Comenius University Bratislava
Faculty of Mathematics, Physics and Informatics

THESIS ASSIGNMENT

Name and Surname: Bc. Sabína Samporová
Study programme: Applied Computer Science (Single degree study, master II. deg., full time form)
Field of Study: Computer Science
Type of Thesis: Diploma Thesis
Language of Thesis: English
Secondary language: Slovak

Title: Semi-supervised learning in Deep Neural Networks

Annotation: These days, Deep neural networks [1] are the most widely used and researched models in machine learning, with application in many different domains. However, training of such models requires an abundance of adequately labeled data and labels for the real world data are scarce. The semi-supervised learning paradigm aims at leveraging this problem, e.g. via methods that involve capturing and evaluating the distance between the feature vectors of the learned labeled and unlabeled data and learning is based on similarity. This approach is used in the popular Mean Teacher model (MT) [2]. Self-organizing maps [3] are one of the classical neural network models that do not require the training signal and yet capture relationships among the data presented to the network preserving similarity in a topological fashion. This mechanism could be utilized for improving semi-supervised learning with information coming from the structure of the data or its feature vectors.

Aim: Study the existing models within semi-supervised learning for categorization with focus on the Temporal Ensembling and the Mean Teacher models [2]. Make an overview of the current state of the art, propose an extension of this semi-supervised model using self-organizing maps [3] and evaluate the new model.

Literature:
[1] Goodfellow, I., Bengio, Y. and Courville, A., 2016. Deep learning. MIT press.
[2] Tarvainen, A. and Valpola, H., 2017. Mean teachers are better role models: Weight-averaged
consistency targets improve semi-supervised deep learning results. Advances in neural information processing systems, 30.
[3] Kohonen, T., 1990. The self-organizing map. Proceedings of the IEEE, 78(9), pp.1464-1480.

Supervisor: RNDr. Kristína Malinovská, PhD.
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Assigned: 30.11.2022

Approved: 01.12.2022 prof. RNDr. Roman Ďurikovič, PhD.
Guarantor of Study Programme

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Student Supervisor