Knowledge-Based Computational Intelligence and Data Mining in Biomedicine

Laboratory 3-7: Assignments

Adrian Horzyk

horzyk@agh.edu.pl

AGH University of Science and Technology Krakow, Poland

Assignments for Lab 3-4

1. Choose a non-trivial biomedical dataset, develop a classification model using **Deep CNN** and try to **optimize hyperparameters**, use **regularization and other approaches** to achieve high performance of your model.

2. Implement the **clustering method** (DBSCAN, Hierarchical Clustering or Spectral Clustering) using any programming language you know, preferably Python. Try to use vectorization where possible.

According to the difficult epidemic situation in the world if your attendance in the laboratory classes was impossible, try to accomplish these tasks at home.
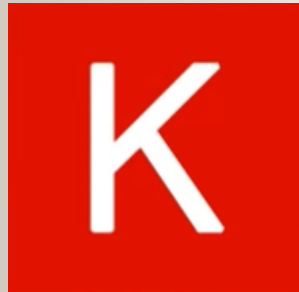
Assignments for Lab 5-7

3. Implement **AGDS associative structures** and use them to find a given number or similar objects in any biomedical data that
   a) satisfy any input criteria
   b) are similar to any chosen object(s)

4. Implement one of the data mining algorithms for searching for frequent patterns, maximal patterns, close patterns, and association rules in any biomedical data.

According to the difficult epidemic situation in the world if your attendance in the laboratory classes was impossible, try to accomplish these tasks at home.

Let's start with powerful computations!
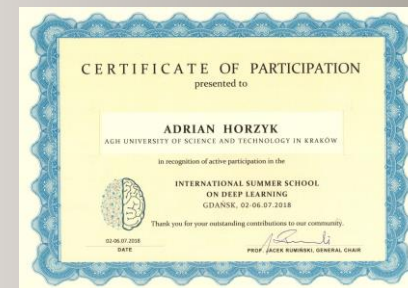
Bibliography and Literature

1. Nikola K. Kasabov, *Time-Space, Spiking Neural Networks and Brain-Inspired Artificial Intelligence*, In Springer Series on Bio- and Neurosystems, Vol 7., Springer, 2019.
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, *Deep Learning*, MIT Press, 2016, ISBN 978-1-59327-741-3 or PWN 2018.
3. Holk Cruse, *Neural Networks as Cybernetic Systems*, 2nd and revised edition
4. R. Rojas, *Neural Networks*, Springer-Verlag, Berlin, 1996.
5. *Convolutional Neural Network* (Stanford)
6. *Visualizing and Understanding Convolutional Networks*, Zeiler, Fergus, ECCV 2014
7. IBM: https://www.ibm.com/developerworks/library/ba-data-becomes-knowledge-1/index.html
8. NVIDIA: https://developer.nvidia.com/discover/convolutional-neural-network
9. JUPYTER: https://jupyter.org/
10. https://www.youtube.com/watch?v=XNKeayZW4dY
11. https://victorzhou.com/blog/keras-cnn-tutorial/
12. https://github.com/keras-team/keras/tree/master/examples
13. https://medium.com/@margaretmz/anaconda-jupyter-notebook-tensorflow-and-keras-b91f381405f8
14. https://blog.tensorflow.org/2019/09/tensorflow-20-is-now-available.html
15. http://coursera.org/specializations/tensorflow-in-practice
16. https://udacity.com/course/intro-to-tensorflow-for-deep-learning
17. MNIST sample: https://medium.com/datadriveninvestor/image-processing-for-mnist-using-keras-f9a1021f6ef0
18. Heatmaps: https://towardsdatascience.com/formatting-tips-for-correlation-heatmaps-in-seaborn-4478ef15d87f

Adrian Horzyk

horzyk@agh.edu.pl

Google: Horzyk

University of Science and Technology in Krakow, Poland

AGH