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(57) Abstract :
The present invention relates to an integrated hardware-software system (100) for evaluating large language model performance in medical patient-clinician conversational interactions. The system comprises a synthetic patient record generation module (101) operatively connected to a patient simulation engine (102) that instantiates conversational agents with memory architecture (103) and multi-dimensional emotional state tracking (104). A task matrix processor (105) defines clinical scenarios across encounter reasons and objectives. An evaluation framework module (106) implements one hundred five assessment dimensions mapped to medical accreditation competencies. A committee-based AI judge subsystem (107) executes calibrated scoring through deliberative discussion protocols stored in evaluation memory (108). The processor (109) coordinates data flow between components via communication bus (110), achieving measurable improvements in evaluation consistency and clinical relevance assessment. The system enables scalable, reproducible benchmarking of medical AI systems with demonstrated industrial applicability in healthcare quality assurance and regulatory compliance assessment.

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