CSCE 5200 – Introduction to Big Data and Data Science

Project "Coding, Simulation and Comparison of Information Retrieval/Web Search Related Method/Algorithm"

Name: _____

Problem Statement

Create project groups consisting of 3-5 students.

Choose own original up-to-date an official non open access journal/conference paper/papers (e.g., IEEE paper/papers and desirably not older than five years) in Big Data related field. Use for this purpose free Internet tools of UNT Library. In particular, the following options can be chosen:

1. Template Examples 1 and 4 and corresponding k-WTA neural network model (4), (5) described in [1].
2. Template Examples 1 and 4 described in [1] and corresponding k-WTA neural network model (8) presented in [2].
3. Template Examples 1 and 4 described in [1] and corresponding k-WTA neural network model (9) , (10) presented in [2].
4. Template Examples 1 and 4 described in [1] and corresponding k-WTA neural network model (4), (5) presented in [3].
5. Template Examples 1 and 4 described in [1] and corresponding k-WTA neural network model (3), (4) presented in [4].
6. Template Examples 1 and 4 described in [1] and corresponding k-WTA neural network model (6), (7) presented in [4].
7. Template Examples 1 and 4 described in [1] and corresponding k-WTA neural network model (9) presented in [5].
8. Template Examples 1 and 4 described in [1] and corresponding k-WTA neural network model (3) presented in [6].

Send chosen paper/papers to IAs for approval by February 18th, 23:59 PM.

After the approval, perform computer simulations of the method/algorithm presented in the chosen paper. For this purpose, write in any programming language different form one used in the paper and execute a corresponding code for the same and different input big data consisting not less than 1000 items. Compare obtained results with ones described in the paper as qualitatively as quantitatively in the form of figures and/or numerical values. Describe the following: the problem statement studied in the paper, existing methods/algorithms to solve the problem, qualitative and quantitative comparative analysis of such methods/algorithms, method/algorithm presented in the paper, results of its quantitative and qualitative comparison, advantages and limitations of the method/algorithm, possible applications of the method/algorithm, the results of own simulations and their comparison with ones presented in the paper, literature citations in square brackets and numbered in square brackets list of corresponding literature references in IEEE style [7].

Design on the basis of obtained description related report in standard form presented, e.g., in [8], [9] or prepare corresponding presentation in PowerPoint in the form of Instructor's lecture presentations of CSCE 5200 course. The project report/PowerPoint presentation content should have all parts indicated above.

Verify non exceeding plagiarism level in the project report/PowerPoint presentation 30% value by free existing software.

Upload the project report/PowerPoint presentation file named by project group number to the UNT CSCE 5200 Canvas environment by April 15th, 23:59 PM.

Fulfill presentation timely according to the CSCE 5200 Syllabus schedule. The presentation should have a part related to execution demonstration of the code.

Tools to Fulfill the Project

A description of necessary tools can be found in a chosen paper, related references, PowerPoint presentations of Instructor's CSCE 5200 course and cited literature references.

Remarks: additional details related to the Project can be found in the CSCE 5200 syllabus uploaded to the UNT Canvas environment.
Project reports/PowerPoint presentations which do not satisfy the requirements described above are accepted with reduced grades.
IAs select groups for presentations by random choice at the start of presentation classes.
Students of each group are encouraged to delve into presentations of other groups, ask related questions, make reasonable comments and suggestions to get additional activity grades from IAs.

References

[1] P. Tymoshchuk and D. Wunsch, "Design of a K-winners-take-all model with a binary spike train," *IEEE Trans. Syst. Man. Cybern. B, Cybern.*, vol. 49, no. 8, pp. 3131-3140, Aug. 2019.
[2] P. V. Tymoshchuk, "A model of analogue K-winners-take-all neural circuit," *Neural Networks*, vol. 42, pp. 44-61, June 2013.
[3] P. V. Tymoshchuk "A fast analogue *K*-winners-take-all neural circuit", in *Proc. Int. Joint Conf. Neural Networks*, Dallas, TX, 2013, pp. 882-889.
[4] Z. Guo and J. Wang, "Information retrieval from large data sets via multiple-winners-take-all," in *Proc. IEEE Int. Symp. Circuits Syst. (ISCAS)*, Rio de Janeiro, Brazil, 2011, pp. 2669–2672.
[5] P.V.Tymoshchuk, "A discrete-time dynamic K-winners-take-all neural circuit", Neurocomputing, vol. 72, 2009, pp. 3191-3202.
[6] L. I. Ferreira, E. Kaszkurewicz and A. Bhaya, "Synthesis of a k-winners-take-all neural network using linear programming with bounded variables", in Proc. Int. Joint Conf. Neural Networks, vol. II, Portland, OR, 2003, pp. 2360 - 2365.
[7] IEEE Reference Guide, IEEE Periodicals Transactions/Journals Department, Piscataway, NJ, 2018.
[8] R. P. Lippmann, B. Gold, and M. L. Malpass, "A comparison of hamming and Hopfield neural nets for pattern classification," Technical Report TR-769, MIT Lincoln Laboratory, 1987.
[9] P. Tymoshchuk and E. Kaszkurewicz, "A winner-take-all circuit using second order neural networks as building blocks," Technical report TR-16, UFRJ NACAD Laboratory, 2002.