing environmental sustainability. SCSE's Prof Wen Yonggang developed DCWiz, an AI solution optimising energy use in data centres. Tools like Reducio and DeepEE enhance cooling efficiency and reduce energy consumption while improving digital twins' accuracy for managing real-world facilities.

OpenGov Asia reported that Singapore's new CREATE Thematic Programme in Decarbonisation, unveiled by Professor Tan Chorh Chuan, integrates AI to advance sustainable energy solutions. The initiative will employ AI for materials discovery, autonomous laboratories, and novel flow chemistry setups to convert carbon dioxide and biomass into essential chemicals and biofuels.

The programme, supported by an SG$ 90 million investment, involves collaboration with NTU, NUS and international partners, aligning with Singapore's net-zero emissions goal and the Singapore Green Plan.

During his visit to NTU's Satellite Research Centre, President Tharman Shanmugaratnam was briefed on ELITE's cutting-edge space technologies. NTU President Professor Ho Teck Hua highlighted NTU's strong expertise in AI and data science, which powers the ELITE project.

For AI to integrate effectively into society, it must prioritise human needs. The DesCartes programme, involving NTU and French researchers, focuses on human-centred AI solutions. Prof Shirley Ho explores public perceptions of AI, ensuring technologies meet societal expectations. Assoc Prof Hannah Yee-Fen Lim addresses regulatory frameworks for AI, focusing on data protection and intellectual property.

Despite advancements, AI systems have limitations. Asst Prof Andrew Prahl emphasises the need for crisis response frameworks to manage AI failures effectively. Dr. Melvin Chen highlights the importance of addressing biases to build trust in AI systems. Understanding AI's limitations and developing appropriate regulations remains crucial as the technology evolves.

NTU's research reflects a commitment to advancing AI while addressing its challenges, showcasing a balanced approach to harnessing this transformative technology for societal benefit.

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