



DEEP LEARNING COHORT 1.0 - ADVANCED ASSIGNMENT

Week 2: PyTorch Workflow Fundamentals

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Hello there! I hear you are now an expert in data manipulation and building linear regression models with PyTorch. Here are a few tasks, I will need your help with using the **Synchronous Machine Learning Dataset**.

Instructions:

1. Feel free to explore beyond the below problems. There are right answers but no wrong approaches!
2. Code-based solutions should be in code cells and text-based answers should be in markdown cells.
3. You can use the hints 🧐 around.

1. PyTorch Fundamentals

Question 1. Loading our data...

- (a) Load the **Synchronous Machine Learning Dataset** as Numpy array. 🧐¹
- (b) Convert the Numpy array to PyTorch tensor, **original_data_tensor**.

Question 2. Art of "Tensor Manipulation"

- (a) Print the size of the dataset.
- (b) Create a tensor, **my_pi_tensor** of same size as **original_data_tensor** containing values of **3.142** at every point and placed on your GPU device. Print the first **13** rows. Print tensor device location. Print tensor datatype.
- (c) Print the fifth-root of the sum of all values in **my_pi_tensor**.
- (d) Create a new tensor, **my_data_tensor** using the first and last 100 rows from the **original_data_tensor**. Print size of **my_data_tensor** [Expect a size of 200 rows].
- (e) Create two 1-D tensors, **features** and **target** from **my_data_tensor**. The **feature** is *dIf (Changing of excitation current of synchronous machine) I* column and **target** is *If (Excitation current of synchronous machine)*. 🧐²
- (f) Split your data into training and test data of ratio 75:25 respectively.

2. PyTorch Workflow Fundamentals

Question 3. Define your Linear model structure. You can use existing model.

Question 4. Train model for any number of epochs. Generate 1 plot of Loss against Epoch during model training and testing. Choose any set of hyperparameters for model training.

Question 5. Briefly comment on your results. What could be done to make the model or prediction better? (< 60 words)

¹The dataset is a zipped csv file with no missing values but uses a non-conventional delimiter: ";" and numbers use "," to indicate thousands. If you still have troubles, see the Code Snippets 1.

²See **Synchronous Machine Learning Dataset** for column indexes to use.

1 Code Snippets

```
# import libraries
import zipfile
import pandas as pd

# download dataset in colab env
!wget https://archive.ics.uci.edu/static/public/607/synchronous+machine+data+set.zip -O data.zip

# unzip data
with zipfile.ZipFile("data.zip", 'r') as my_zip:
    my_zip.extractall()

# read csv and parse to pandas
dataset_name = "synchronous machine.csv"
data = pd.read_csv(dataset_name, delimiter=";", thousands=',')

# get numpy data
numpy_data = data.values
```