A General Organization of a Report

This document outlines the **bare minimum** sections of a report.

Non-indexed sections:

- Title page with candidate's details and copyright information
- Abstract
- Keywords

Beginning of indexed sections. Under each of these sections, you can create subsections or subsections as you see fit.

- Section 1: Introduction (a minimum of 1 – 2 pages):
    - Overview: Background, historical information, stats, etc.
    - Problem definition and Motivation: Motivate and describe the problem you are addressing and how you are addressing it. What is the problem? Why is it important?
    - Technical Challenges
    - Objectives and scope
    - Research approach and Hypothesis: If there are any assumptions and hypotheses considered. What is your basic approach? A short discussion of how it fits into related work in the area is also desirable.
      Contributions, Summary of the results, and Conclusions that you will present.
    - Organization of the report

- Section 2: Related work/Literature Review (a minimum of 1 – 2 pages):
    - Background: All relevant background information
    - Literature review: A well-organized clear literature review discussing the key existing works and their pros and cons.
        - Answer the following questions for each piece of related work that addresses the same or a similar problem. What is their problem and method? How is your problem and method different? Why is your problem and method better?
    - Also, provide a table to summarize your findings through the literature review.
    - The table should include reference no. and the year of the work.

- Section 3: Methodology
    - Overview of the proposed methodology to solve the problem at hand.
    - Precisely define the problem you are addressing (i.e., formally specify the inputs and outputs).
    - In-depth detail of the proposed method using high-quality flowcharts and block diagrams:
        - Describe in reasonable detail the algorithm you are using to address this problem.
        - A **pseudocode description** of the algorithm you are using is frequently useful. Trace through a concrete example, showing how your algorithm processes this example. The example should be complex enough to illustrate all the important aspects of the problem but simple enough to be easily understood.
        - If possible, an intuitively meaningful example is better than one with meaningless symbols.
    - Include mathematical modeling of your proposed solution.

- Highlight what are the key contributions of your solution compared to the state-of-the-art existing solutions.
- Describe the contribution of the proposed model: Is your model novel? If so, explain how novel it is compared to the existing solutions.
  - Is your model an improvement on an existing model? If so, elaborate on the improvements you made, how you did that, why you did so, and the impact of your modifications compared to the existing models. Justify all the modifications you made.
- Elaborate on the benchmark datasets used and the evaluation metrics employed.
- Explain your model-building strategy, like, how did you pick the optimal number of layers? Or why did you choose this specific architecture? Justify every step of your model building.
- Discuss your training strategy (learning rate, batch size, optimizers, etc.); how did you manage **overfitting issues**?
- An algorithmic summary of the operations carried out at various stages of the proposed solution/framework/model.
- What are the criteria you are using to evaluate your method?
  - What specific hypotheses does your experiment test?
  - Describe the experimental methodology that you used.
  - What are the dependent and independent variables?
  - What is the training/test data that was used, and why is it realistic or interesting?
  - Exactly what performance data did you collect and how are you presenting and analyzing it?
  - The complexity of your model, for instance, the number of trainable parameters, number of hyperparameters, FLOPS, and memory size.
    For example, you can take advantage of a table to discuss the hyperparameter selection, like below.

Hyperparameter	**Value**
Optimizer	Stochastic gradient descent (SGD)
Batch size	64
Loss function	Categorical cross-entropy
Learning rate	0.003
Number of epochs	1000
⋮	⋮

- Section: Experimental Study and Analysis:
  - Provide a summary of the benchmark datasets used in your work.
  - The hardware and software platform used to build your model and test.
  - How did you manage class-imbalance conditions (if there was a such case)?
  - How did you handle data scarcity (if there was a such case)?
  - Use graphs/charts/tables, provide an extra slide/transparency with a summary of the results,
  - Explain the results quantitatively and qualitatively (e.g., visualizing the results along with ground truths)
  - Comparisons to competing methods that address the same problem are particularly useful.

        - Discuss the % of improvements you achieved compared to a baseline model. It should also include timing analysis, for example, per sample prediction time.
    - Discuss failure scenarios.
    - Conclusion and future direction

- Last Section: Conclusions/Discussion:
    - An overall conclusion of the entire work conducted for the project.
        - Briefly summarize the important results and conclusions presented in the report/thesis. What are the most important points illustrated by your work? How will your results improve future research and applications in the area?
        - Meeting the objectives: Clear explanation of your implementations, achievements, challenges you faced, and limitations of the proposed models, and recommendations.

    - Future work:
        - Remarks on next steps: Provide information on where the research or project is heading.
        - What are the major shortcomings of your current method? -- provide suggestions to overcome the limitations of the current development.
        - For each shortcoming, propose additions or enhancements that would help overcome it.

- Non-indexed sections:
    - Acknowledgment: Give credits to the data set providers, publicly available source code, collaborators, and funding agencies.
    - Bibliography: Be sure to include a standard, well-formatted, comprehensive bibliography with citations from the text referring to previously published papers in the scientific literature that you utilized or are related to your work.
    - Appendix – Additional results, resume of the candidate, links to the source code organized on GitHub.