

Fundamentals of CNN

Assignment Questions

Assignment

1. Difference between Object Detection and Object Classification.

a. Explain the difference between object detection and object classification in the context of computer vision tasks. Provide examples to illustrate each concept.

2. Scenarios where Object Detection is used:

a. Describe at least three scenarios or real-world applications where object detection techniques are commonly used. Explain the significance of object detection in these scenarios and how it benefits the respective applications.

3. Image Data as Structured Data:

a. Discuss whether image data can be considered a structured form of data. Provide reasoning and examples to support your answer.

4. Explaining Information in an Image for CNN:

a. Explain how Convolutional Neural Networks (CNN) can extract and understand information from an image. Discuss the key components and processes involved in analyzing image data using CNNs.

5. Flattening Images for ANN:

a. Discuss why it is not recommended to flatten images directly and input them into an Artificial Neural Network (ANN) for image classification. Highlight the limitations and challenges associated with this approach.

6. Applying CNN to the MNIST Dataset:

a. Explain why it is not necessary to apply CNN to the MNIST dataset for image classification. Discuss the characteristics of the MNIST dataset and how it aligns with the requirements of CNNs.

7. Extracting Features at Local Space:

a. Justify why it is important to extract features from an image at the local level rather than considering the entire image as a whole. Discuss the advantages and insights gained by performing local feature extraction.

8. Importance of Convolution and Max Pooling:

a. Elaborate on the importance of convolution and max pooling operations in a Convolutional Neural Network (CNN). Explain how these operations contribute to feature extraction and spatial down-sampling in CNNs.

Submission Guidelines:

- Answer all the questions in a single Jupyter Notebook file (.ipynb).
- Include necessary code, comments, and explanations to support your answers and implementation.
- Ensure the notebook runs without errors and is well-organized.
- Create a GitHub repository to host your assignment files.
- Rename the Jupyter Notebook file using the format "date_month_topic.ipynb" (e.g., "12_July_CNN_Basics.ipynb").

- Place the Jupyter Notebook file in the repository.
- Commit and push any additional files or resources required to run your code (if applicable) to the repository.
- Ensure the repository is publicly accessible.
- Submit the link to your GitHub repository as the assignment submission.

Grading Criteria:

1. Understanding and completeness of answers: 40%
2. Clarity and depth of explanations: 25%
3. Correct implementation and evaluation of optimizer techniques: 15%
4. Analysis and comparison of different optimizers: 10%
5. Proper code implementation and organization: 10%

Note: Create your assignment in Jupyter notebook and upload it to GitHub & share that uploaded assignment file link through your dashboard. Make sure the repository is public.