

Assessment #10

Date: November 4, 2021

Subject: A systematic review on application of deep learning in digestive system image processing

APA Citation:

Zhuang, H., Zhang, J. & Liao, F. A systematic review on application of deep learning in digestive system image processing. *Vis Comput* (2021).

<https://doi.org/10.1007/s00371-021-02322-z>

Assessment:

In deep learning, some important things to consider are: how and from where the data is collected for a learning network, accuracy of the model designed, and how these conditions can be improved. In applying this to the medical field, these characteristics become even more important, because failing to appropriately consider these things could result in a misdiagnosis, or even over diagnosis of patients (Zhuang, Zhang, and Liao).

One common problem that is faced when building a deep learning network is finding data for the network to train with. This process is an important step in creating a neural network because the AI has to be trained to recognize specific patterns. In medicine, this has broader applications because of how medical imaging needs to be precisely analyzed. A lot of the time, researchers are unable to collect a large amount of medical data, because the only images they have would probably be the ones that are from a local clinic. Even with that, there was only data of 100 patients that was able to be used. For training AI, there needs to be a larger sample size, because a really small dataset usually results in a selective bias, because the AI is so used to having to analyze only a small subset of data that it doesn't have the ability to recognize other patterns (Zhuang, Zhang, and Liao).

The accuracy of the model that is designed is also vital to how AI will work over time. An example of this would be with the lack of data that could lead to inaccuracy and bias. If the model isn't

accurate, it can also lead to misdiagnosis and over diagnosis of problems, an example being if the model says that a person has a condition, even if they don't actually. In the article, it was mentioned that CAD systems have accuracy rates of upwards of about 80%. This still makes deep learning networks a good tool for diagnosing conditions, and it will most likely be used in coordination with a physician, so the doctor can double check the scans for accuracy a second time.

However, it would still be nice if the models had a higher rate of correct scanning and possible diagnosis, because it largely reduces the amount of work that has to be done by healthcare workers. One example of how accuracy can be improved is by using an RMDL, or Recalibrated multi-instance deep learning method, which helps to identify lesions in medical scans (Zhuang, Zhang, and Liao). This, along with GAN, and FCNs, or generative adversarial networks, and whole convolutional networks, can be used together to generate more accurate results, and less false positives. This would help reduce time spent on false diagnosis, and healthcare providers would have more time to spend on other patients, and spend resources otherwise. These applications of deep learning and eliminating biases, and using new techniques to reduce false positives would help in the long run in reducing time and energy being spent on making a diagnosis, and treating conditions.