CHAPTER 6

CONCLUSION AND SUGGESTION

6.1 Conclusion

We conclude that the higher accuracy of the color transformation can be achieved by the optimum *order of linear regression model* in *sub-divided color space*. As mentioned before, the proposed method divides the color space regardless of the *LUT data's knots*. Thus the accuracy of the approximating is varied upon the characteristic of each model. However, the 3rd order with tetrahedral partition is the best combination to approximate both printer models.

The accuracy of color transformation is directly proportional to the *LUT data size*, which is a base of the regression model. The larger *LUT data size* is absolutely suitable for the obtained regression model. However, The high accuracy should not be achieved by only increasing the *LUT data size*, because it needs large processing time and resources. The *LUT data size* should be large enough to represent the major characteristic of the real model. In this work, the *7x7x7 LUT data size* is not enough for the 3rd order to approximate the *CLC1120* model that it shows the result of the accuracy as 1st order.

For the *order of regression model*, it can be concluded that the higher accuracy would be obtained from the *higher order of regression model*, because the error significantly decrease not only the ΔE_{rms} but also ΔE_{max} to around 50% for the *BJC8500* model with 9x9x9 level in the whole partition. Moreover, it can be

concluded that more term's number in the regression model is not useful to achieve much of higher accuracy, because it is based on the same *LUT data*. For the *sub-divided color space*, it is a method to achieve higher accuracy of color transformation, as the regression model of each sub-space represents each characteristic of its sub-boundary. In this work, the *Tetrahedral Partition* method is chosen because of its simply searching algorithm and also the appropriateness. However, the partition method can not be considered as high accuracy as the order of the regression model, because it must compromise the accuracy of each partition with the *Continuity* which is handled by *Overlapping Partition*. Moreover, the partition method does not significantly reduce the error for the model with high non-linear.

The combination of the third order of *Regression Model* and *Tetrahedral Partition* seems to be effective as the results of satisfied accuracy. For the printer model BJC8500: $\Delta E_{rms} = 3.31$ and $\Delta E_{max}=12.10$. And for the printer model CLC1120: $\Delta E_{rms} = 5.60$ and $\Delta E_{max}=13.96$. Both printer models are acceptable in most of the field of color applications. Note that with the maximum error, it might be unacceptable in some areas such as logo colors. In addition, if the *Tone Curve Adjustment* is pre-adjusted, it could be expected that this proposed method would be more acceptable in the practical use.

6.2 Suggestion

There are many factors that could be continued to investigate its effect such as the relation among the number of *LUT data*, the partition size and the order of regression model. Especially for the partition method, it should be continue investigate in other type of partition that affects to the approximated accuracy.

Another interesting point is to apply the specific partition method to specific field of work such as the skin tone color, nature color etc.,

And, to practice this research, It should be test this combination method with typical calibrated process such as tone adjustment curve.

Finally, This algorithm is not tested with an image yet because; the technique of gamut mapping is required to compress general image gamut color into the printer gamut.

Note that to apply this technique on Desktop Publishing Prepress system may not be suitable because of the maximum error of the approximation that unacceptable in some specific field work such as logo.