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Machine Learning and AI

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Lab 1

1. Follow the steps above to open a Jupyter Notebook and take a screenshot of the output of the code below:

import torch

import torchvision

x = torch.rand(5, 3)

print(x)

A white rectangular object with a black stripe

AI-generated content may be incorrect.

2. Follow the steps above to open a Jupyter Notebook and take a screenshot of the output of the code below:

import torch

torch.cuda.is\_available()

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AI-generated content may be incorrect.

3. What is the main difference between supervised and unsupervised learning? Is the ResNet model in Chapter 2 an example of supervised or unsupervised learning? Why?

* Supervised learning: This is training a model using labels, you can think of learning with a tutor or teacher where you are given examples and guided through to the answer.
* Unsupervised learning: This is training a model with no labels, the model sees the raw data and isn’t given any guidance but tries to find patterns by itself – This can be seen as like studying on your own and finding insights. You look for trends and similarities.

The ResNet model in chapter 2 is an example of supervised learning because you use a pretrained model to identify what’s in a picture and it returns golden retriever with a high confidence interval. It’s learning from images which are already labeled as correct and used this to be able to identify other dog breeds.

4. Briefly describe the fields of machine learning and deep learning, as well as the main difference(s) between both fields.

* Machine Learning: This is the field where computers learn from given data and make decisions or predictions based off said data. The computer isn’t programmed to be able to do this to make that clear. This is like a model learning to predict customer attrition based off of behavioral information, demographics of a customer and maybe some engineered features.
* Deep learning: This is a subfield of machine learning that uses neural networks to learn from large amounts of raw data. It uses this data to try and break down complex functions with inputs and outputs that are distant so like speech to text or an image to an output of a sentence description.
  + Differences:
    - Machine learning usually uses less complex models than deep learning which is often using multi-layered neural networks.
    - Deep learning often needs much more data as well as computing power

5.

* What type of data transformation is performed by a hidden layer in a neural network using RELU activation (f(x)=max(0,x))?
  + When doing this in python I noticed that negative values were transformed to 0 and other values stayed constant. This would be a non-linear activation/transformation.
* What type of data transformation is performed by a hidden layer in a neural network using linear activation (f(x)=x)?
  + When testing this in python, it left all values unchanged and is a Linear transformation