Task Details

You need to pick 1 out of 2 from the following 2 Options

Option 1: Neural Network Architectures Survey

1. **Domain Selection**
    - Choose one specific application domain, such as autonomous driving, cybersecurity, multimedia processing, natural language processing, game AI, etc.
2. **Identify Architectures**
    - Select **at least three distinct neural network architectures** introduced within the last five years that are relevant to your chosen domain.
    - To ensure consistency across all submissions, neural network architecture is defined as the structured design of a neural network, encompassing its **layer composition, connectivity patterns, activation functions, learning mechanisms, and any specialized components or modules** that distinguish it from other architectures. You may discuss the modules in the architecture like:
        1. **Layer Types and Arrangement**: Such as convolutional layers, recurrent layers, attention mechanisms, etc.
        2. **Connectivity Patterns**: Including feedforward, residual connections, skip connections, etc.
        3. **Activation Functions**: The specific non-linear functions used within neurons.
        4. **Learning Mechanisms**: Optimization algorithms, loss functions, and training strategies.
        5. **Specialized Components**: Unique modules like transformers, attention layers, normalization layers, etc.
3. **Analysis for Each Architecture**
   For each selected architecture, provide:
    - **Name of the architecture**: Official name or widely recognized term.
    - **Concise overview**: A high-level explanation of its design and purpose. Why this architecture is proposed, to solve what problems of existing architectures.

- **Key contributions and innovations**: What differentiates it from existing methods?
- **Performance on benchmarks**: Summarize any reported results on standard datasets (if available).
- **Strengths and limitations**: Critically evaluate where it excels and where it falls short.

4. **Comparative Summary**
    - Conclude your survey by comparing these architectures. Highlight any trends, patterns, and open research questions you observe.

Option 2: Research Challenges Survey

1. **Domain Selection**
    - Select a single application domain (e.g., one from the examples above) to examine in-depth.
2. **Identify Challenges**
    - Investigate the **major research challenges** or issues in that domain over the past five years. Your analysis must include, but is not limited to:
        - **Security Issues in Deep Neural Networks (DNNs)**: How do recent advances tackle security concerns and vulnerabilities?
        - **Applications and Challenges of Large Language Models (LLMs)**: What unique problems do LLMs face (e.g., bias, scalability, interpretability), and how do they contribute to the domain?
3. **Analysis of Each Challenge**
    - **Nature and scope**: Clearly define the challenge and explain its significance.
    - **Recent solutions or approaches**: Discuss notable methods or frameworks proposed to address the issue.
    - **Effectiveness and limitations**: Critically evaluate how well these solutions work and where they fail.
    - **Unresolved gaps**: Identify remaining questions or areas where current methods are insufficient.
4. **Thematic Synthesis**
    - Provide a cohesive discussion that connects these challenges and solutions, indicating broader trends and possible future directions.

Report Structure

Regardless of the option chosen, your report should follow a clear structure:

1. **Introduction**
    - State your chosen domain and clarify which option (1 or 2) you are pursuing.
    - Offer a brief rationale for your choice.
    - Provide a roadmap of what the reader can expect in the subsequent sections.
2. **Main Body**
    - **Option 1:** Present your survey of recent neural network architectures, following the points above.
    - **Option 2:** Present your survey of major research challenges, with emphasis on DNN security and LLM-related issues.
3. **Discussion**
    - Summarize the key insights gained from your analysis.
    - Reflect on both achievements and ongoing limitations within the field.
    - Suggest areas for further study or future research directions.
4. **Conclusion**
    - Offer a concise closing statement that encapsulates the overall findings of your investigation.
    - Highlight the significance of these findings for both researchers and practitioners.
5. **References**
    - Provide a properly formatted reference list (APA, IEEE, or a recognized citation style).
    - Ensure all in-text citations appear in this reference list.

Formatting & Submission

- **Length**: 1500 - 3000 words (excluding references).
- **Format**: Submit your report as a **PDF** document. Use clear headings and subheadings for readability.
- **Citation**: Cite all sources accurately and consistently to avoid plagiarism.
- **Deadline**: [*Specify the submission date and time here.*]
- **Submission Method**: [*Specify how/where the PDF should be submitted.*]

Evaluation Criteria

- **Depth of Research**: Demonstration of thorough literature review and understanding of current work in the chosen domain.
- **Clarity & Organization**: Logical flow, clear headings, and coherent presentation of ideas.
- **Critical Analysis**: Ability to compare and contrast different architectures or solutions and assess their strengths/weaknesses.
- **Use of Evidence**: Inclusion of relevant data, citations, and examples from credible sources.
- **Originality**: **No plagiarism**. Any form of plagiarism or uncredited content (including from AI) will result in a zero grade.

Important Notes

- **Plagiarism** (including inappropriate use of AI-generated text without meaningful editing or citation) is strictly prohibited. If you are using AI-generated text, please state it in your document, there will be NO penalty relating to AI-generated text.
- Ensure you **review your document carefully**. Repetitive, irrelevant machine-generated text or empty sentences will lead to a lower grade.
- Always give proper credit to the original authors and sources when referencing ideas or findings.