UIUC / Wolters Kluwer: LLM-Based Differential Diagnosis

Project Goal  
Our goal is to investigate how advanced language models can improve clinical decision-making for physicians and enhance patient care. Our focus is on the differential diagnosis stage of the clinical process.

# Approach

## Technology Questions

T1. How well does AI perform differential diagnosis?

* Research papers, based on NEJM case reports, measure whether an LLM, using only model knowledge, can produce a differential diagnosis that includes the known final diagnosis. O1-preview does this better than GPT-4. How well do state-of-the-art models do?
* Can the LLM produce good reasoning for why the conditions were ranked this way?
* Would UpToDate content help?

T2. To what extent are we constrained by the input information?

* For good performance, are we constrained to give detailed patient histories, or can we ask the user for a small “vignette”
* What if we give the LLM a (synthetic) transcript of a patient-clinician conversation, does that give a different performance? What about a (synthetic) medical chart?

T3. Can AI support next steps after the differential workup?

* One step further than providing a differential with reasoning would be to provide evaluation steps.

T4. Beyond current LLM capabilities, how might future capabilities, realistically inferred from trends in the technology, affect a product offering AI differential diagnosis?

* This is creative/speculative thinking.

## Product Experience Questions

PE1. What could a differential diagnosis product look like?

* Imagine we are a start-up that has discovered, from the technological questions above, that we have a certain technology to do this task. What would a product offering look like?
* Related to question above about “future capabilities”, could the product be significantly different due to technological improvements, within a few years?
* This is creative/speculative thinking.

PE2. What synergies could exist between UpToDate and a differential diagnosis process?

* This is creative thinking.

# Timeline (Tentative) for 12 weeks

## Phase 1: Project Kickoff and Initial Research

* **Duration:** 2 weeks

## Phase 2: …