Using Deep Learning to Identify Critical Documents for Clinical Decision Support Systems

Fan, Brandon (School: Blacksburg High School)

Doctors/Physicians are challenged with effective clinical decision making regarding the treatment plans for patients with specific conditions/symptoms. They often resort to clinical decision support systems to help them come up with the best treatment plan for patients at critical times. However, the search quality of current clinical decision support systems is often low, so they fail to help doctors find relevant medical articles related to their patients' conditions. To help improve search ranking performance in clinical decision support systems, I introduce a novel deep-learning (DL) based learning-to-rank algorithm that can retrieve more relevant and important biomedical articles matching a doctor's search queries containing patients' conditions or symptoms. I compared the performance of the DL-based algorithm to multiple benchmarks (including state-of-the-art system implementations for this task) and found that my algorithm achieves better results. The newly designed ranking algorithm can be incorporated into existing clinical decision support systems to assist doctors in making better and more informed clinical decisions, reduce medical costs, and ultimately save patients' lives.

Awards Won: