<p style="text-align:center">**Deep Learning –HW#6**</p>

About the Assignment

The main aim of the assignment is to gain some fundamental knowledge about deep learning on Python. The gains of this homework are:

- Able to design a LGBM model for time series prediction
- Able to setting the parameter of a LGBM model
- Able to analyze performance of a model
- Able to save and load a model

Tasks:

Dataset link: https://deprem.afad.gov.tr/depremkatalogu

1.   Context

There are few dataset on time series analysis, in particular devoted to apply Machine Learning for earthquake analyis.

2.   Content

In this homework, you are given four parameters: Enlem, Boylam, Ay, Derinlik, Büyüklük.

You are responsible to extract some statistical features from those data, and apply LGBM Model or Tabnet Model for estimating Büyüklük of earthquake.

For instance; Enlem, Boylam, Ay (Month) and Derinlik inputs are given, then you are expected to predict the Büyüklük of the earthquake.

The performance of your system depends on the obtained features of Derinlik and Buyukluk data, such as mix, max, moment, kurtosis, gmean, hmean and etc….

Ex: The harmonic mean of Derinlik and Buyukluk data is:

$$hmean \; feature = \frac{2}{\dfrac{1}{Derinlik} + \dfrac{1}{Buyukluk}}$$

Ex: Average feature is

$$Average \; feature = \frac{Derinlik + Buyukluk}{2}$$

You have to find more features for accurate prediction of magnitude. Typically, your dataset would be as shown below:

$$\begin{bmatrix} Enlem_1 & Boylam_1 & Ay_1 & Derinlik_1 & Feature_1 & Feature_2 & Derinlik_1 & \cdots & Feature_n \\ Enlem_1 & Boylam_1 & Ay_1 & Derinlik_1 & Feature_1 & Feature_2 & Derinlik_1 & \cdots & Feature_n \\ Enlem_2 & Boylam_2 & Ay_1 & Derinlik_1 & Feature_1 & Feature_2 & Derinlik_1 & \cdots & Feature_n \\ Enlem_2 & Boylam_2 & Ay_1 & Derinlik_1 & Feature_1 & Feature_2 & Derinlik_1 & \cdots & Feature_n \end{bmatrix}$$

You can split the data with these ratios. The 70% training, 10% validation, and 20% test.

Monthly predict the

1- Implement a model by using Pytorch.
2- Save model with by considering low root mean squared score.
3- Load model and evaluate model with test samples.
4- Show the root mean squared error for of model.

Send colab notebook and pdf as zip file
Send your code as zip. Yourname-surname-hw#.zip