The Most Tenuous Group Query

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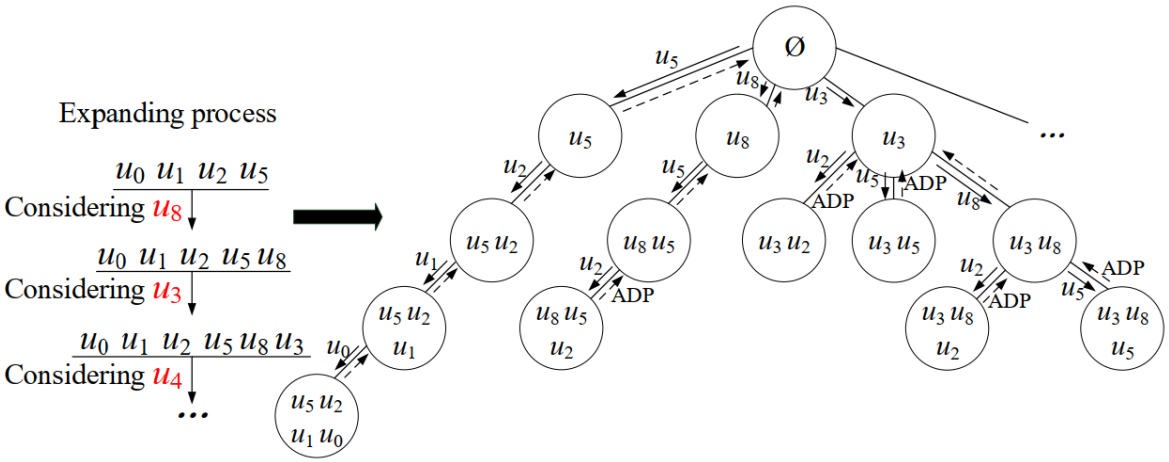
Problems & Ideas

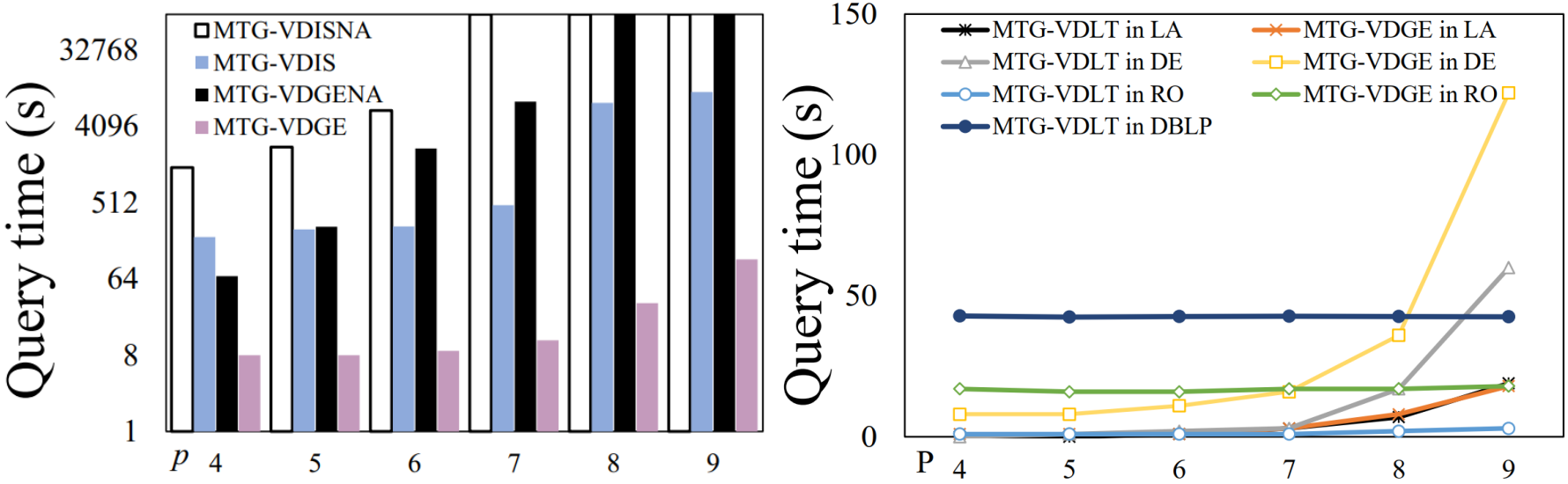
- Problems of the previous tenuous group query :
  - the metrics (e.g., k-triangle, k-line, and k-tenuity) used to measure the tenuity, require a suitable k value to be specified which is difficult for users without background knowledge. And the value of k determines the tenuity of the result set.
- Ideas: We formulate the most tenuous group (MTG) query. To address the MTG problem, we propose an exact algorithm, namely MTG-VDIS, an optimization exact algorithm, called MTG-VDGE, and an approximation algorithm, namely MTG-VDLT.



An example of MTG-VDGE. According to the order of the degree of vertexes, the possible combinations are traversed according to the degree and reverse based branch and bound (DRBB) order, and Vertex Distance Filtering (VDF) and Average Group Distance Pruning (ADP) strategies are used to reduce unnecessary traversal combinations.

Main Contributions

- Contributions:
  - This paper proposes the MTG problem for the first time, and proves its NP-hardness;
  - The concepts of group distance and average group distance of a group are proposed to measure the tenuity of groups;
  - This article proposes two exact algorithms to solve the MTG problem, namely MTG-VDIS and MTG-VDGE. Approximation algorithm MTG-VDLT is also proposed to improve the efficiency of MTG query;



Query time of different algorithms on different datasets. Left: the query time of the four exact algorithms by varying p-values on DE dataset; Right: the query time of MTG-VDLT and MTG-VDGE on different datasets by varying p values.