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Submission Summary

Conference Name
2020 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)

Paper ID
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Paper Title
M-Protein diagnostics using generative active learning

Abstract
With comparatively less labeled data and high labeling cost, most of the medical involved tasks can not be directly tackled by state of art machine learning approaches for their lack of large carefully labeled datasets. Our paper is based on the a dataset of immunofixation electrophoresis(IFE) images used in the M-Protein diagnostics that has no annotation. In order to make the diagnostics process more efficient, our paper try to train a binary classifier(normal or not) with only few data instance labeled by human experts and all other unlabeled data. We do the semi-supervised training by combining active learning with generative models. In our proposed method, we do these things iteratively: first we find the most uncertain data instances in the latent space of the generative model using the classifier; then we generate synthetic IFE images for human oracle to annotate; afterwards we add these labeled data back in the training set of the classifier. In addition, according to prior knowledge of the IFE images, we propose a specific explainable generative model based on Gaussian mixture model(GMM) that is only effective in this dataset, and compare the result of it with universal effective generative model like GAN and VAE. In order to figure out the best representation of this dataset, we conduct extensive experiments to demonstrate the difference between applied generative models, evaluate the effect they make on active learning quantitavely, and explore the reason behind the results.

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Primary Subject Area

Representation learning

Secondary Subject Areas

Image and video synthesis
Machine learning architectures and formulations
Medical, biological and cell microscopy
Neural generative models

Domain Conflicts

tsinghua.edu.cn; buffalo.edu

Conflicts of Interest

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Submission Files

M-Protein Diagnostics Using Generative Active Learning.pdf (445.7 Kb, 2019/11/16 下午 3:49:31)