

Project

For the project, you are tasked to develop a tutorial using Jupyter Notebooks on a specific Topic assigned to you. The tutorial should have the structure as outlined below clearly identified. You will work in pairs to discuss ideas, examples, and implementation and you can utilise online resources (with proper referencing), as you see fit.

1. Introduction [1]

- A brief overview of the algorithm.
- Why it's important/useful (maybe think about advantages or disadvantages over other approaches) – This is to be addressed at the end as well.
- Applications where it's commonly used.

2. Theory [2]

- Explanation of the underlying principles.
- Mathematical formulations (if appropriate). Here you might want to think or discuss loss function (if this is different from other approaches), how training is done, and the working basis of the algorithm.
- Key concepts and components of the algorithm.

3. Implementation [4]

- Steps to implement the algorithm.
- Necessary libraries and tools.
- Code snippets or pseudocode for clarity.
- Explanation of parameters and their significance (e.g., learning rate, depth, hidden layers etc.).

4. Advantages and Disadvantages [1]

- Pros and cons of using the algorithm.
- Comparison with other similar algorithms.

5. Example/Case Study [4]

- Application of the algorithm on a dataset.
- Walkthrough of the implementation with a simple example.
- Results interpretation.
- Performance evaluation metrics.

6. Tips and Tricks (EXTRA) [1]

- Best practices for using the algorithm effectively.
- Common pitfalls to avoid.
- Optimization techniques.

7. Conclusion [2]

- Summary of key points.
- Future directions or areas for improvement.
- Final thoughts.

8. Presentation [5]

References

- Citations for any sources or materials used in the tutorial.
- Your report should be accompanied by individual statements indicating the proportion of work undertaken by each student.

Additional Considerations:

- **Clarity:** Ensure the tutorial is easy to understand for beginners. Use simple language and provide explanations where necessary.
- **Visuals:** Incorporate diagrams, charts, or graphs to aid understanding.
- **Interactivity:** If possible, include interactive elements like code snippets that readers can run themselves. Make sure your code/tutorial is done using Jupyter notebook
- **Examples:** Provide examples to illustrate different aspects of the algorithm. Feel free to reference other examples that might highlight key points.

Group Topics:

1. Random Forest algorithm
2. XGBoost algorithm
3. Support Vector Machines (SVM)
4. K-Nearest Neighbors (KNN)
5. K-Means Clustering
6. Principal Component Analysis
7. Convolutional Neural Networks (CNNs)
8. Recurrent Neural Networks (RNNs)
9. Graph Neural Networks (GNNs)

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