

# A Reinforcement-based QA Recommender System for Responding to Community-based Suggestions using Enhanced Contextualization

Abhishek Bais, Haley Feng, Princy Joy, Shannon Phu  
Advisor: Dr. Ali Arsanjani

# Introduction

- Community-based question-answering social networks helps registered users find an online community to ask, answer, and discuss topics of interest
  - ie. Reddit
- In particular, discovering the appropriate group/community is difficult as the social network platform scales to more users
- For example, Reddit has 430M monthly active users and 2.6M+ subreddits

# Proposed Solution

- We propose a question-answering machine learning application that:
  - Answers a user's question about what subreddit they are looking for
  - Recommends and ranks subreddits in order of relevance
  - Guides the user to better recommendations through question refinement

## Mock:

Describe the subreddit you are looking for.

What subreddit can I discuss about pencil sketches.

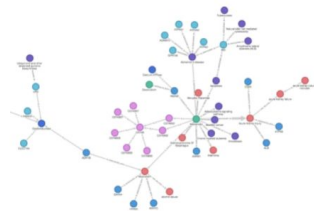
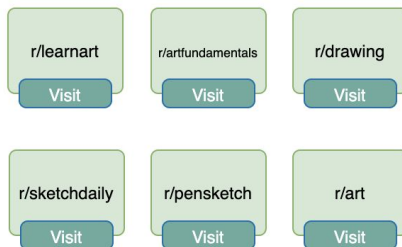


Which subreddit discusses pencil art?

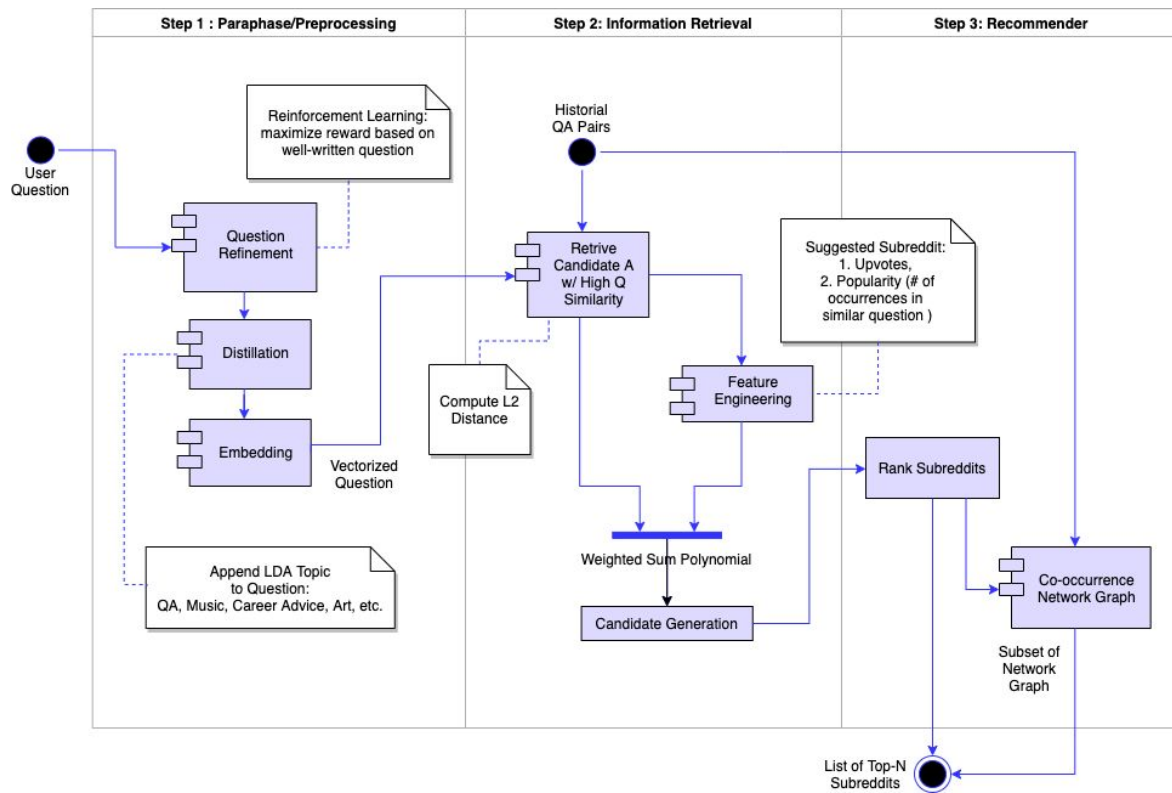
Yes.



## Results

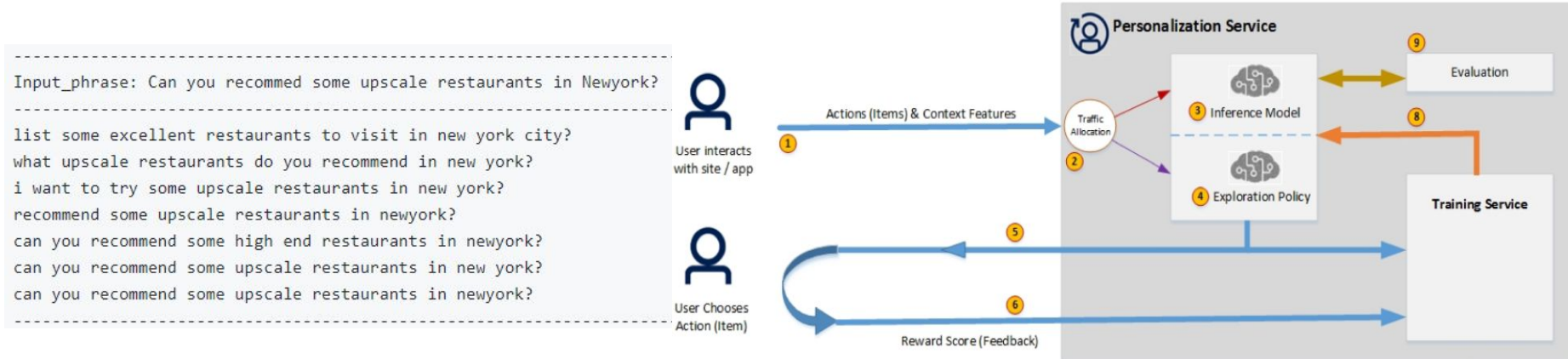


# Architecture



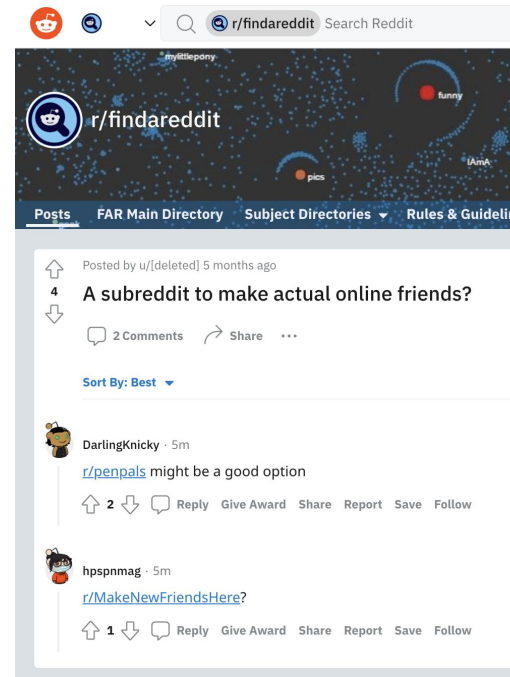
# Reinforcement-based Question Refining

- Purpose: refine the user's question input to the QA system
- Leveraged an open-sourced natural language paraphrase built using the T5 large language model to generate question re-phrasing candidates
- Integrated with Azure Personalizer service which provides online reinforcement learning to learn which question paraphrasing the user prefers



# Data Collection and Processing

- Leveraged Pushshift and PRAW Reddit APIs to scrape r/FindARReddit to get questions and community suggested subreddits
- Scraped 1 year of data 7/1/2020 - 7/1/2021 for 40k total posts
  - Question
  - Answers
  - Upvotes
- Cleaned and extracted only subreddit data



question_id	question	question_vocab	comment_upvotes	suggested_subreddits
o0oakk	A subreddit to make actual online friends?	make actual friend title	2	r/penpals
o0oakk	A subreddit to make actual online friends?	make actual friend title	1	r/makenewfriendshere

# Experiments

Experiment	Architecture	Cleaned?	LDA Appended?
TF-IDF	TF-IDF		
BERT	BERT Base		
Cleaned Token BERT	BERT Base		
BERT + LDA	BERT Base		
Cleaned Token BERT + LDA	BERT Base		
Semantic Search Transformer	Semantic Search Transformer		
Cleaned Token Semantic Search Transformer	Semantic Search Transformer		
Semantic Search Transformer + LDA	Semantic Search Transformer		
Cleaned Token Semantic Search Transformer + LDA	Semantic Search Transformer		

# Evaluation Metric Results

