Assignment 1

**Membri echipă:** Butacu Ștefan-Alexandru, Cadar Eduard, Spiridon Dragoș, Ciupeiu Diana-Maria, Cusiac Andrei

**Denumire echipă:** Air, Trees, Water, Animals

**Tema:** P11 - Monitorizarea și predicția în schimbările de temperatura cu efect în topirea ghețarilor

**Articole:**

1. **Tang, Wang, et al. "Artificial Neural Network-based prediction of glacial debris flows in the ParlungZangbo Basin, southeastern Tibetan Plateau, China." Journal of Mountain Science 18.1 (2021): 51-67.**

* **Reason:** Global warming has caused the melting of glaciers on the Qinghai-Tibet Plateau increasing the risk of geological disasters. World’s average temperature has increased by 0.7°C. This increase has led to the presence of more glacier melt water, resulting in more frequent natural hazards such as floods, glacial debris flows and glacial lake outbursts.
* **Set de date:**
  + Training and validation set - data from the China Meteorological Administration (1970 - 2017)
  + Testing set - dataset from Bomi Geological Hazard Observation and Research Station of the Chinese Academy of Sciences ( 2018, 2019)
  + Time, scale of hazard, rainfall, temperature from a total of 102 glacier and debris flow disaster events in 31 debris flow gullies, from 1970 to 2019; meteorological data was downloaded from http://data.cma.cn/
* **Algoritmi:** Two-layer fully connected neural network, trained using K-fold cross validation
  + Libraries used: Numpy, Pandas, and PyTorch
* **Metrici:** MSE (mean square error) and MAE (mean absolute error)
* **Rezultate:** After analyzing the data, it is indicated that there is a close relationship between 24h accumulated rainfall and the occurrence of glacial debris flows and moderate connections with the 24h average temperature; the built model has 5 input neurons (24h accumulated rainfall, daily average temperature, daily maximum temperature, daily minimum temperature, daily temperature difference), two hidden layers with 32/64 neurons, and an output neuron, corresponding to the predicted scale of the glacial debris flow

1. **Al-Shawwa, Mohammed O., et al. "Predicting temperature or humidity in the surrounding environment using artificial neural network." (2018).**

* **Set de date:** Nature of the surrounding place, proximity or distance from water surfaces, the influence of vegetation, and the level of rise or fall below sea level
  + About 60% of the total sample data was used for network training in this paper. About 30% of the total sample data served as test and the remaining 10% used for validation of the system.
* **Algoritmi:** ANN (Artificial Neural Network) - each weight was initialized to some small random value
* **Metrici:** -
* **Rezultate:** The neural network was able to accurately forecast 100% of the excellent data (representing 12 inputs and based on the inputs.) We have two outputs represented in values and each value is as follows: (11)100% , (01) 100%, (10) 100%.

1. **Min, Yimeng, S. Karthik Mukkavilli, and Yoshua Bengio. "Predicting ice flow using machine learning." arXiv preprint arXiv:1910.08922 (2019).**

* **Set de date:**
  + LANDSAT 8 - satellite images of Antartica ranging from November 2015 - February 2017;
  + 10675 images, every image has 12 frames with the shape of 128 by 128
  + The interval between each frame ranges from 2 weeks to 9 month gaps, each pixel stands for a 30 meters by 30 meters region
* **Algoritmi:** 
  + Unsupervised learning
  + Long Short-Term Memory
* **Metrici:**
  + KG divergence of the prior loss D\_KL, l2 penalty
  + 2 LSTM layers (each of 128 units)
* **Rezultate:**
  + Predicts future ice flow
  + Track ice sheet and glacier dynamics
  + IceNet dataset