Title of the Paper

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February 26, 2026

1 Proposal

1.1 Topic Area

I select 7. A well-defined algorithmic modification.

1.2 Formal Research Question

In a circular harkness table discussion, how effective is the beam search algorithm, compared to a simple greedy algorithm, in determining the table arrangement that maximizes cross-talks between students?

1.3 Formal Problem Definition

The problem models a circular harkness table discussion geometrically, where the cross-talk between students is modeled as $v_i v_j \cos(\theta_{ij})$, where θ_{ij} is the angle between the vector $\overrightarrow{v_i v_j}$ and $\overrightarrow{Ov_i}$, where O is the center of the circular table. There are n students in the discussion, where each student is given an index of normalized talkativeness v_i ($0 \leq v_i \leq 1$). The goal is to find the arrangement of students around the table that maximizes the total cross-talk, which can be expressed as $\sum_{i \neq j} v_i v_j \cos(\theta_{ij})$.

1.4 Hypothesis

The beam search algorithm will yield a significantly higher total cross-talk compared to the greedy algorithm, because the greedy algorithm tend to get stuck in an inefficient local maximum, while the beam search explores wider and tend to find a better local maximum. Although the beam search cost more time, considering the small number of students in a typical harkness table discussion, the importance of maximizing the cross-talk performance outweighs the cost of time.

1.5 Theoretical Plan

1.6 Experimental Plan