



Task Oriented Genetic Generative IR



Hrishikesh Kulkarni¹, Sean MacAvaney², Nazli Goharian¹ and Ophir Frieder¹

¹IR Lab, Georgetown University, ²University of Glasgow

hpk8@georgetown.edu



GEORGETOWN UNIVERSITY



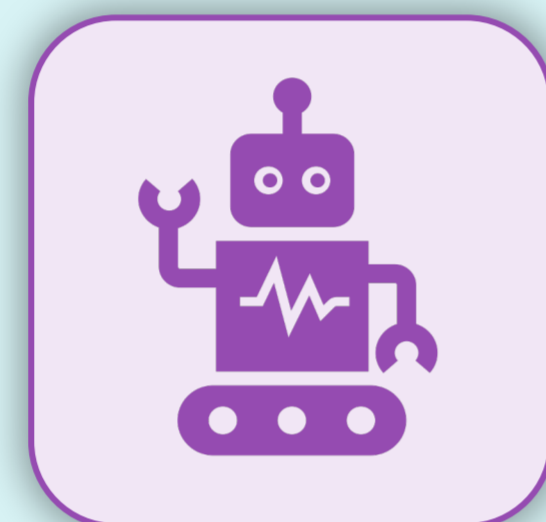
Modelling a task as a corpus of queries by using LLM to generate more contextual information

best cafes in dc

best cafes in dc with wifi and great coffee

best cafes in dc open late

best cafes in dc for studying



fitness function = relevance model

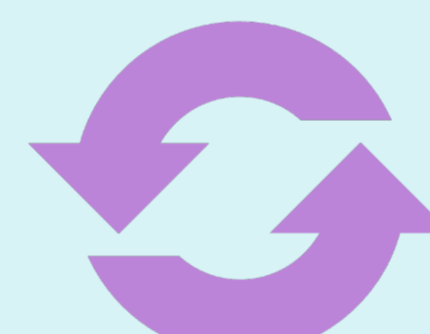
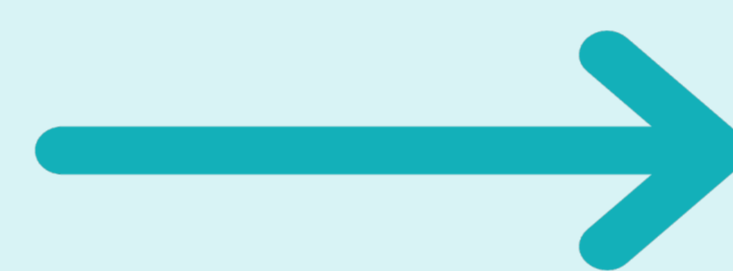
15 Must-Try Coffee Shops Around D.C. The best drip java, pour-overs, and lattes in town. A strong class of caffeinated contenders have entered the scene in recently including...

Local favorites still going strong in Washington DC which include Colada Shop, Compass Coffee, and Dolcezza, to name a few. NYC imports are also on the rise around D.C. For...

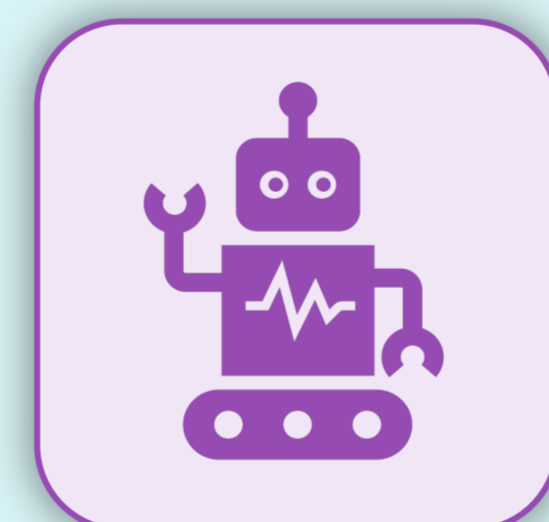
The Best Coffee in Washington, D.C. Keeps Getting Better. Things are really perking up in the nation's capital, especially at these D.C. coffee shops. With 12 locations scattered...

...
The best cafes in Washington DC include Compass Cafe, La Coop...

One of the oldest cafe in Washington DC named Logan Circle Cafe...



Repeat



Re-rank and insert



LLM re-writer

Re-write the query with more details

Parameters: no. of facets, doc sampling depth, mutations per iteration, termination depth



Genetic Operators

Mutation

Re-write the passage

Re-write the passage to better answer the question

Crossover

Combine ideas from both passage1 and passage2 to answer the question

Search based on just query does not provide holistic information about users' needs. Traditional reformulation of queries leads to more similar queries but fail to provide more information about users' core objective.

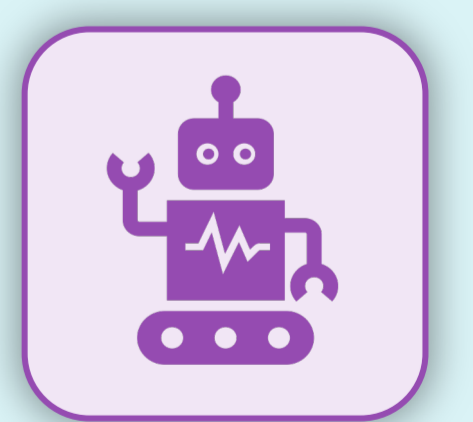
For a goal-oriented and context-driven outcome we:

1. Model the task as a set of queries by using LLM
2. Use these generated facets of task to retrieve initial set of relevant docs (seeds)
3. Model GenIR as a Genetic algorithm
 - a. Doc text is the genetic representation
 - b. LLM re-writer performs genetic operations
 - c. Relevance model is the fitness function

Task Oriented Genetic Generative Information Retrieval leads to more relevant, comprehensive and task-focused answers.

Evaluation

Using cross-encoder MonoT5 on TREC DL 2019, 2020 for parameters {4, 4, 12, 2}



Percentage cases where generated answer is preferred over retrieval output

