CHAPTER 4
ANALYSIS AND DESIGN

4.1.   Analysis

As seen in figure 4 in chapter 2 , the general architecture of the proposed model is very simple , from images being prepared for pre-processing that is combined feature the results then were added to dataset before being send as input for machine learning , however as simple as it is there are number of problems encountered during implementation and data collection. Some of the problems encounterd were caused by inattentiveness in the coding , for example small problems caused by wrong input parameter that result in error where the model unable to process the input. Such problems can be easily solved by fixing the parameter , however there are problem caused by physical limitation of the hardware , in that case I must concede and change the parameter to make the model works under the limitation , such a problem usually appear in the form of memory allocation error.

The problems explained above are problems that appear in the process of constructing the model and those problem can be easily identified , but the problems encountered during testing and data collection is even more insidious. For example the first testing for the model work fine , it may not give a satisfying results but it was acceptable , that is until I did a second testing where despite the change in parameter the results is exactly the same down to the very last digit. The problem where the model stuck with the same result every testing was soon settled , it seems the cause of the problem is the learning rate of the model is too high which is somewhere around $1x10^{-2}$ to $1x10^{-3}$, this problem was resolved by lowering the learning rate to $1x10^{-6}$.

However , the previous problem does not compare to the problem found later. After doing some data collection , it was then I notice that the pre-processing does not work properly and only input a blank image , in other word the model so far are just blindly guessing whether the image is forged or not. It was such a fatal mistake on my end for not realise it sooner. The results of the testing before the fatal error was fixed is still recorded and shown in the later section because the difference of parameter is still proven to change the results but the results became rather vague in term of how much impact it would actually give to the model. The cause of the problem revealed to be a problem in combining the two feature simply because the lack of

data type or dtype parameter , the combining module was later given dtype parameter of cv2.CV_8U.

4.2.   Design

In the later development , still with the same general architecture of the model , a new kind of input for machine learning was tested. Instead of a single channel image used as input , the new method use an image with 3 color channel as input for the model.
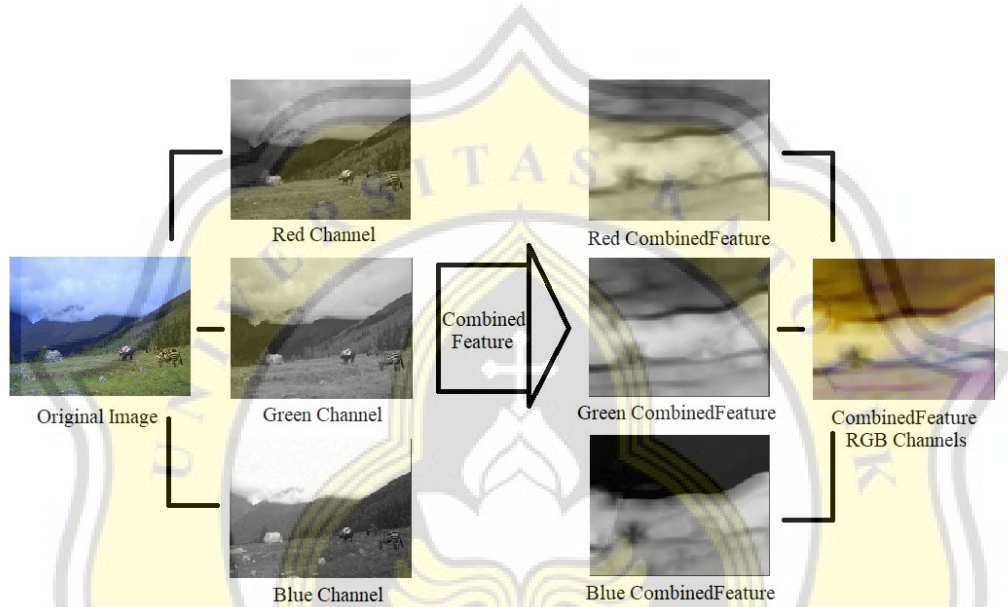

Figure 9: 3 Channels - RGB Input Method

In the first implementation of the new input method , as seen in figure 9 above combined feature method was done toward each individual color channel of an RGB image where the output then was put back together as their respective color channel of an image , in contrast as what seen in figure 3 where initially the input for ResNet50 only consist of a single channel image. In other words , combined feature of red color channel was used as red channel of the model input , and so on with the other color channels.
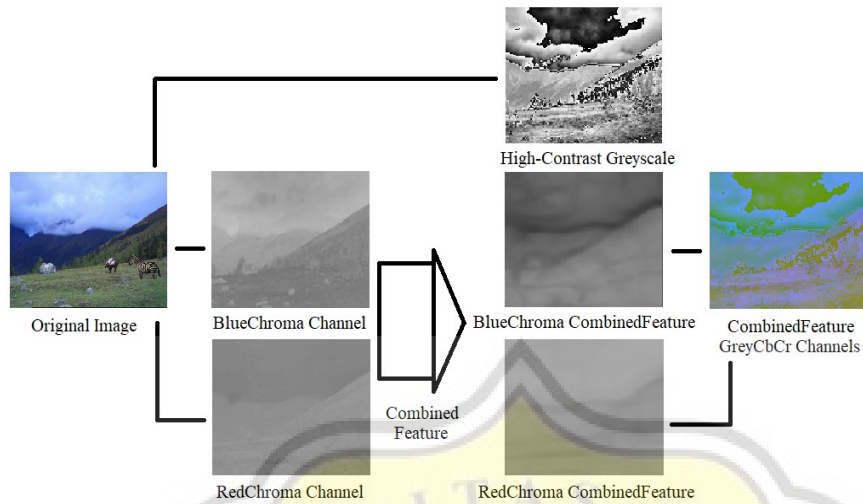
Figure 10: 3 Channels - GreyscaleCbCr Input Method

For the second implementation , images in dataset were turned into YCbCr format before the blue and red chroma channel were individually processed by combined feature method as seen in figure 10 above. And just like the RGB input method , the outputs were used as their own respective channel in input , but the Y or lumination channel was not processed , instead it was replaced with greyscale format of the original image that was later increased in contrast by multiplying the value of greyscale image by 4.

The two implementations were done to see how the difference in input pre-processing method can be done without changing the general structure of the model , and how it would affect the results of the model. And with it , improvement can be made to not only the parameters but also the model as a whole.