Advancing Combinatorial Problem-Solving: Integrating Large Language Models into Algorithm Design

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Abstract:

This project seeks to develop up-to-date educational modules that train students in the use of large language models (LLMs) in solving combinatorial problems. The main module will teach students to use LLMs in understanding programs obtained from third-parties sources such as online competitive programming archives; another module will teach students to use LLMs to search for novel algorithms to tackle challenging combinatorial puzzles and optimization problems. Our module will bring much needed updates to current curriculum that incorporate developments in the very rapidly changing artificial intelligence landscape. These updates will benefit students in several ways. First, they will acquire additional skills consistent with the curriculum. Second, they will become familiarized with LLMs, removing psychological barriers in their acceptance of the technology. Third, we can expect them to transfer the ideas they learned in these modules into other areas of artificial intelligence. The introduction of the module to the school syllabus can help us transform our curriculum in preparation of a future where artificial intelligence is commonplace and ubiquitous. In the process of preparing the modules, we can future-proof our course material in three ways. One, we procure important hardware (GPUs) that is essential to the teaching, as well as for adoption of new artificial intelligence technology. Two, we develop software libraries that can be reused. Three, we gain the expertise and experience to accommodate future changes. We believe that the introduction of these modules can help increase visibility of the university to a public that is concerned about artificial intelligence literary, and hopes to understand the technology to further their career.