

Are fast labeling methods reliable?

A case study of computer-aided expert annotations on microscopy slides

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Deep-learning-based pipelines have shown the potential to revolutionize microscopy image diagnostics by providing visual augmentations and evaluations to a pathologist. However, to match human performance, the methods rely on the availability of vast amounts of high-quality labeled data, which poses a significant challenge. To circumvent this, augmented labeling methods, also known as expert-algorithm-collaboration, have recently become popular. However, potential biases introduced by this operation mode and their effects on training deep neuronal networks are not entirely understood [1]. This work aimed to evaluate this for three pathological patterns of interest. Ten trained pathology experts performed a labeling task without and with computer-generated augmentation. To investigate different biasing effects, we intentionally introduced errors to the augmentation. In total, experts annotated 26,015 cells on 1,200 images in this novel annotation study. Backed by this extensive data set, we found that the concordance of multiple experts was significantly increased in the computer-aided setting, versus the unaided annotation. However, a significant percentage of the deliberately introduced false labels was not identified by the experts.

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References

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