

**PROJECT CHARTER**

GENERAL PROJECT INFORMATION

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| PROJECT NAME | | COURSE PROFESSOR | PROJECT PI/SPONSOR |
| Summarization Assistant for Academic Research with XAI | | Dr. Tehmina Amjad | Dr. Tehmina Amjad |
| STUDENT | EMAIL | Expertise | |
| Karan Kendre | [kendre.k@northeastern.edu](mailto:kendre.k@northeastern.edu) | Machine Learning, Natural Language processing, Backend | |

PROJECT OVERVIEW

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| **PROBLEM**  **OR ISSUE** | With the exponential growth of scientific publications driven by LLM advancements, researchers face information overload - often reviewing dozens of papers to find only a few relevant ones. Current AI summarization tools (ChatGPT, Claude) operate as "black boxes," leaving users uncertain about output credibility and potential hallucinations. Users cannot verify which parts of the source text contributed to generated summaries, creating trust and reliability concerns in academic research. |
| **PURPOSE OF PROJECT** | To develop an intelligent, transparent summarization system that processes complex academic papers into concise, user-tailored summaries while providing explainability features that show exactly which portions of the original text contributed to the generated output, thereby enhancing user trust and making AI-assisted research more reliable. |
| **BUSINESS CASE** | This tool addresses critical inefficiencies in academic research workflows, potentially saving researchers hours per literature review. By adding explainability to AI summarization, we increase adoption among skeptical academics, differentiate from existing tools, and contribute to the broader goal of trustworthy AI in education and research. The transparent nature aligns with academic integrity standards and peer review requirements. |
| **GOALS /**  **METHODS /**  **METRICS** | 1. Achieve ROUGE-2 scores >40% and BERTScore >0.85. 2. Enable section-specific summarization. 3. Provide visual explainability for >90% of generated content. 4. Process papers 50% faster than manual reading.   **Methods:** Fine-tune transformer models (T5/BART/BERT) on scientific corpora; Implement attention visualization and attribution   techniques; Develop hybrid explainability approach. **Metrics:** ROUGE scores, BERTScore, user trust ratings (1-5 scale), processing   time, factual accuracy assessment. |
| **EXPECTED DELIVERABLES** | 1. Fully functional web application (Streamlit/Gradio interface). 2. Fine-tuned transformer models for scientific text. 3. Explainability visualization system. 4. Comprehensive benchmarking report comparing against Claude/ChatGPT. 5. Open-source codebase with documentation. |

PROJECT SCOPE

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| **WITHIN SCOPE** | 1. Full-text and section-wise summarization (Introduction, Methods, Results, Conclusion). 2. Support for arXiv and PubMed papers. 3. Explainability features showing source attribution 4. User interface for paper upload and interaction 5. Benchmarking against existing LLM tools 6. Support for PDF and plain text formats 7. Customizable summary length |
| **OUTSIDE OF SCOPE** | 1. Multi-modal summary (ability to interpret Graphs, tables etc.) 2. Citation extraction module, for richer summaries. 3. Multi-document comparative summarization, |

TENTATIVE SCHEDULE

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| **KEY MILESTONE** | **START** | **FINISH** |
| Form Project Team / Preliminary Review / Scope | 09/01/2025 | 09/07/2025 |
| Finalize Project Plan / Charter / Kick Off | 09/08/2025 | 09/14/2025 |
| Define Phase | 09/15/2025 | 09/28/2025 |
| Measurement Phase | 09/29/2025 | 10/12/2025 |
| Analysis Phase | 10/13/2025 | 10/31/2025 |
| Improvement Phase | 11/01/2025 | 11/14/2025 |
| Control Phase | 11/15/2025 | 11/25/2025 |
| Project Summary Report and Close Out | 11/26/2025 | 12/01/2025 |

REFERENCES

1. **ScisummNet Dataset and Related Papers** 
   1. **Dataset:** [**https://cs.stanford.edu/~myasu/projects/scisumm\_net/**](https://cs.stanford.edu/~myasu/projects/scisumm_net/)
   2. **Paper:** [**https://arxiv.org/abs/1909.01716**](https://arxiv.org/abs/1909.01716)
2. **"Attention is Not Explanation" (Jain & Wallace, 2019)** 
   1. **Paper:** [**https://arxiv.org/abs/1902.10186**](https://arxiv.org/abs/1902.10186)
   2. **Follow-up discussion:** [**https://arxiv.org/abs/1908.04626**](https://arxiv.org/abs/1908.04626)
3. **SHAP for Transformers Documentation** 
   1. **GitHub:** [**https://github.com/slundberg/shap**](https://github.com/slundberg/shap)
   2. **Transformers Tutorial:** [**https://shap.readthedocs.io/en/latest/example\_notebooks/text\_examples/transformers/**](https://shap.readthedocs.io/en/latest/example_notebooks/text_examples/transformers/)
4. **Hugging Face Transformers Library** 
   1. **Documentation:** [**https://huggingface.co/docs/transformers**](https://huggingface.co/docs/transformers)
   2. **Model Hub:** [**https://huggingface.co/models**](https://huggingface.co/models)
   3. **Datasets:** [**https://huggingface.co/datasets**](https://huggingface.co/datasets)
5. **ROUGE and BERTScore Evaluation Metrics** 
   1. **ROUGE Package:** [**https://github.com/google-research/google-research/tree/master/rouge**](https://github.com/google-research/google-research/tree/master/rouge)
6. **BERTScore:** [**https://github.com/Tiiiger/bert\_score**](https://github.com/Tiiiger/bert_score)
   1. **Paper (BERTScore):** [**https://arxiv.org/abs/1904.09675**](https://arxiv.org/abs/1904.09675)
7. **Scientific Document Summarization Literature** 
   1. **Survey Paper:** [**https://arxiv.org/abs/2110.15114**](https://arxiv.org/abs/2110.15114)
   2. **BART for Summarization:** [**https://arxiv.org/abs/1910.13461**](https://arxiv.org/abs/1910.13461)
   3. **SciBERT:** [**https://arxiv.org/abs/1903.10676**](https://arxiv.org/abs/1903.10676)
8. **Explainable AI Best Practices** 
   1. **Captum Library (PyTorch):** [**https://captum.ai/**](https://captum.ai/)
   2. **Transformers Interpret:** [**https://github.com/cdpierse/transformers-interpret**](https://github.com/cdpierse/transformers-interpret)
   3. **"Attention is Not Not Explanation":** [**https://arxiv.org/abs/1908.04626**](https://arxiv.org/abs/1908.04626)
9. **Additional Useful Resources** 
   1. **arXiv Dataset:** [**https://www.kaggle.com/Cornell-University/arxiv**](https://www.kaggle.com/Cornell-University/arxiv)
   2. **PubMed Central:** [**https://www.ncbi.nlm.nih.gov/pmc/**](https://www.ncbi.nlm.nih.gov/pmc/)
   3. **Streamlit Documentation:** [**https://docs.streamlit.io/**](https://docs.streamlit.io/)
   4. **Gradio Documentation:** [**https://www.gradio.app/docs/**](https://www.gradio.app/docs/)