Exploratory Search on Graph Databases through Subgraph Query Feedback

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OBJECTIVES

1. To formally analyze the feedback (WIFSSQ and WNSSQ) and propose novel querying algorithms
2. To efficiently integrate the feedback as a generic module into a GUI for graph platforms
3. To formulate the optimal opportunities for delivering feedback
4. To conduct comprehensive performance and usability evaluations
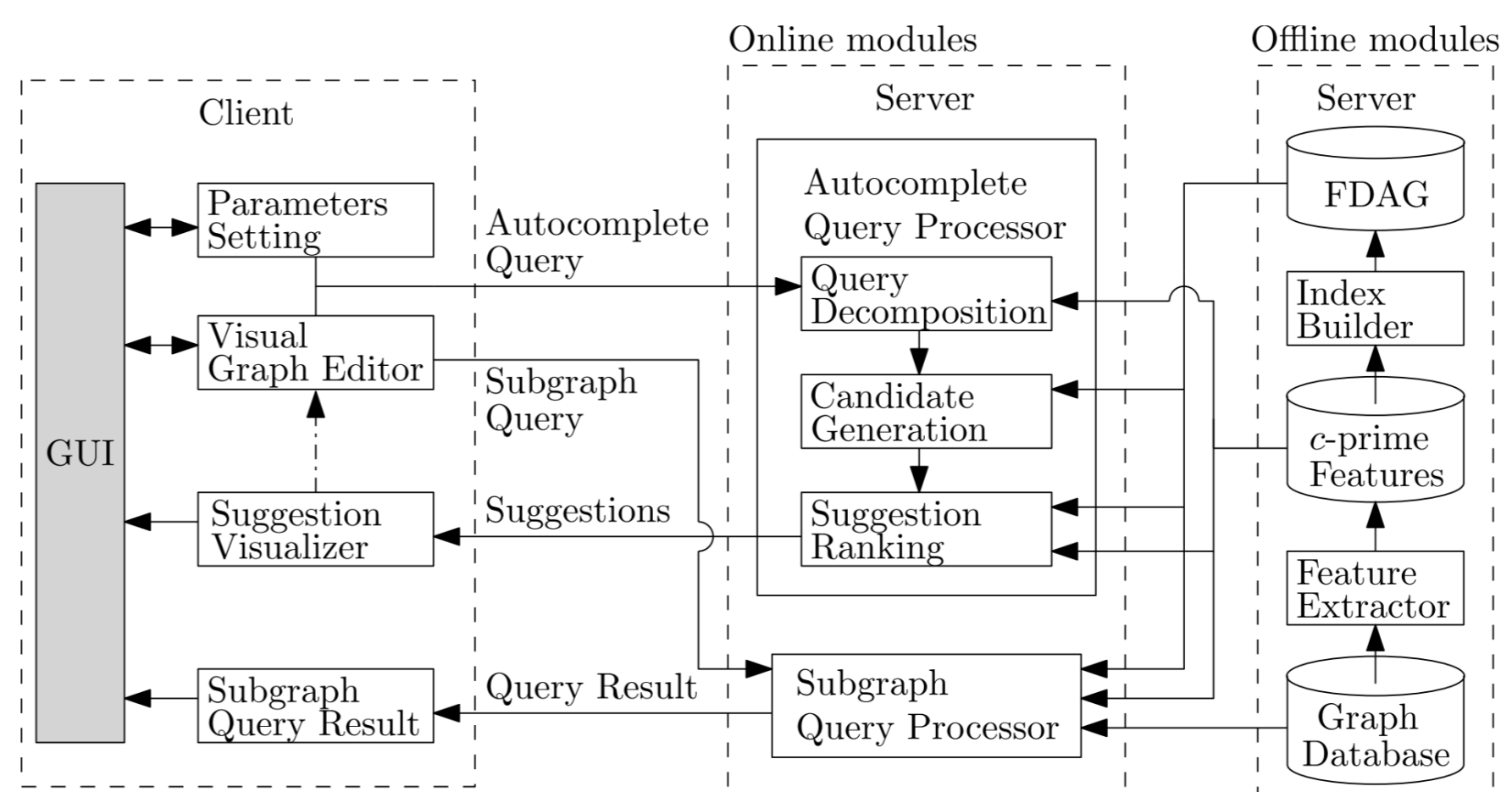
HIGHLIGHTS

A prototype of exploratory search via query Autocompletion for subGraph query (AutoG)

- User draws a small part of their subgraph queries
- User requests feeback from AutoG
- Feeback is given to user in the form of *query suggestions* for completing their queries

❖   **AutoG GUI (bottom: feedback from AutoG)**
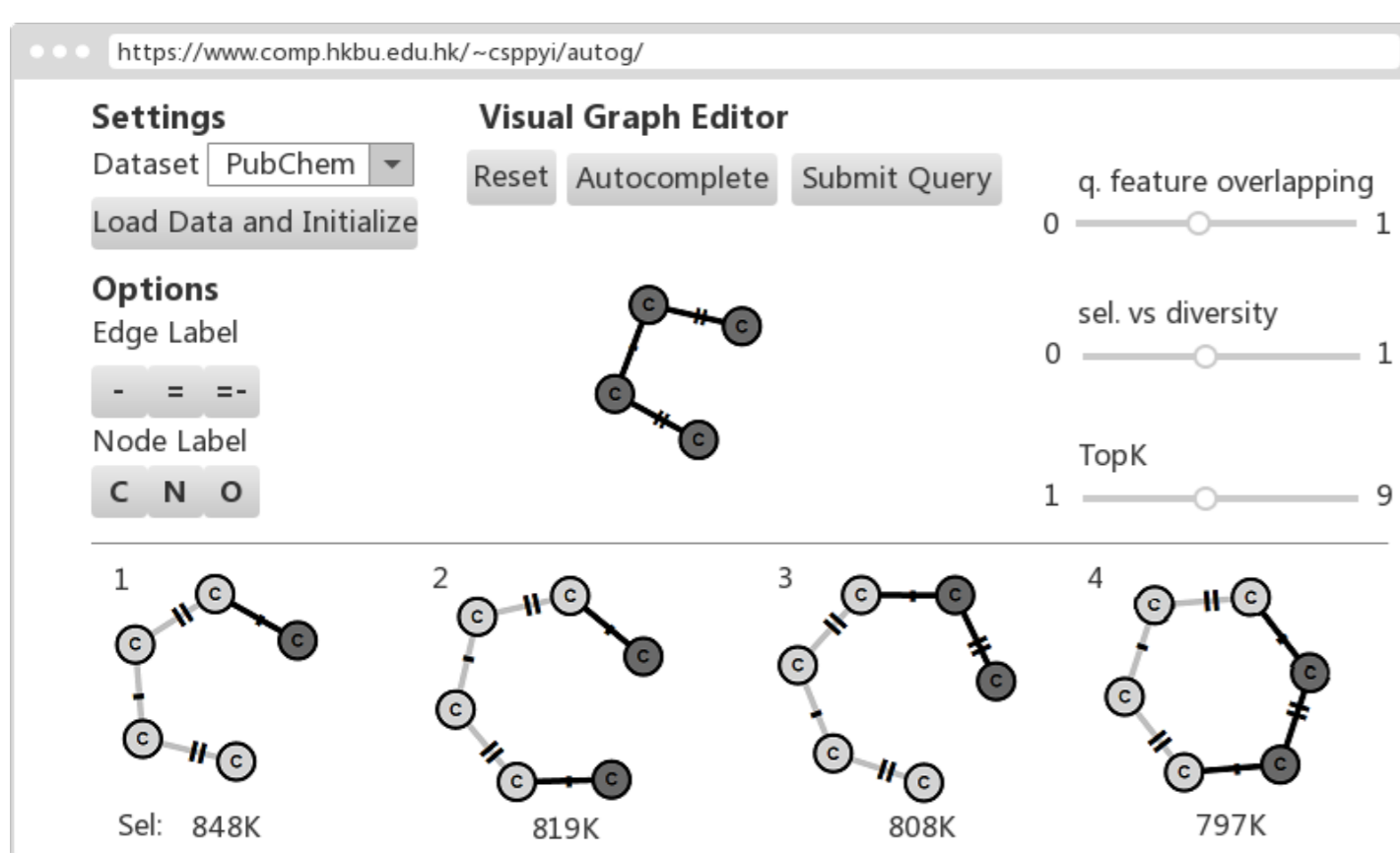
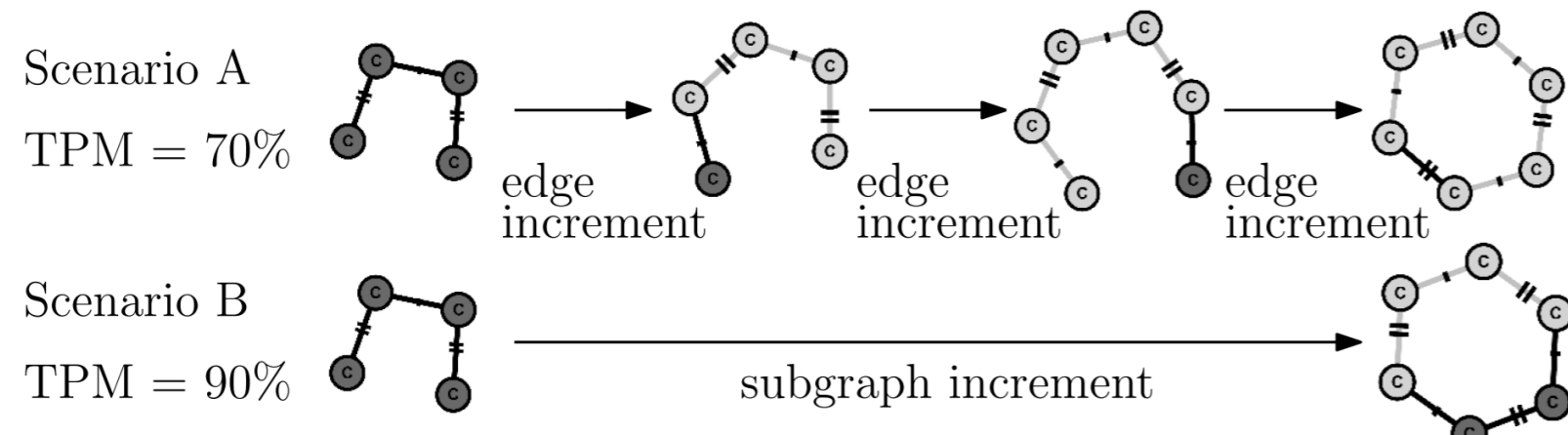❖   **Modules of the AutoG architecture**

Major steps in deriving helpful suggestions

- Decompose a query q into a set of embeddings of subraph features in q
- Generate candidate suggestions
- Rank the suggestions based on the users' preference (e.g. selectivity-oriented and diversity-oriented), with an approximation bound to the optimal suggestions

Result discussions on simulations and usability test with real users

- Alleviate users from the potentially painstaking task of graph query formulation (e.g. saved at least 42% mouse clicks)
- The user test shows that TPM has a positive correlation with the users' agreement to the statement "AutoG is useful".

Scenario A
TPM = 70%
edge increment   edge increment   edge increment

Scenario B
TPM = 90%
subgraph increment

❖   **Quality metrics (TPM): Clicks saved / Clicks wo AutoG**
❖   **Data: 100 queries from PubChem (publicly available chemical database)**

$|q|$	#AUTOG	TPM (%)
8	2.2	45%
12	3.3	44%
16	4.0	42%

SELECTED PUBLICATIONS

1. P. Yi, B. Choi, S. S. Bhowmick and J. Xu, "AutoG: A Visual Query Autocompletion Framework for Graph Databases," in The International Journal on Very Large Data Bases, 2017.
2. P. Yi, B. Choi, S. S. Bhowmick and J. Xu, "AutoG: A Visual Query Autocompletion Framework for Graph Databases," Proc. of Very Large Data Base, 2016
3. N. Ng, P. Yi, Z. Zhang, B. Choi, S.S. Bhowmick, J. Xu, "FGreat: Focused Graph Query Autocompletion," Proc. of IEEE International Conference on Data Engineering, 2019.
4. G. Li, N. Ng, P. Yi, Z. Zhang, B. Choi, "Answering the Why-Not Questions of Graph Query Autocompletion", in International Conference on Database Systems for Advanced Applications, 2018.