Project Proposal

1. Title: Parallelized Fast Style Transfer toward chi-chi video
2. The participants: 劉晏 李政哲 莊侑穎
3. Introduction/motivation:

App 產生特效等好久

1. Statement of the problem

速度太慢，加速

1. Proposed approaches

Algorithm流程圖 加上 加速部分

1. Language selection

Python flexible

1. Related work
2. Statement of expected results

顯著加速

1. A timetable

研讀相關資料

架設環境

Run original project

閱讀code 尋找可平行畫部分

時做平行畫

實作困難檢討 解決

Final project 統整完結

1. References

<https://arxiv.org/pdf/1508.06576.pdf>

<https://arxiv.org/pdf/1603.08155.pdf>

FastChi – The Parallelized Fast Style Transfer toward Chi-chi video

Member: Yen Liu, Peter Chuang, Sunner Li

1. **Introduction and Motivation**

The style transfer is a very popular problem in recent year. However, the speed and performance are important issues that should be conquered. We purpose the parallel structure toward this task, and speed up the procedure of transforming. The network will split the video as two parts, and use two GPU to transform the style to the content image in parallelism.

1. **Related work**

About the question of the artificial style transfer, Gatys et al. [1] adopt the deep neural network to achieve the great performance, and it’s the first implementation to use convolution network to complete the task. However, the speed is the bottleneck. Ulyanov el al. [2] raised another creative idea which called instance normalization to accelerate the whole transforming process. Moreover, the instance normalization can also reduce the correlation between batch training images.

It’s another critical problem to design the appropriate loss function. In the previous work [1], the authors usually used pixel-to-pixel error to compute the loss. However, this method of loss computing didn’t consider the spatial variance. For example, if the result which is generated by deep network shifts a little toward the structure of origin image, the value of loss computation becomes very large which isn’t reasonable. To solve the correlative problem, Johnson et al. [3] purposed the combination of perceptual loss with usual forward network. The network would use feature map in higher-level to compute the loss value rather than using output of the network directly, and the designment can make the network preserve the capability which dealing with the situation of spatial difference.

In this work, how to transfer the style to the content image with more high speed is the problem we should consider. We purpose the implementation that uses parallel mechanism to accelerate this procedure.

1. **Structure**
2. **Timetable Plan**
3. **Reference**

[1] Leon A. Gatys, Alexander S. Ecker, and Matthias Bethge, “Image Style Transfer Using Convolutional Neural Networks,” In *2016 Computer Vision and Pattern Recognition (CVPR)*, Las Vegas, Nevada, USA, 27-30 June, 2016, pp. 2414-2423.

[2] Dmitry Ulyanov, Andrea Vedaldi, and Victor Lempitsky, “Instance Normalization: The Missing Ingredient for Fast Stylization,” arXiv: 1607.08022v2 [cs.CV], Sep. 2016.

[3] Justin Juhnson, Alexandre Alahi, and Li Dei-Dei, “Perceptual Losses for Real-Time Style Transfer and Super-Resolution,” arXiv: 1603.08155v1 [cs.CV], March 2016.