# Project: Summarizing and Analyzing Research Papers

## Submission Template

**Learner Name**: [Sachin Sahu]

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**Topic**: [**A Text Mining Based Map of Engineering Design: Topics and their Trajectories Over Time**]

**Research Paper**: [https://www.cambridge.org/core/journals/proceedings-of-the-international-conference-on-engineering-design/article/text-mining-based-map-of-engineering-design-topics-and-their-trajectories-over-time/3EE9225D21E3D6BE78F90CC744E3166F]

### Initial Prompt

**Description (50 words max)**: [summarise research paper including important topics and key points in max 100 words]

**Generated Summary (100 words max)**: [The paper titled "A Text Mining Based Map of Engineering Design: Topics and Their Trajectories Over Time" uses topic modeling to analyze 3,129 documents from the International Conference on Engineering Design (ICED) from 2003 to 2017. It identifies 12 key topics, including creativity, user-centered design, sustainable development, and product modeling. The study tracks trends in these topics over time, noting the rise of modern topics like Industry 4.0 and user-centered design. The research provides insights into the evolution of the engineering design field and the changing focus areas for researchers.]

### Iteration 1

**Description (50 words max)**: [focus on how the proposed methods improve upon existing solutions and specific results in max 100 words]

**Generated Summary (100 words max)**: [The paper presents a method using text mining, specifically Latent Dirichlet Allocation (LDA), to map engineering design topics from 3,129 documents published in ICED proceedings. This approach improves upon expert-based methods by reducing biases, lowering costs, and providing quantitative analysis. Key results include identifying 12 primary topics, such as creativity and sustainable development, and tracking their trends over time. The method offers a replicable, dynamic view of the field, enabling better insight into evolving research trajectories in engineering design.]

### Iteration 2

**Description (50 words max)**: [list of key resources and references used in this research paper in 100 words]

**Generated Summary (100 words max)**: [The key resources and references used in the research paper titled "A Text Mining Based Map of Engineering Design: Topics and their Trajectories Over Time" include:

* Proceedings from the International Conference on Engineering Design (ICED) from 2003-2017, comprising 3,129 documents.
* Text mining and topic modeling techniques, specifically Latent Dirichlet Allocation (LDA) by Blei et al. (2002), for clustering topics from unstructured data.
* Key references include works on text mining in engineering design such as those by Chiarello et al. (2017, 2018) and other studies on knowledge extraction and representation.
* The Scopus API for document retrieval, focusing on engineering and technical sciences publications.​]

### Final Prompt

**Description (50 words max)**: [perform detail summary of research paper in the form of list in max 100 words]

**Generated Summary (100 words max)**: [**Summary of the Research Paper**

* The paper uses text mining, specifically topic modeling, to map the field of Engineering Design (ED).
* It analyzes 3,129 documents from ICED conferences (2003-2017) to identify 12 key topics.
* Topics include Creativity, Design Education, Manufacturing, and Sustainable Development.
* The study observes trends in topic popularity, with User-Centered Design growing and others like Customer Satisfaction declining.
* Latent Dirichlet Allocation (LDA) is used for topic extraction.
* Results provide a dynamic overview of ED's evolution, aiding researchers in understanding topic trajectories over time.]

### Insights and Applications

**Key Insights (150 words max)**: [The research paper "A Text Mining Based Map of Engineering Design: Topics and Their Trajectories Over Time" applies text mining techniques to 3,129 documents from the International Conference on Engineering Design (ICED) between 2003 and 2017. Using Latent Dirichlet Allocation (LDA), the study identifies 12 key topics in engineering design, such as Creativity, Design Education, and Sustainable Development, and analyzes their prevalence over time. The findings reveal stable interest in core topics like Creativity and Problem Solving, while areas such as User-Centered Design and Manufacture are gaining momentum. The research offers a dynamic overview of the field's evolution, providing insights for researchers to understand trends, gaps, and opportunities in engineering design.]

**Potential Applications (150 words max)**: [The research findings have potential applications in enhancing knowledge management in the field of Engineering Design (ED). By using text mining techniques, such as topic modeling, the study helps in automatically extracting, representing, and organizing large volumes of unstructured data from scientific literature. This can support researchers and practitioners in identifying emerging trends, managing knowledge effectively, and pinpointing areas for further research and innovation. Additionally, the approach provides a dynamic mapping of ED topics, which could guide curriculum development, inform industry practices, and foster interdisciplinary collaboration. It also offers a foundation for the development of intelligent tools and databases that streamline literature review and discovery processes, ultimately contributing to more efficient and targeted research efforts in the evolving field of engineering design​.]

### Evaluation

**Clarity (50 words max)**: [The research paper provides a concise conclusion about how text mining techniques help create a map of engineering design topics, identifying major trends over time. However, the insights could be clearer by directly linking specific outcomes and the practical implications for researchers and practitioners.]

**Accuracy (50 words max)**: [The final summary and insights of the research present a comprehensive analysis of the evolution of topics in Engineering Design (ED). The authors used text mining to identify 12 topics and their trajectories over 15 years, offering valuable insights for the ED community on research trends and knowledge management. Accurate and well-structured.]

**Relevance (50 words max)**: [The research paper provides a comprehensive analysis of the evolution of topics in Engineering Design using text mining techniques. It is relevant for understanding current trends, identifying emerging subfields, and improving knowledge management in this area by leveraging data-driven methods like topic modeling.]

### Reflection

**(250 words max)**: [Reflecting on my research experience, I encountered both significant learning opportunities and challenges. One of the major challenges was working with large datasets, especially in the field of engineering design, where diverse subtopics like psychology, machine learning, and mathematics intersect. Navigating this complex, interdisciplinary space required a structured approach to manage and analyze the vast body of unstructured text data. Applying text mining techniques, such as topic modeling, proved instrumental in uncovering key topics and trends from a large corpus of academic papers.

A key insight I gained was the value of using automated methods, such as Latent Dirichlet Allocation (LDA), for identifying patterns and trajectories in academic research. While these tools offer efficiency and objectivity, they also highlighted the need for expert validation, as data-driven models require interpretation to ensure relevance to the field.

Overall, this experience enhanced my understanding of data-driven research methods and their application in engineering design, offering a more holistic view of evolving topics within the discipline.]