

Exploring Artificial Intelligence as a Service (AI-aaS) for an AI-Assisted Assessment Online Infrastructure

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This study explores Artificial Intelligence as a service (AI-aaS) from two perspectives. The first is to develop a system that can provide educational researchers and practitioners alike ready access to AI algorithms and services across an entire school. The second is to leverage, and then evaluate the use of AI-aaS to support AI-driven assessment, paying particular attention to its infrastructure requirements and pedagogical demands. AI-aaS has several successful use cases and can be found in smart applications across numerous sectors like transportation, manufacturing and energy. This study proposes a new application for education. It explores third-party AI-aaS as an outsourced service and evaluates its effectiveness for handling educational routines and complex assessment policies, and large data volumes generated from formal assessment of learners. AI-aaS offers the opportunity to try algorithms and services to determine feasibility and suitability before committing to scale. In the first case exploration, it examines the feasibility of using AI-aaS when applied in a monitoring, analysis, plan, execution plus knowledge (MAPE-K) loop to manage the internal operation of a system as well as its interactions with other systems in an autonomous manner. AI-aaS applications, even within education, have to account for quality and performance requirements that need to be translated into an institution's quality of service standards. The study explores the use of a management layer and a training layer to achieve this. In the second case exploration, which is linked to the first use case, the study explores building an adaptive AI-assisted competency-based assessment engine for higher education and workplace training. The goal is to develop an AI engine, that is an AI-aaS, for evaluating, mapping and tracking skills and competencies proficiency attainment. Besides time and labour-saving benefits, the AI skills engine can better support skills proficiency levels determination by personalising assessment to learners and workers using machine learning and deep learning methods. Currently, determining and tracking a learner's or worker's proficiency levels by a battery of "stop and test" quizzes, exams and questionnaires remain a time-consuming affair for human assessors. AI can help unburden labour and time-intensive evaluation especially for determining gaps in skills and competencies required for academic and career progression. It is also better at compiling a training attainment record that can be retrieved and updated almost instantaneously. The goal of smart, responsive and personalised automated evaluation has tremendous potential in higher education and workplace training. This is even more so for evaluating adult skills and competencies, as this is a current gap. The study investigates a unified view of AI-aaS for research, educational and business opportunities in future infrastructure and virtualisation, vis-a-vis an on-premise system. It includes discussing the challenges and advantages of developing a nominal, lean network architecture for AI-aaS, by defining new protocols in the network management layer to enhance MAPE-K loops, by capturing efficiencies in the training layer. It also evaluates the effectiveness of AI-aaS to support implementation at the application level. AI-aaS is underdeveloped for research and educational purposes and there is promise to advance research and understanding in this emerging area.

Keywords: Artificial Intelligence, AI as a Service, AI-aaS, AI Assessment

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