Reversing the Twenty Questions Game

CSC-791 NLP Project

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Introduction

- What is the 20 questions game?

  – Person 1: Thinks of an Entity

  – Person 2: Asks question and gets yes/no response from Person 1

- The Online Akinator

  – Computer (guesses) V. Human (answers)

- Can we reverse the roles?

Challenges

- Not an easy lookup problem
  - Wikipedia is vast, but not omniscient

- Large penalty if wrong
  - One wrong answer can throw off the Akinator by a lot

- Constraining the domain
  - **Animal** / Character / Object
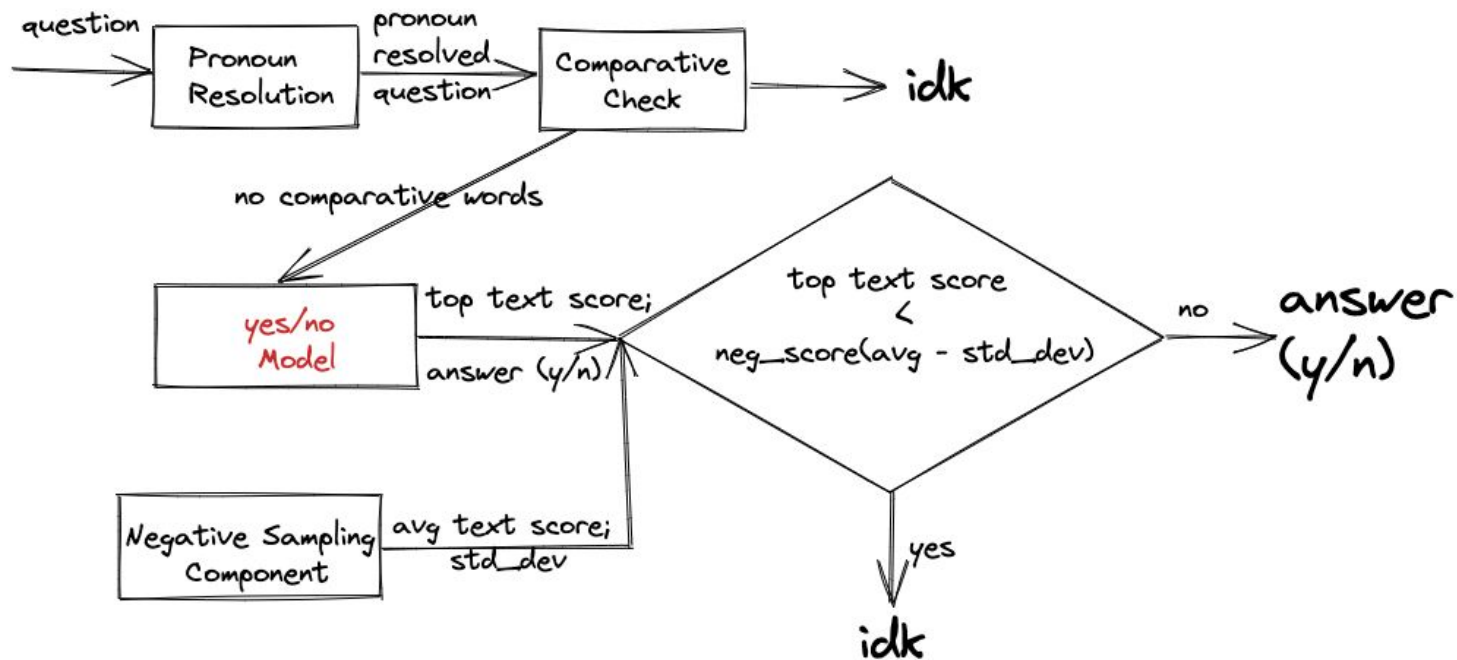
Q: Can cheetah be a pet?

A: [yes] In modern times, <u>cheetahs probably are the most difficult wilds cats to have as pets</u>, due to the necessity for wide open spaces for cheetah for them to run at full speed . == Cheetah as a pet ==

Due to the fact that cheetahs never attack and kill humans <u>they were extremely popular as hunting pets</u> since antiquity and especially in medieval times in the Near and Middle East.
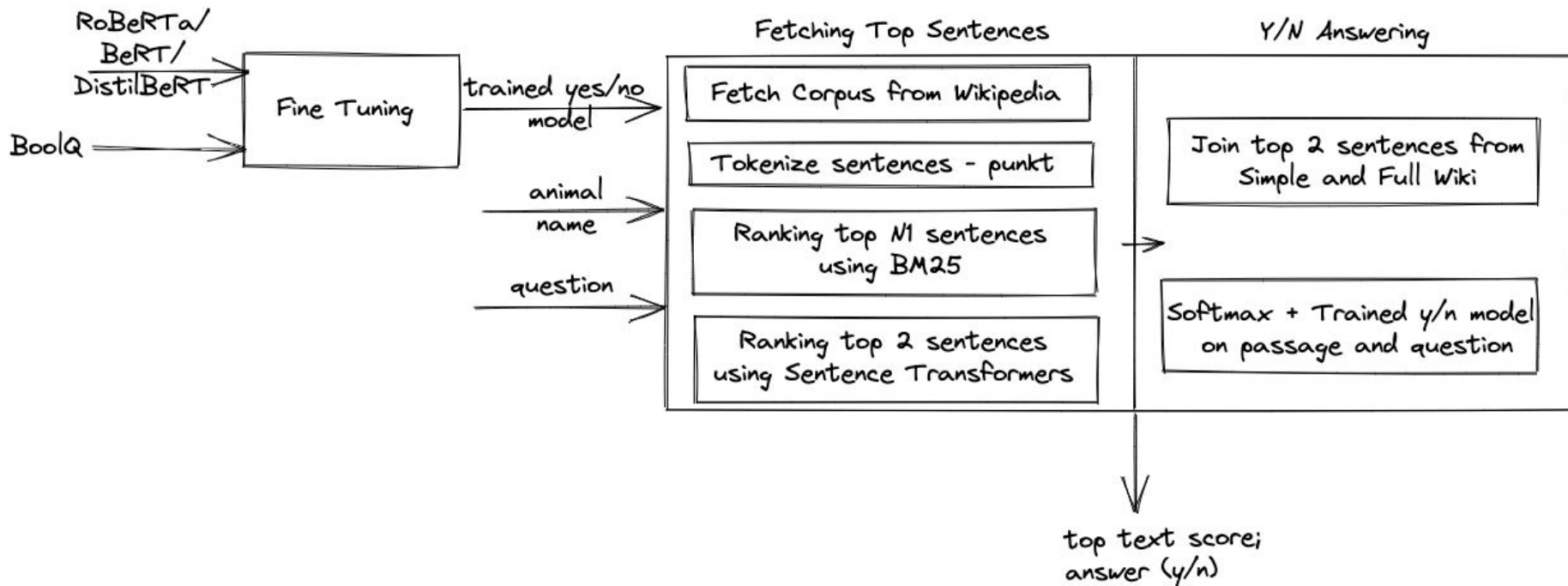
Q: Is cheetah a pet?

A: [no] === Diet and hunting === <u>The cheetah is a carnivore that hunts small to medium-sized prey</u> weighing 20 to 60 kg (44 to 132 lb), but mostly less than 40 kg (88 lb).
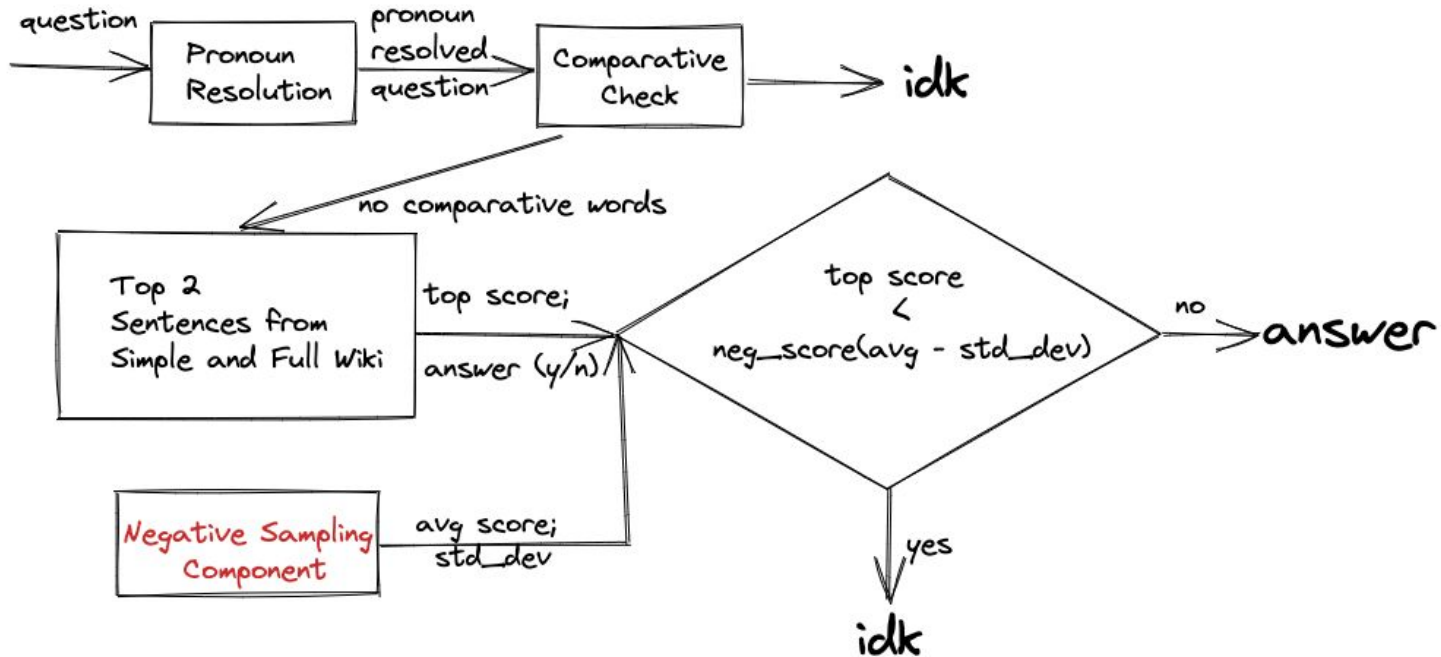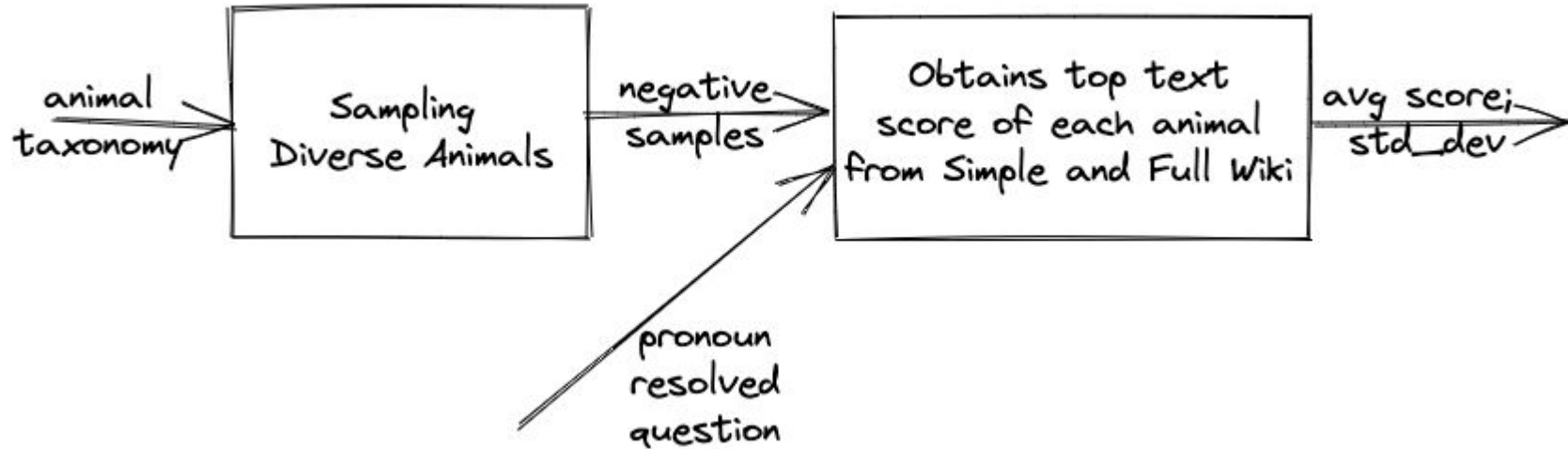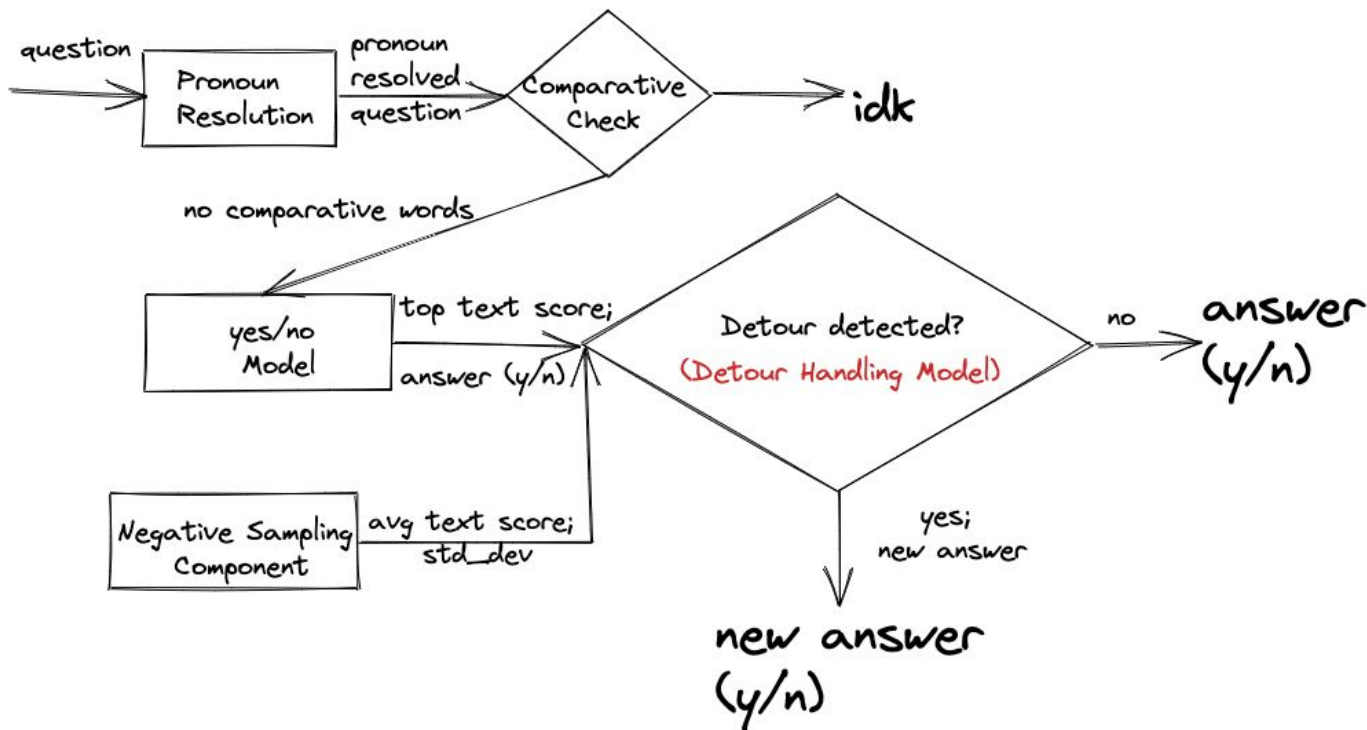
Basic Model

Yes/No Model

Negative Sampling
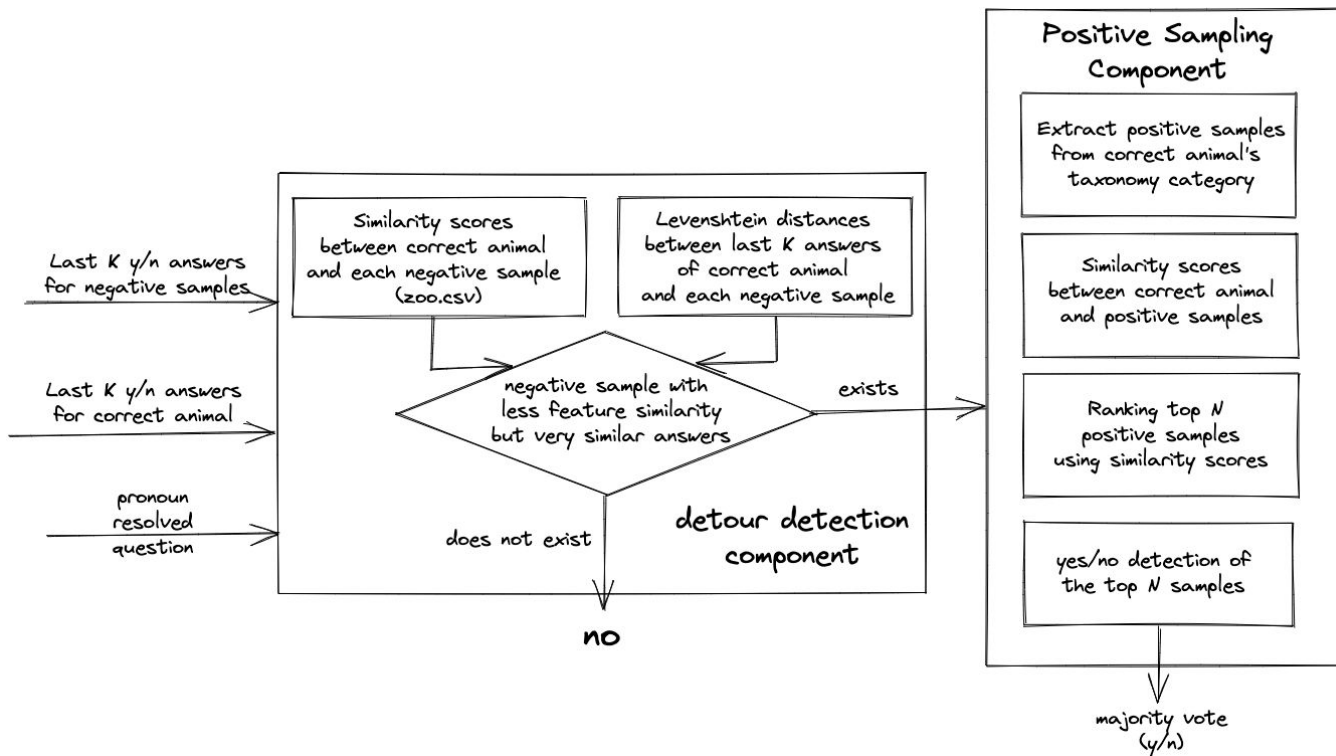
Negative Sampling Component

Improving upon Negative Sampling

Detour Detection Model

Results

- Hand annotation
  - 250 answers
  - Accuracy: 78.69% (of y/n)
  - F1 (no): 81.67%
  - F1 (yes): 74.61%
- Estimated correct answer
  - 264 samples
  - Accuracy: 62.18% (of y/n)
    - Maybe inaccurate because of crowd source data

Evaluation Metrics

- Detour recovery time
  - Weak long term memory
  - Approx. 8 questions to come back on track
- Best guess probability
  - On avg. for 15 animals was 25.91%
  - Looks less, but relatively high number
    - Initial guess list probability < 1%

Limitations

- Shortcomings in problem-definition
  - limit ourselves to "animal" domain
- Current state of transformer models
- Our primary dataset BoolQ
- Using Wikipedia as our primary corpus
- Limitations of word2vec models

Demo

End