Good morning everyone, thank you for the opportunity. I am Depus, hereby bringing the presentation of face mask detection. With the goal is to find best model for detecting actual non mask user as accurate as possible from pictures.

Here is the outline for today’s presentation

First we move on to the exploratory data analysis, here can be seen that all dataset has balanced number of samples for each class, therefore imbalance data handling is not needed. Total of one thousand and six image are used, all of them are in different size, in three different picture format with the same spectrum which is RGB and the dataset is devided into two class which are Mask and Non Mask.

For data preprocessing, the first thing to do is splitting folder Train to be train & inference

After that we do image data generator to change some specification of the picture. For data set validation, test, inference and train, we do rescale. But for train we also adding rotation\_range, width\_shift\_range, height\_shift\_range, horizontal\_flip, and zoom\_range. With the goal are

rotation range is to make variety for mask position, width shift and height shift are to ensure that the mask not always in the center of the photo. Horizontal flip is to vary the position of mask, vertical flip isn't used because we need ensure that the model can caught the pattern of mask which always used in mouth-nose area. Zoom\_range is to make variety in masker size.

In model definition, here are the details of all three model used in this dataset. First model use 2 layer Conv2d, activation relu, one layer flatten, 2 layer Dense, activation relu and kernel initializer is glorotnormal. 1 layer output and Model compile with loss is categorical crossentropy , optimizer is SGD and metrics used is recall.

For the second model, its actually the first model with addition of 2 dropout layer plus 1 batch normalization layer. Then, in model compile, the optimizer changed to Adam.

For the third model, the modification is actually really simple it is only changing optimizer to Adam.

Next we move on to model evaluation, where I’ll make the explanation quite brief.

For the recall graph, all of the model showing an improving recall, but in the second model there is a little bit indication of gradient exploding,

Here we can see the result of first model, the accuracy score is quite low, with recall in line 1 in both train and test is also low and the number of misprediction in both test and train confusion matrix is still high with total of one hundred and seventy-nine mispredictions.

For the second model, there is better result in all. Where in accuracy score it is show a good fit with high accuracy, and recall in line 1 of classification report is high and a goodfit, and the number of misprediction in confusion matrix is reduced to only eighty one misprediction.

Next we move to the third model where we can see further from model 2. Where in accuracy score it is show a good fit with higher accuracy, and recall in line 1 of classification report is higher, and the number of misprediction in confusion matrix is also reduced to only 67 from total six hundred seventy six sample. This third model has best performance compared with the other 2 model, therefore, this model is chosen for model inference and also model deployment.

For inference, we do simulation for our chosen model with inference data. There are 24 samples with characteristic of difference in size, same format and same spectrum. The result are..

All of mask class are detected correctly, but in non mask class there are two misprediction. In picture of 217 jpg and 326 jpg. With 2 misprediction out of 24 data, the accuracy in inference data is 91.7%. But why there are misprediction?

It can be seen that in 326.jpg, the color of face is too light and it may have detected as a mask, for 217.jpg the face may be detected as a face printed mask. As in the train there is some pictures of mask with a nose and mouth printed in it that make our model learned that some shape of face is also categorized as a mask.

From overall evaluation, the third model has best performance. The accuracy of the model in the inference data is 22/24 = 91.7% and this score is a good fit. Notes found from inference mispredictions that photo brightness may affect the prediction result, and there are also several faces that predicted as a mask (or for exact a face printed mask).

For future improvement we can try another parameter tuning, using functional model and adding brightness range in preprocessing, and make constraints for samples in training dataset