A Multi-Agent System for for Impact Story Generation

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Motivation
Writing Impact Stories now

- ✖ Few researchers actively promote their own work.
- ✖ Time-consuming.
- ✖ Expensive to hire writers.
- ✖ A lot of impact research goes unnoticed and underutilized.

Proposed Solution
A Multi-Agent System

- ✔ Specialized task execution [1].
- ✔ Scalable knowledge processing.
- ✔ Flexible system adaptation [2].
- ✔ Collaboration ensures quality.
- ✔ Integration LLMs in MAS for text writing remains underexplored.

Data
Two Formats

- **Dataset:** 11 UvA stories & corresponding LinkedIn posts.
- **UvA website:** marketing style written post of multiple paragraphs with headers.
- **LinkedIn post:** a relative short story highlighting key findings.
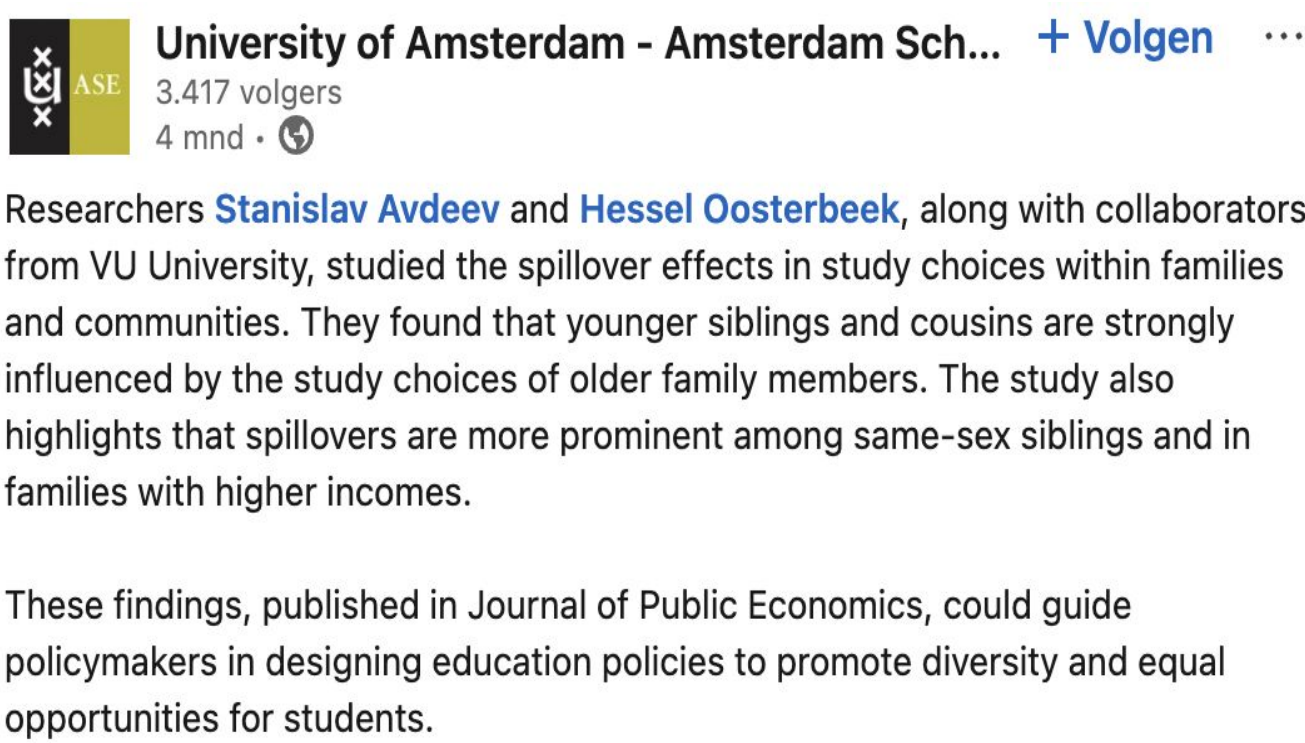- **ASE & ABS** impact research.

Figure 1. Example LinkedIn post.

Experiments

- Impact stories are generated with MAS and a single LLM to compare performance.
- MAS-generated stories are compared to UvA and LinkedIn references for alignment.
- MAS is tested on research papers of varying lengths and complexities.
- ROUGE, BLEU, compression ratio, and readability scores assess MAS output.

Validation Methods

Quantitative
- ROUGE score
- BLEU score
- Compression Ratio
- FRE

Qualitative
- Stakeholder feedback

Usability
- Flexibility - using edge cases to test.
- Scalability - papers of different sizes and complexities.

The Multi-Agent System
Backend & Preprocessing

Core team outline

- 🤖 **Group chat manager**
  - ○ Organize and moderate team discussions.
- 🤖 **Outline creator**
  - ○ Create structured outlines for impact stories.
- 🤖 **Text writer**
  - ○ Write draft versions of the impact story.
- 🤖 **Text reviewer**
  - ○ Review draft impact stories and send feedback for improvement.
  - ○ Allows for **human feedback.**

Preprocessing

1. **Data cleaning**
   - Handle non-text elements.
   - Standardize formatting.
2. **Section segmentation**
   - Divide the research paper into smaller sections.
   - Identify key sections and remove irrelevant sections (e.g., references, acknowledgments).
3. **Section summarization (BART)**
   - Generate concise summaries of selected sections.
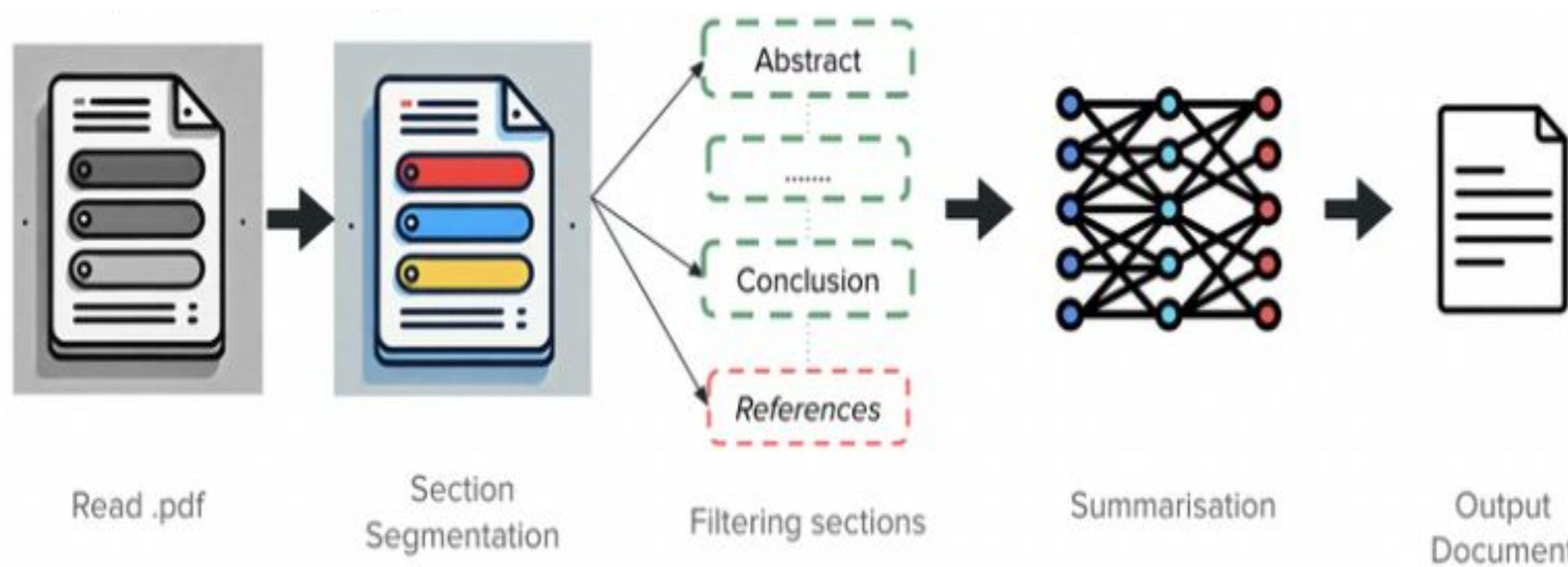   - Extractive/Abstractive summarization.
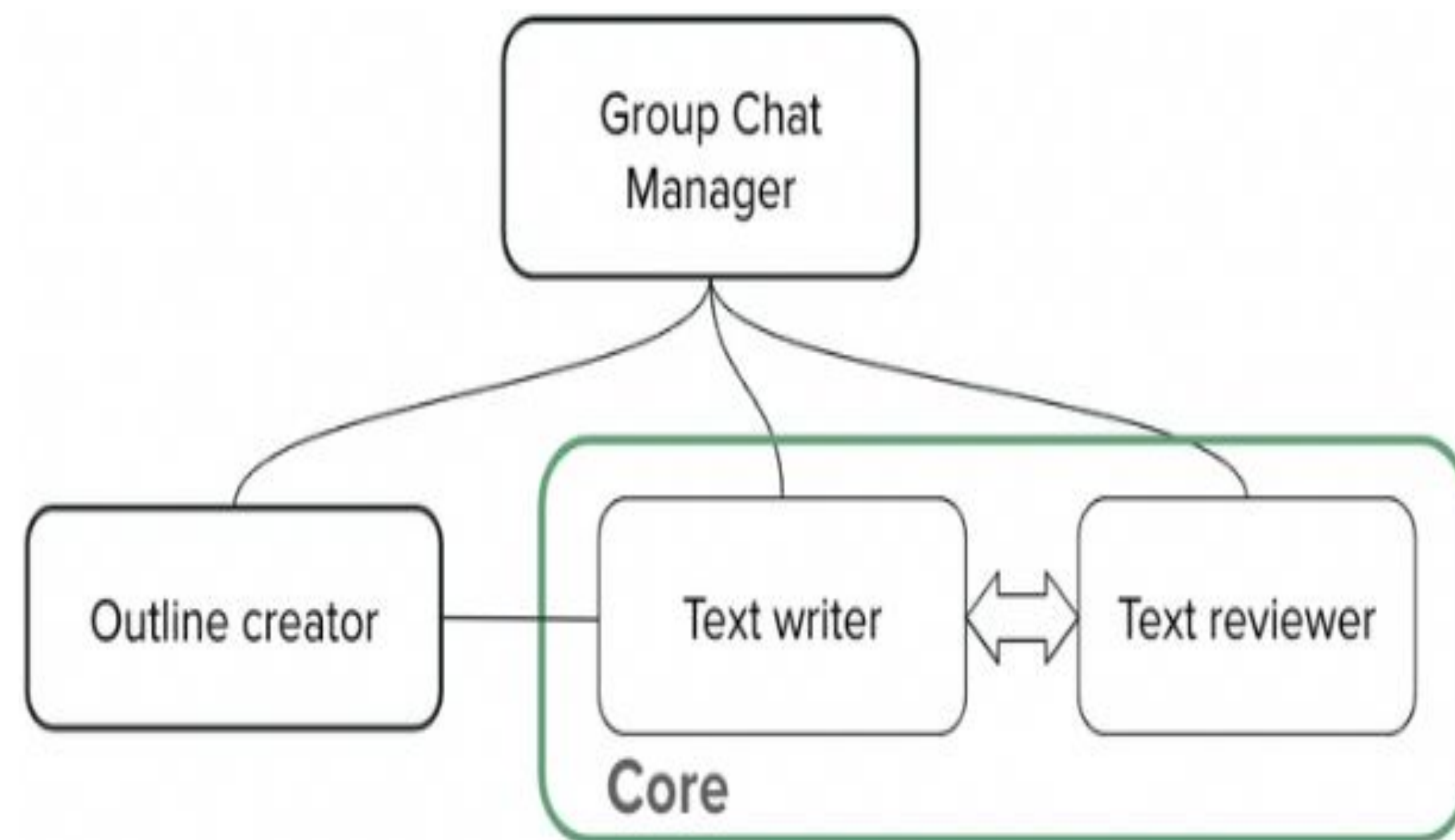

Figure 2. Preprocessing pipeline.

Figure 3. Multi-agent system setup.

Frontend

1. Upload a PDF of the research paper.
2. Select a template (UvA/LinkedIn).
3. Backend preprocesses the research paper and start the multi-agent system workflow.
4. Agents generate the impact story, with the Text Reviewer providing feedback unless a human steps in.
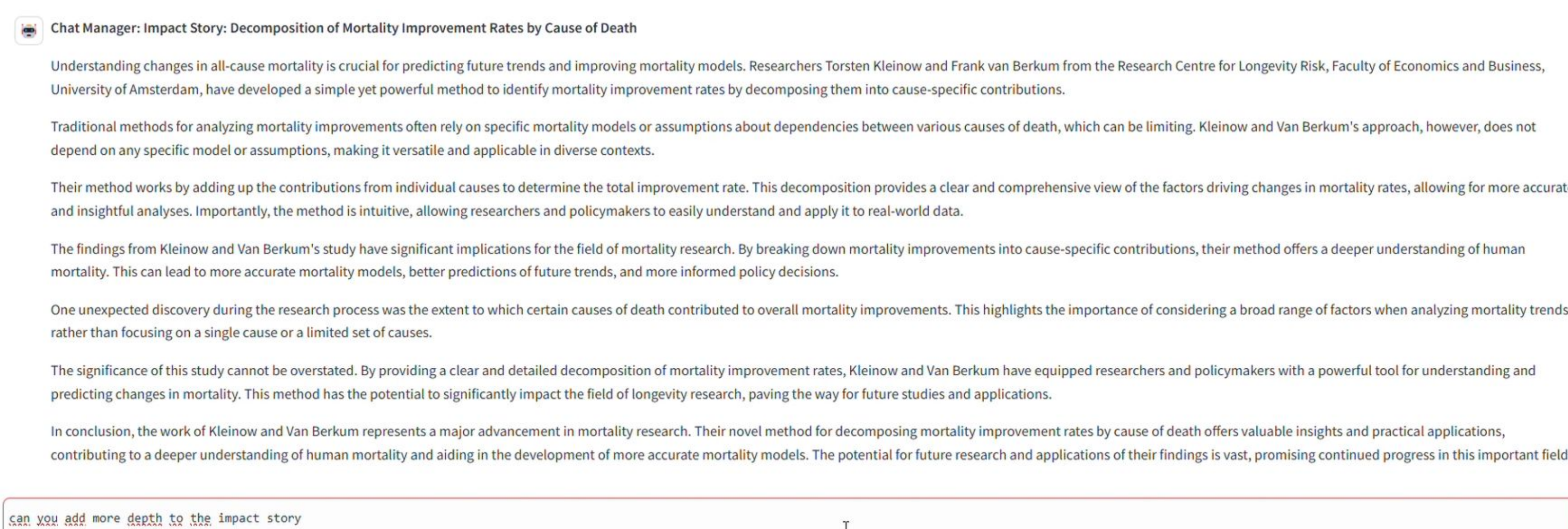5. Save the draft impact story as a PDF file.

Figure 4. Start-up interface.

Figure 5. Chat-bot interface with human input.

Results & Conclusion

- The **MAS outperforms a single LLM** agent across **all evaluation metrics**, with better summary alignment and consistency.
- The performance gap is more noticeable in longer templates (UvA).
- The **MAS** provides **more detail and accuracy**, while the single LLM agent struggles with depth.
- Using the MAS offers both a reduction in time spent on generating the impact story as well as the cost associated with it
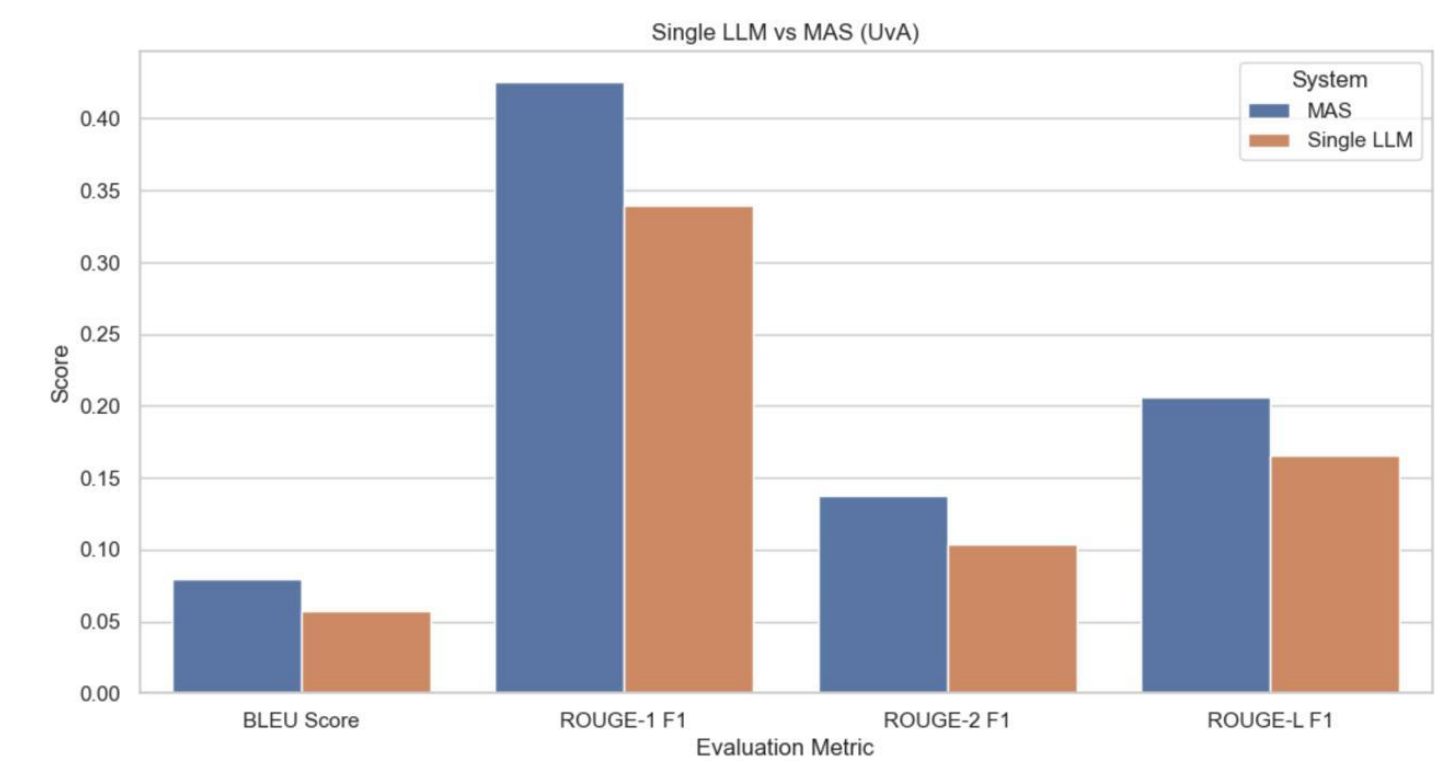

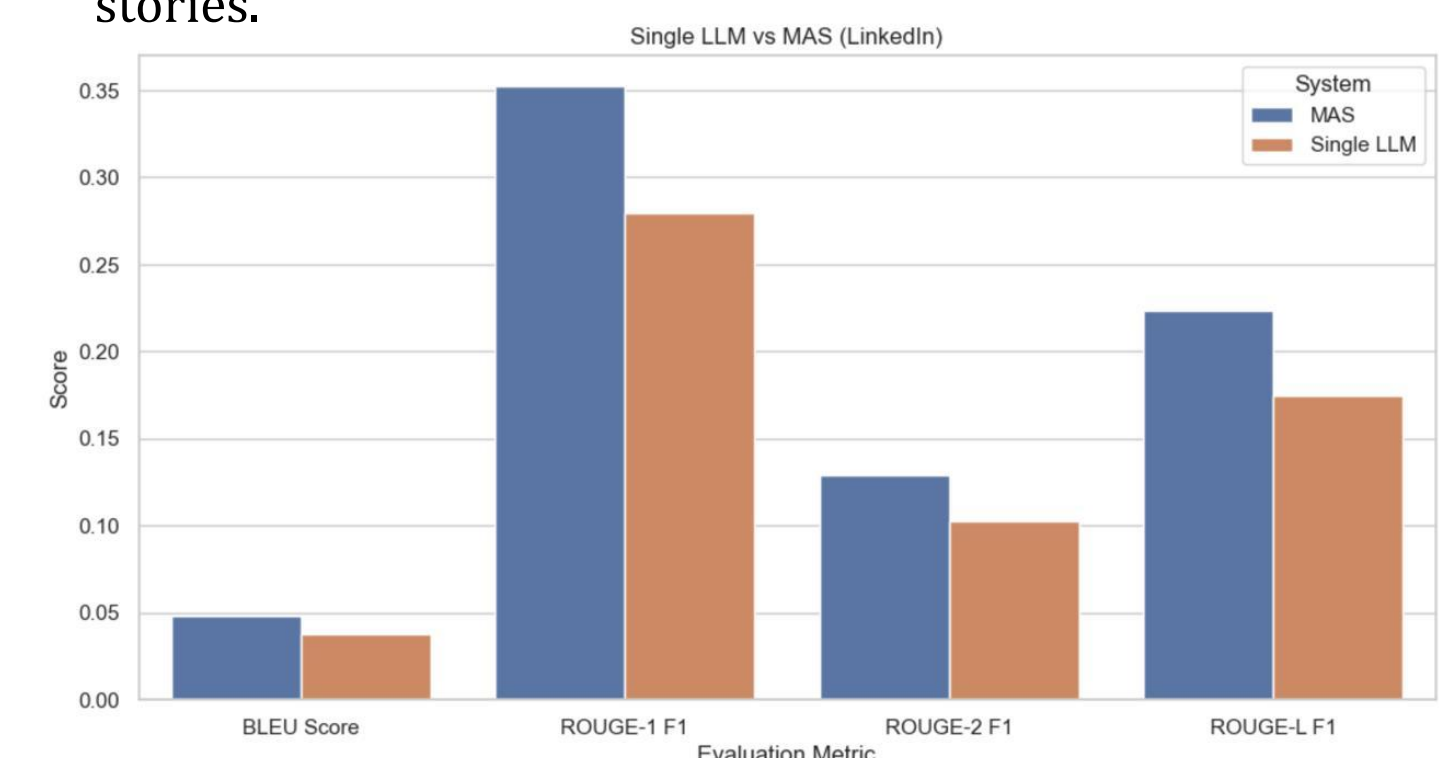**Figure 6.** Comparison MAS generated vs reference UvA stories.

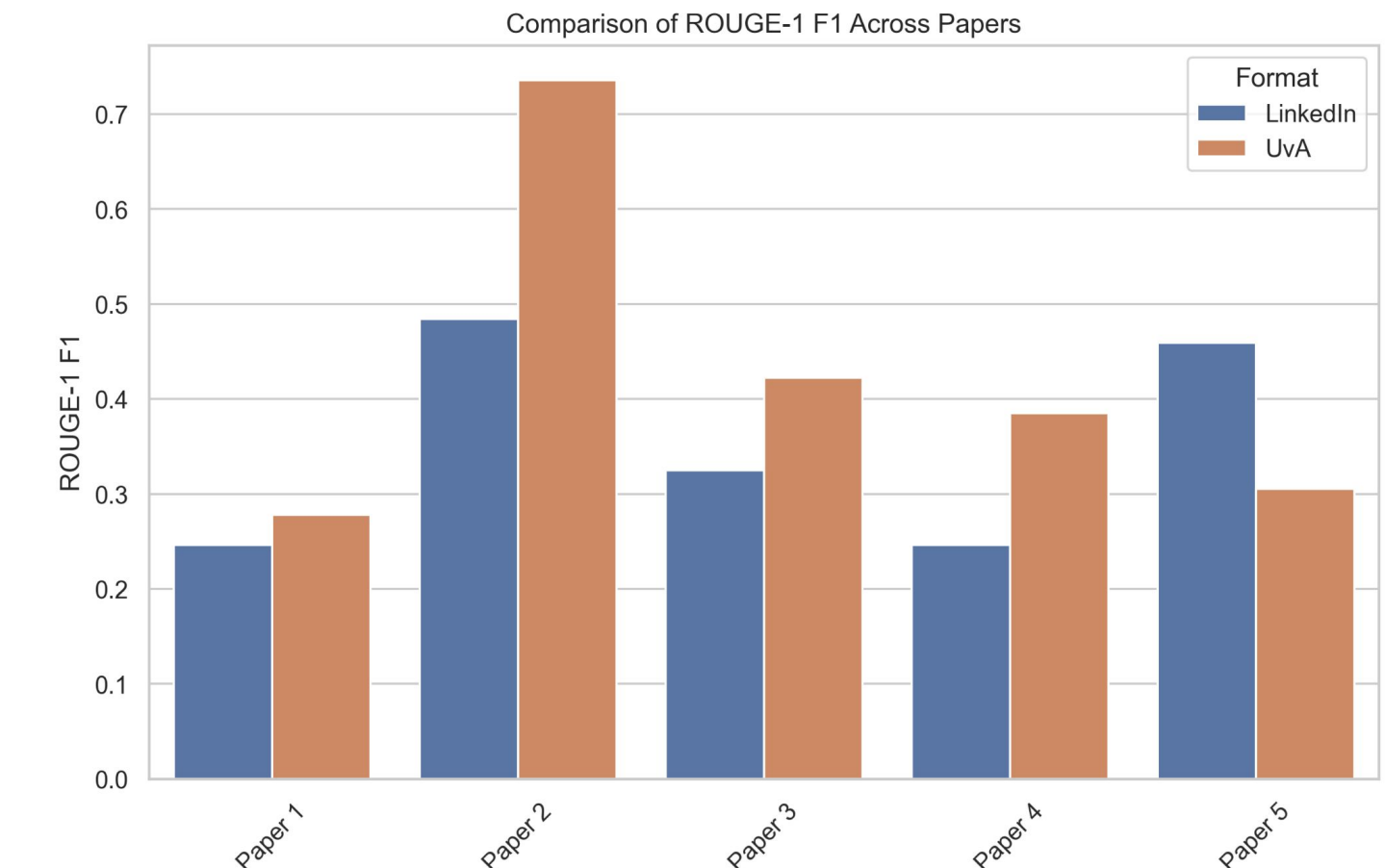**Figure 7.** Comparison MAS generated vs reference LinkedIn stories.

Figure 8. Rouge-1 F1 scores for the different generated stories.

Limitations

- API token limits cause in a limit to the conversation length and allowed length of the preprocessed text.
- Difficult to achieve further improvements in generation speed.
- The preprocessing can only handle a single research paper and no other formats such as interviews.

Future work

- Expand format options beyond the two current templates.
- Allow for different types of input documents apart from research papers.
- Enable impact story generation from multiple research papers at once.

References

1. Y. Shoham and K. Leyton-Brown. 2017. Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations. Cambridge University Press.
2. R. F. Da Silva et al . 2019. A Survey of Multi-Agent Systems for Energy Management. Applied Energy 252 (2019), 113491