

REVIEW

of the article "Analysis of Thyroid Gland Cytological Images Using Computer Vision"
by co-authors Ilya Lozhkin, Andrey Mironov, Konstantin Zaytsev, Aleksander Garmash,
Boris Shifman, Fatima Abdulhabirova, Lilia Urusova, Nadezhda Platonova

The article submitted for review is devoted to the study of the capabilities of a modern neural network model apparatus for solving the problem of identifying thyroid diseases when analyzing digitalized cytological images. To do this, the authors, in accordance with the Bethesda categorizer, identified individual cells and cell clusters that meet the conditions for classifying an image into one of the categories. Then, segmentation problems (in this case, determining the number of different cell types and their clusters) and classification were solved to determine a specific category. The category determines further actions for treating the disease.

The work is interesting because identifying the types of individual cells requires working with high-resolution images, breaking the image into related fragments (tiles). And, when working with cell clusters, on the contrary, it is necessary to analyze full-size images of lower resolution. Therefore, to solve the whole complex of segmentation problems with the allocation of cells and their clusters of different types, different neural models were used in the work, the execution of which is organized in parallel. To decide which specific neural network architectures to choose to solve this specific problem, a study of the efficiency of several modern architectures was conducted. Thus, it was decided to use the DeepLabV3+ model with the EfficientNet-B6 encoder for segmentation of cell clusters, the Yolov8s-cls model for classification of cell clusters; for segmentation of individual cells - the Unet++ model with the mobilenet_v2 encoder. Each of the architectures is trained for a separate class of cells.

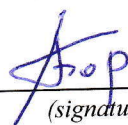
The initial data for the study were real anonymized digital images transferred by the Endocrinology Research Center named after Academician I.I. Dedov of the Ministry of Health of the Russian Federation.

The approach proposed in the peer-reviewed work allows, using modern neural network architectures, to solve the multi-signature problem of categorizing thyroid diseases based on cytological images.

Taking into account the above, I believe that the article "Analysis of Thyroid Gland Cytological Images Using Computer Vision" by co-authors Ilya Lozhkin, Andrey Mironov, Konstantin Zaytsev, Aleksander Garmash, Boris Shifman, Fatima Abdulhabirova, Lilia Urusova, Nadezhda Platonova meets all the requirements for scientific articles, and I recommend it for publication in the International Journal of Open Information Technologies.

Reviewer

Leading developer of application software
at JSC Rosseti Tsifra, Ph.D.
Borzyak-aa@rosseti.digital
(place of work and position)


(signature)

/ Borzyak A.A./
(Full name)

P.P.

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