Assignment I

August 28, 2024

1 Automatic Differentiation Engine

In this part of the assignment, we'll implement our own automatic differentiation engine. Open the Jupyter notebook **Q1/autograd.ipynb** and follow the provided instructions.

2 Convolution Neural Network

Here, we'll delve into the fundamental building blocks of convolutional neural networks. Open the Jupyter notebook **Q2/convolutional_networks.ipynb** and follow the instructions. You'll become a CNN ninja after completing this exercise.

3 MM-AmazonTitles-300K

Now that you've become a ninja, let's test your skills on an extreme classification task. Open Jupyter notebook **Q3/amazontitles.ipynb** and follow the instructions.

- **Note:** The Jupyter (.ipynb) notebooks provided for each question have been designed to be as user-friendly and straightforward as possible. However, should you have any questions or doubts, please do not hesitate to contact the TAs via Piazza.
- **Submission guidelines:** For the final submission, you are required to upload a zip file on Moodle. This zip file should include the files provided to you, as you will be modifying these files directly. If there are any visualizations or points you wish to convey that cannot be effectively presented within the .ipynb files, you may include an additional document(PDF) to cover those aspects. Make sure to follow the structure and content of the files as provided in the original package.

IMPORTANT: Please ensure that all submitted code is your original work. Copying code or utilizing AI tools such as ChatGPT for assistance in coding assignments is strictly forbidden. We will employ tools like MOSS to detect plagiarism and other tools to identify AI-generated content. Violations of this policy will result in a zero score for the assignment, along with possible further disciplinary measures.

Methods for Accessing and Using Jupyter Notebooks

1. Google Colab

1. Navigate to the Google Colab platform.
2. Log in using your Google credentials.
3. To create or open a notebook, use the `File` menu to select `New notebook` for a fresh start, or `Open notebook` to upload an existing `.ipynb` file from your device, Google Drive, GitHub, or a URL.
4. With the notebook open, you can execute Python code within code cells, format text using Markdown, and include various visual elements.

2. Anaconda

1. Download and install the Anaconda distribution on your system.
2. Launch Anaconda Navigator, which comes bundled with the Anaconda installation.
3. Within Anaconda Navigator, select `Jupyter Notebook` from the `Home` tab to start the Jupyter Notebook application in your web browser.
4. You can either navigate to a directory containing your `.ipynb` file or create a new notebook by selecting `New` > `Python 3`.
5. Begin coding and exploring the features of the Jupyter environment, including code execution, notebook saving, and visualization creation.

3. Visual Studio Code (VS Code)

1. Download and install Visual Studio Code.
2. Install the Python extension available in the Extensions Marketplace within VS Code.
3. Launch VS Code and either open an existing `.ipynb` file by dragging it into the editor or create a new Jupyter notebook by accessing the `Command Palette` (Ctrl + Shift + P) and selecting `Jupyter: Create New Blank Notebook`.
4. You can now write and run code cells directly within the VS Code interface, enjoying full support for code execution, markdown formatting, and visualizations akin to the Jupyter Notebook web application.

4. Jupyter Notebook (Standalone Installation)

1. If you are not using Anaconda, install Jupyter Notebook by first installing Python and then running `pip install jupyter` in your terminal or command prompt.
2. Start Jupyter Notebook by entering `jupyter notebook` in your terminal or command prompt, which will open the interface in your default web browser.
3. Navigate to your `.ipynb` file's location or create a new notebook by selecting `New` > `Python 3` (or another kernel).
4. Begin working within your notebook, where you can write and execute code, create markdown text, and generate visual data representations.

5. Kaggle Notebooks

1. Visit the Kaggle website and either log in or create a new account.
2. Navigate to the `Notebooks` section and choose `New Notebook` to start a fresh notebook, or `Upload` to import an existing `.ipynb` file.
3. Once inside the notebook, you can immediately start coding and executing tasks within the provided environment. Kaggle notebooks offer a wide array of pre-installed libraries and access to various datasets.