Building a better AI detector using retrieval methods

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Project Presentation 1

Problem

- AI used very prominently
- People tend to paraphrase AI content
- Difficulty telling original work from AI generated text
- Current AI detectors don’t work well
- Leads to lack of knowledge for students
- AI gives untrustworthy or false information
- Need better detection mechanism

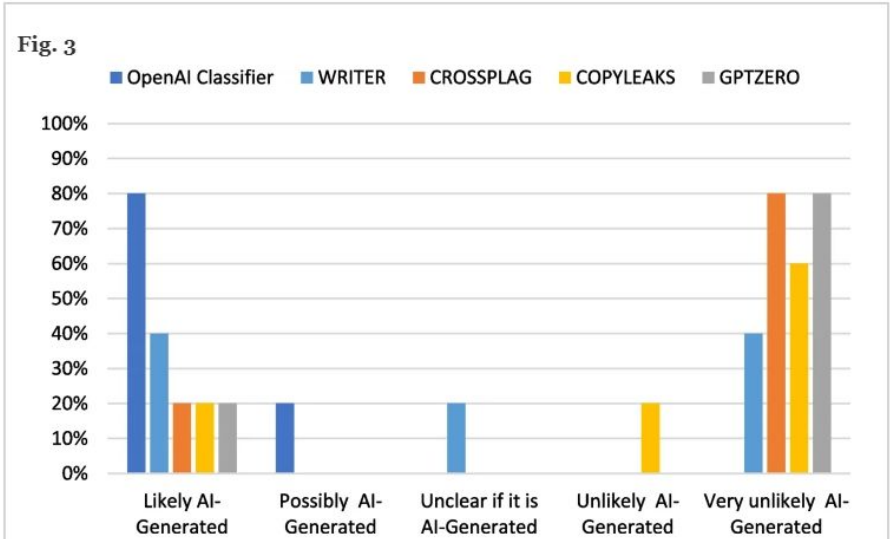
Background

- Many AI detectors out there
- Accuracy varies significantly
- Unreliable for teacher use
- Possibility of false positives
- Not close to 100% accuracy

Other Solutions

- Most prominent AI detectors:
  - GPTZero
  - Copyleaks
  - CrossPlag
- Detectors do not perform well against GPT 4.0
- Many false negatives and uncertain classifications

Evaluating the efficacy of AI content detection tools in differentiating between human and AI-generated text



The responses of five AI text content detectors for GPT-4 generated contents

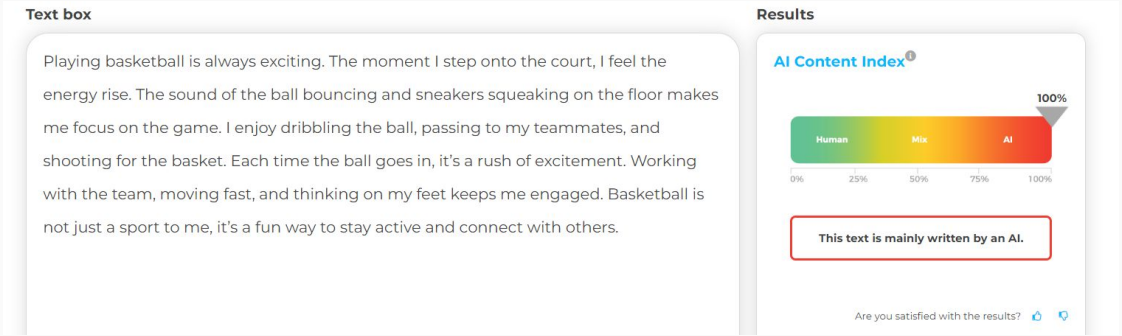
Other Solutions Continued

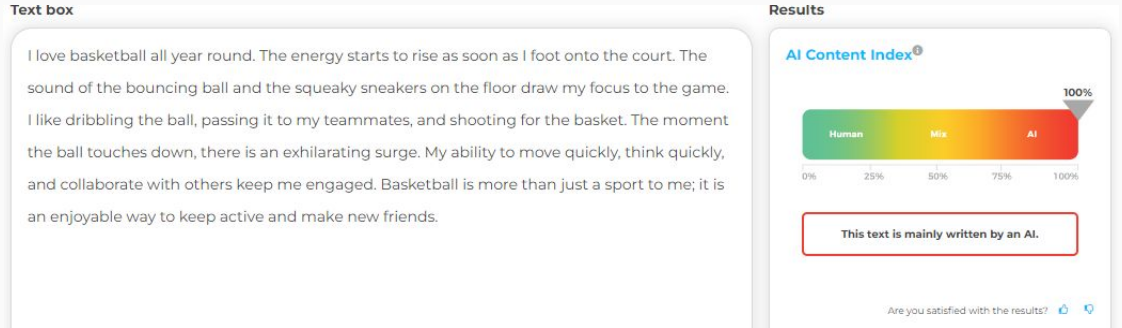
- How these AI detectors work
  - GPTZero:
    - Amount of predictability in the text
    - Looks at the variance in the sentences, AI generated text typically has less variety
  - Copyleaks
    - Scans the document against different sources to see if it matches anything
    - Sentence by sentence detection against human writing
  - CrossPlag
    - Text analysis using Natural Language Processing
    - Using a dataset created by human and AI content
- Pros: Detect well on older GPT generations
- Cons: Fail on GPT 4.0 and paraphrased AI generations, inconsistencies

Demo of current solutions

- GPTZero: https://gptzero.me/
- CopyLeaks: https://copyleaks.com/ (doesn't seem to work without subscription)
- CrossPlag: https://app.crossplag.com/individual/detector
- Sample AI generated text: “Playing basketball is always exciting. The moment I step onto the court, I feel the energy rise. The sound of the ball bouncing and sneakers squeaking on the floor makes me focus on the game. I enjoy dribbling the ball, passing to my teammates, and shooting for the basket. Each time the ball goes in, it’s a rush of excitement. Working with the team, moving fast, and thinking on my feet keeps me engaged. Basketball is not just a sport to me, it’s a fun way to stay active and connect with others.”

AI Detectors with paraphrasing





AI Detectors with paraphrasing continued

"Playing basketball is always exciting. The moment I step onto the court, I feel the energy rise. The sound of the ball bouncing and sneakers squeaking on the floor makes me focus on the game. I enjoy dribbling the ball, passing to my teammates, and shooting for the basket. Each time the ball goes in, it's a rush of excitement. Working with the team, moving fast, and thinking on my feet keeps me engaged. Basketball is not just a sport to me, it's a fun way to stay active and connect with others."

I love basketball all year round. The energy starts to rise as soon as I foot onto the court. The sound of the bouncing ball and the squeaky sneakers on the floor draw my focus to the ga me. I like dribbling the ball, passing it to my teammates, and shooting for the basket. The moment the ball touches down, there is an exhilarating surge. My ability to move quickly, think quickly, and collaborate with others keep me engaged. Basketball is more than just a sport to me; it is an enjoyable way to keep active and make new friends.

Why Is Mine Better?

- Model that is more accurate on GPT 4.0
  - Current detectors struggle on this
- Model that is better with paraphrased GPT 4.0
  - GPT 4.0 content that people paraphrase but the meaning is the same
- Model that gives more consistency in detecting GPT 4.0 content

Novelty

- Using retrieval methods (not used on common AI detectors) on GPT 4.0
  - Using a database of AI generations to tell whether text is a paraphrasing of AI generated text
    - Use semantic similarity scores
    - Find any matches to previous generations
  - Accuracy will remain high even as the amount of paraphrasing goes up
- Use on “mixing attacks”
  - Texts that has both human written elements and AI generated text
- Higher accuracy than current AI detecting algorithms have

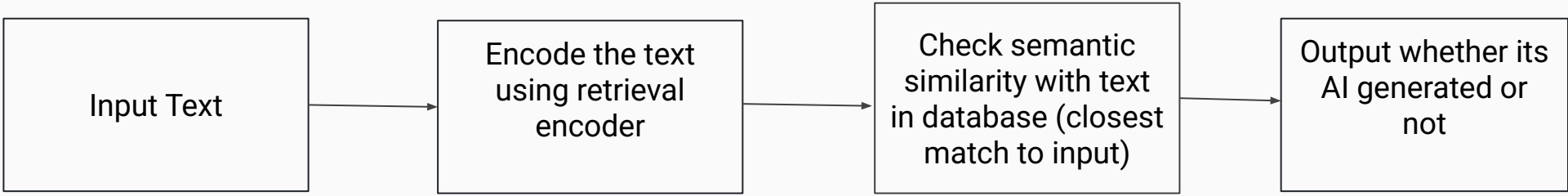
Impact

- Used in school by teachers
  - A more reliable way to check AI content
- Trustworth source of AI detection
- Maintains integrity
- Creates a fair learning environment

Method

- Store retrieval encoded sequences of text that were generated by GPT 4.0 in database
- Feed in input text
- Use a retriever encoder to encode input text
- Check to see if input text matches database text (semantic similarity)
- Set the threshold (T), if the text score is higher than T, then it is judged as not similar
- Output whether the text is detected as GPT 4.0 generated or not

Method: Systems Architecture



Results

- I hope to measure 85% accuracy or better on detecting text generated by GPT 4.0
- Model takes input text
  - Could be paraphrased
  - Could be mixed in with human content,
  - Model tells whether it was AI generated or not
- Expect better performance than current AI detectors

Limitations

- Text with shorter number of words
- Not using watermarking and statistical outlier methods
- Other potential AI’s (besides GPT 4.0)
- Scalability to more than 15 million generations
- Different languages AI detection

Conclusion and Future Work

- Use retrieval method along with other methods (watermarking, statistical outlier) to improve shorter text identification
- Experiment retrieval methods with other AI’s
- Test accuracy with more than 15 million generations
- Use translation to detect AI content in multiple languages

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Q&A

THANKS!