USING OF CONVOLUTIONAL NEURAL NETWORK FOR HISTOPATHOLOGY ANALYSIS

Hlavcheva D., Yaloveha V., Podorozhniak A.
National Technical University "Kharkiv Polytechnic Institute",
Kharkiv

Nowadays, Convolutional Neural Networks (CNN) are widely used for analyzing of medical images. Especially, this deep learning approach is applied to the CT, MRI, mammography, biopsy images for cancer diagnosis and prediction. For example, paper [1] is devoted to breast histopathology images from the BreCAHAD dataset classification using CNN [1], and tumor nuclei detection using R-CNN [2]. Authors in [3] applied a CNN-based method for lung cancer detection in whole-slide histopathology images.

In the research the LC25000 dataset [4] was used, 15 thousand of 768×768 lung biopsy images belonged to 3 classes were selected from the dataset for further classification by CNN. The structure of the developed CNN is presented in Fig. 1.
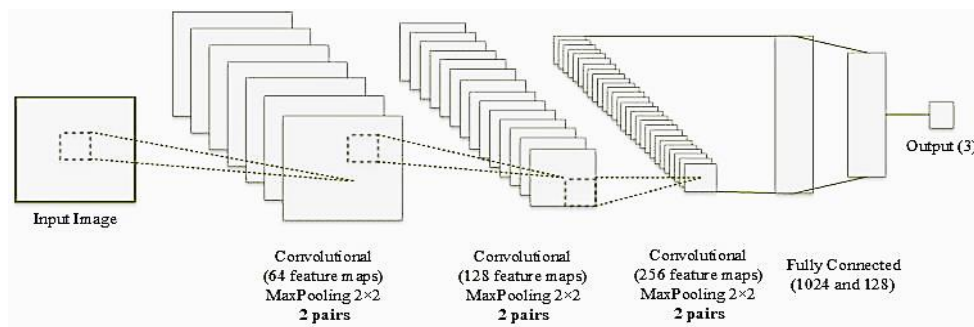

Fig.1 – Architecture of the CNN

To avoid overfitting Dropout layer and Early Stopping were used. So, the developed CNN was training during 29 epochs, and resulted accuracy on test data was 0.917. The obtained result was compared with the related research on the LC25000 dataset. The current experiment proved the relevance of using the LC25000 dataset for training and testing of CNN for successful classification of biopsy images and automatization of histopathology analysis. Therefore, future researches will be devoted to increasing of classification accuracy and using of the whole dataset, including both colon and lung biopsy images.

References:
1. Hlavcheva D., Yaloveha V., Podorozhniak A. Application of convolutional neural network for histopathological analysis //Advanced Information Systems. – 2019. – Т. 3. – №. 4. – pp. 69-73.
2. Hlavcheva D. et al. Tumor Nuclei Detection in Histopathology Images Using R-CNN // 16th International Conference on ICT in Education, Research and Industrial Applications. CEUR Workshop Proceedings, Vol. 2740, 2020, pp. 63-74.
3. Šarić M. et al. CNN-based method for lung cancer detection in whole slide histopathology images //2019 4th International Conference on Smart and Sustainable Technologies (SpliTech). – IEEE, 2019. – pp. 1-4.
4. Borkowski A. A. et al. Lung and Colon Cancer Histopathological Image Dataset (LC25000) //arXiv preprint arXiv:1912.12142. – 2019.