DocAide: A Collaborative AI Medical Assistant Using Novel Autonomous Learning

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During early stages of Covid-19, AI couldn't effectively guide doctors, as tackling large problem domains prone to frequent mutations is challenging. DocAide is a general purpose AI-based medical guidance system to guide doctors for surgeries and new diseases like Covid-19. A medical expert initially trains the system to provide this guidance, and then the system uses autonomous learning to refine its knowledge automatically far beyond the human expert. DocAide autonomously learned using three new techniques - dynamic ensembles, reinforcement optimization and cloud clustering. Through a novel result-oriented approach, it automatically overshadowed deficiencies in base learning models using targeted improvisation models, such as for patient-recovery trends, past pandemic successes and pharma trial results. A model selector used a novel hierarchical state based reinforcement learning to automatically select the best model that optimized processing for a guidance query. DocAide facilitated collaboration between doctors to provide guidance based on successful treatment by other doctors. Results for Covid-19 and ACL surgery exemplary domains showed that DocAide automatically learned to exceed performance of a standalone deep-learning network both with minimal training in early stage and with experience, adapting quickly to mutations while providing superior performance. The result-based autonomous learning alleviated need for extensively trained monolithic models, adapted performance as aspects of domain changes without destabilizing rest of the models, leveraged past knowledge and guided exploration when exploitation became inadequate. This approach can be used for numerous expansive and fast-changing consumer and commercial problem domains not possible today.

Awards Won:

Oracle Academy: Award of $5,000 for outstanding project in the systems software category.