Discuss the doppelgänger effects

2022/1/10 Ziqi Lu

After reading this journal paper I can clearly feel that machine learning has played an extremely important role in the development of various fields in recent years. I will have a brief discussion based on my own research experience and this film paper.

The main problem of active learning AI is still the understanding of the core elements of the data itself. doppelganger effects as a problem mentioned in the paper is more prominent in the biomedical field, and my current project is also related to medical data. Also for classification problems, segmentation problems, recognition problems, etc., it is all based on the extraction of data features. Any problem, any error that exists in each field has a unique result that each field exhibits. I don't think there is an effect, or a problem, that exists only in a particular domain, it is just that it manifests itself in different ways, and in many cases we don't notice it, but it does exist in all domains. In the thesis, the doppelganger effects are discussed in a timely manner in the current study, which led to the phenomenon of influencing the experimental results, and finally the parameters are adjusted by repeatedly modifying the accuracy of the model, taking into account the data itself, so that the problems with the data need to be considered and their accuracy verified before all structural adjustments are made, and then the improvement plan of the model is adjusted with accurate data.In addition, according to its classification model, through experimental transformation and network structure.

For the causes of doppelganger effects, combined with their own experience for lung nodule identification segmentation research exists to improve the model scheme while generating side effects. In medical segmentation and medical data research, I think the main existence is the judgment of true and false positives and true and false negatives(Fig.1)[1]. I also encountered similar problems during my own research, but they were not caused by data tagging errors(Fig.2). Previously, I knew about doppelganger effects, but I was not detailed enough.And stability as a study or model effect of good or bad results of the main basis for good judgment I think it should be placed after the data test. Therefore, excluding the possible effects of future experiments and the stability and accuracy of the final experimental results, the experimental data itself should be better adjusted and optimized. The similarity and ambiguity of the data will also affect the model results. In combination with our own experimental experience, ground truth is the key, and there are inevitable mistakes in the manual labeling process, so we need to conduct multiple checks and computer-aided identification to reduce the errors caused by manual or visual. Experimental data and its labeling is accurate enough, the experimental results can also have a good improvement. Often, the experimental data are either missing some of the tags or the results are inaccurate due to factors such as undertraining of the network training results caused by a small data set. By reading this paper, even less and more accurate data can affect the experimental results a lot, but the data is not accurate enough to affect the experimental results as well. To ensure the objectivity and authenticity of the data, a large-scale random sampling is required, and there is a certain amount of chance. I think all the data itself is not a problem, just how we use this

data process there is a small amount of work on the negligence and the results of the existence of factors affected by chance.

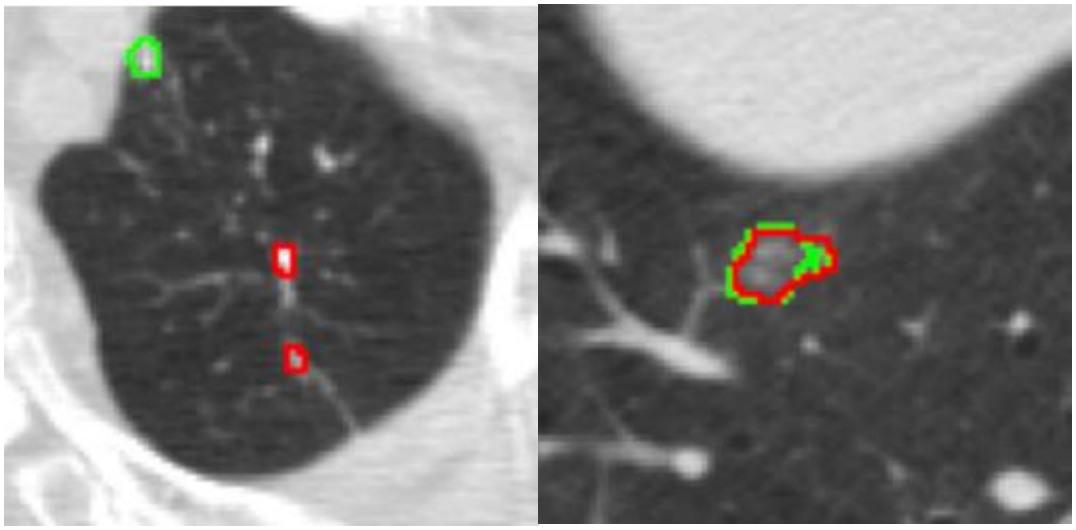

Figure 1: shows the results of false positives and inaccurate marker ranges as mentioned in the reading papers during my research.

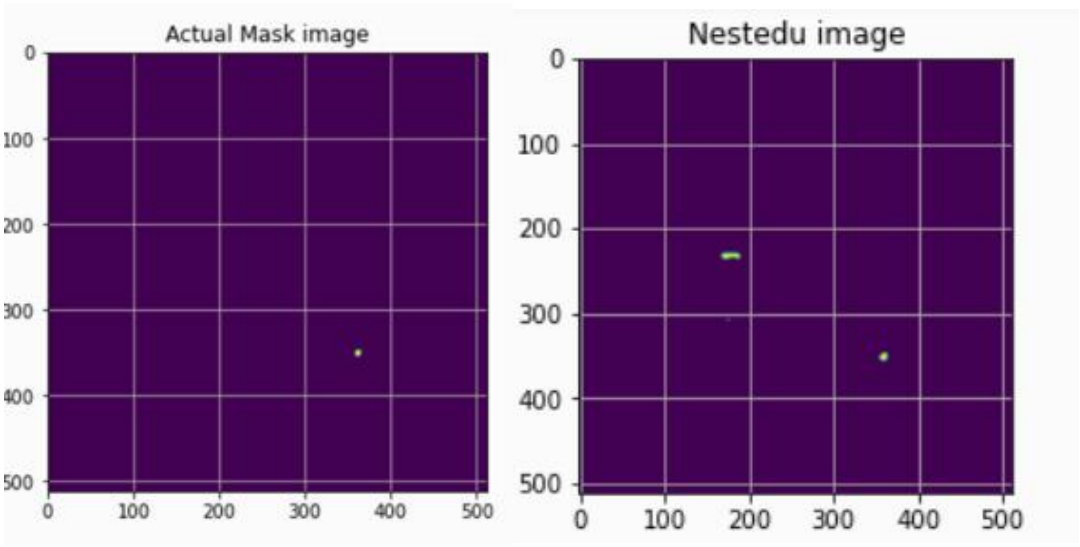

Figure 2: shows the results of false positives marked by using the dataset (LIDC-IDRI) for my own experiments.

To solve the fundamental problem, I think we should not for the characteristics of the data itself, but to transform the structure of our training neural network, this specific conditions of the neural network training results in the model, for the common case of accuracy is still insufficient. Therefore, the future work to tap into the core features of the data to achieve further improvement in accuracy and improve the stability of its generalization is the ultimate direction of our efforts, which will benefit the world.I am also interested in participating in the exploration of doppelgänger effects.

References:

1 Suzuki, Kazuhiro , et al. "Development and Validation of a Modified Three-Dimensional U-Net Deep-Learning Model for Automated Detection of Lung Nodules on Chest CT Images From the Lung Image Database Consortium and Japanese Datasets." Academic Radiology (2020).