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Promoting Technology and Collaboration

Large Language Models for Surgical Simulation and Education

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Background: With the development of Large Language Models (LLMs), opportunities for surgical simulation and education have emerged, enhancing virtual training environments and offering personalized pathways. In surgical simulation and education, interest is growing in integrating LLMs to improve training procedures and provide personalized guidance to practitioners.

Technology Overview: Large Language Models (LLMs) are cutting-edge AI systems capable of generating high-quality, context-relevant text across various scenarios. Their powerful natural language generation abilities allow them to produce coherent responses based on prompts. These models demonstrate semantic understanding, enabling them to grasp complex sentence structures, extract key information, and respond appropriately. LLMs also retain conversation history, ensuring consistent and contextually appropriate responses. Their comprehension and reasoning abilities support applications like instructional virtual assistants, personalized surgical education systems, and surgical training content generation. Continuous learning allows LLMs to adapt quickly, refine their capabilities, and improve over time. All these characteristics make LLMs pivotal in enhancing intelligent systems for surgical simulation and education.

Potential Application in Surgical Simulation and Education: In surgical education, LLMs can create training scenarios, guide learners through decision-making, assess responses, and offer real-time feedback. In surgical simulations, LLMs can simulate dialogue between virtual patients or mentors, providing opportunities for users to practice communication, teamwork, and clinical reasoning skills. LLMs can enhance VR-based simulations by narrating procedural steps, predicting complications, and suggesting corrective actions. Most importantly, LLMs enable personalized education by dynamically adjusting training modules based on individual progress.

Potential Opportunities to Collaborate: The integration of LLMs into surgical simulation and education offers promising collaboration opportunities between medical schools, AI researchers, and healthcare organizations. AI researchers could develop fine-tuned LLMs for surgical training, creating hybrid systems with AR/VR technologies. Collaborative efforts could also result in comprehensive, open-source platforms that enable continuous model and surgical education improvement, ultimately advancing surgical training.