**CoroNet: A Deep Neural Network for Detection and Diagnosis of COVID-19 from Chest X-ray Images –** Clelia Middleton, Basile F.E. Curchod, and Thomas J. Penfold

* What the aim of the research?

To use a CoroNet (Deep Convolutional Neural Network model) to automatically detect COVID-19 infections from chest X-rays.

* What are the scientific challenges?

Models are able to achieve a 98% COVID-19 detection accuracy for two classes, but the performance for multi class classification for COVID-19 is unknown. Other than COVID-NET, none of the methods mentioned in the discovery portion of the paper are able to detect pneumonia bacterial and pneumonia viral separately.

* Describe the contribution of this research?

Because other models are unable to handle multi class classifications, this model is designed to classify three types of pneumonia (bacterial, viral, and COVID-19) using a deep convolutional neural network – or CoroNet. The neural network will classify the three types of pneumonia based on chest x-ray images.

* How the proposed contribution differs from related work published in different venues?

This paper, unlike previous, is able to provide multi class classifications where previously models could only provide binary.

* Assess the weakness and the strength of the contribution?

The CoroNet model has 33,969,964 parameters in total which means it is very likely to have high error rates and overfitting. This is apparent in the Accuracy over 80 Epochs plot presented in the paper:

A graph with blue and orange lines

Description automatically generated.

However, it is probably worth noting that overfitting in neural networks is not uncommon.

Additionally, the performance for non COVID-19 pneumonia are comparatively lower in overall accuracy than to their counterpart. If I had to take a guess, it is likely because COVID-19 is strongly identifiable in x-rays and has some similarities to viral pneumonia.

* Explain how these papers are relevant to your project. What are the learned lessons and how do they help you in developing, training and testing your project's models.

Our project seeks to provide several diagnoses via chest x-rays. Because of this, if this method is applicable to our own modeling, we may consider using this type of neural network. However, because our data set is not altogether huge, we may similarly find a similar model to use in model relearning.

**CoroNet: Deep Neural Network-Based End-to-End Training for Breast Cancer Diagnosis –** Nada Mobark, Safwat Hamad, S.Z. Rida

* What the aim of the research?

To use CoroNet to diagnose breast cancer. This particular paper uses a pre-trained natural image database (ImageNet)-based CNN model, CoroNet, for its predictions. This paper uses mammography images.

* What are the scientific challenges?

Not enough data present to make standalone predictions without pre-training.

Scarcity of images – which is addressed through at transformation proposed by Hussain et a. This helps increase the classification accuracy.

Quality of the images. High resolution images are desired for this analysis so that the model can more accurately predict results.

* Describe the contribution of this research?

This paper primarily compares CoroNet to VGG, MobileNet, and ResNet50. Below is a chart of the performance between the four models. What we can take away from this is that CoroNet is the best option as it not only has the best accuracy but the least amount of loss.

A screenshot of a graph

Description automatically generated

* How the proposed contribution differs from related work published in different venues?

This paper is not offering any new information but rather a test to compare neural networks so that readers may choose the best one for their project design.

* Assess the weakness and the strength of the contribution?

The paper does not necessarily come up with anything new and the dataset they use is relatively small, but it does allow the researcher to glance at the information and choose a model that will produce the best results.

* Explain how these papers are relevant to your project. What are the learned lessons and how do they help you in developing, training and testing your project's models.

This paper utilizes the neural network that we will likely use and compares it to other models while using images as their main source of data. It also uses pre-trained models due to having a relatively small dataset. Both of these things are applicable to us as our dataset may be very small per category and, due to the nature of our data, will likely be processed through CoroNet for classification. The good thing is that, in this paper, CoroNet has a classification accuracy of 86.67%. The high accuracy rating is definitely appealing in terms of modeling our project.

Citations:

Khan, A. I., Shah, J. L., & Bhat, M. M. (2020, January 11). *CoroNet: A deep neural network for detection and diagnosis of COVID-19 from chest x-ray images*. Science Direct. Retrieved October 13, 2024, from https://www.sciencedirect.com/science/article/pii/S0169260720314140

Mobark, Nada, et al. "CoroNet: Deep Neural Network-Based End-to-End Training for Breast Cancer Diagnosis." *Https://Www.Mdpi.Com/2076-3417/12/14/7080*, 13 Jul. 2022, www.mdpi.com/2076-3417/12/14/7080. Accessed 13 Oct. 2024.