Exercise 12.1

In lecture demo a class VanillaRNN was introduced. Use this class to build a Vanilla RNN using PyTorch to predict future stock prices based on historical data. We will use the stock price data of a company called "Zoom Video Communications, Inc. (ZM)".

The data can be loaded from https://raw.githubusercontent.com/haniemi/deeplearning/main/data/ZM.csv

Use only columns 'Date' and 'Close' from the data file.

Do the following preprocessing with the data:

- convert the Date column to datetime. Tip: Pandas has a function `to_datetime`.
- sort the data by date. Tip: DataFrame object has a function `sort_values`.
- make a data for sequences from column Close by
  - changing the type to float. Tip: values from a Series object can be converted as follows: `values.astype(float)`
  - standardizing it with the formula (data - data_mean) / data_std, where data_mean is the mean of data (column Close) and data_std is the standard deviation of data (column Close).

Generate data sequences from preprocessed data using sequence length 50.

Create dataloader for data using a batch size of 16. For this exercise do not use suffling, i.e. use parameter `suffle=False`.

Create the VanillaRNN class by copying the code from the lecture demo.

Use MSELoss as loss function and Adam as optimizer (with learning rate 0.001).

Use hidden state size 32 when creating the model (- input and output sizes are both naturally 1) .

Use the seed to 55 just before creating the model (`torch.manual_seed`).

Train the model with 100 epochs.

Evaluate the model by generating predictions to data (i.e. for all tensor sequences). Tip. This was made also in lecture demo.

Because the values were standardized at preprocessing, inverse predictions to real values with the following formula: predictions * data_std + data_mean (data_std and data_mean were calculated for standardization).

Plot the inversed predictions and the corresponding true values (- make them the same inverse operation as above) in a line graph which has **your name and creation datetime as a title**. Name the image file as follows: *YOUR_NAME_Ex_12_1.png*, where YOUR_NAME is replaced with your own name, e.g. *NieminenHans_Ex_12.1.png*.

Exercise 12.2

Continue Exercise 12.1.

The last date in the stock prize data is 2024-06-05 with a stock prize 62.090. Predict the next days stock prize. How is the predicted value? Choose the right answer.

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