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# Optimizing Color Consistency in Photo Collections

## Project 33

28<sup>th</sup> September 2019

Github link [https://github.com/shubhMaheshwari/Color\\_Consistency](https://github.com/shubhMaheshwari/Color_Consistency)



**Figure 1:** Editing a photo collection with our method. First row: input images exhibiting inconsistent appearance. Red arrows indicate pairs of images that were detected to share content. Second row: automatically induced consistent appearance. Third row: after propagating user adjustment of the leftmost photo (photos with similar content are affected more strongly). Fourth row: propagation of an adjustment done to the sixth photo. Previous adjustment remains as constraint. (Note: adjustments are deliberately exaggerated in this example.)

## Main Goal

The main goal of the project is to create method for consistent editing of photo collections. When the user does make changes to selected images, these changes automatically propagate to other images in the collection, while still maintaining as much consistency as possible.

## Problem Definition

### 1. Matching Photos in a Collection

- A lightweight link prediction mechanism (Non-Rigid Dense Correspondence (NRDC)) is used to suggest candidate pairs that are likely to yield meaningful matches.
- As a pre-processing step, we construct a match graph  $G = \{V, E\}$  whose vertices  $V$  represent individual photos in the collection and whose edges  $E$  contain information regarding the correspondences between photo pairs.

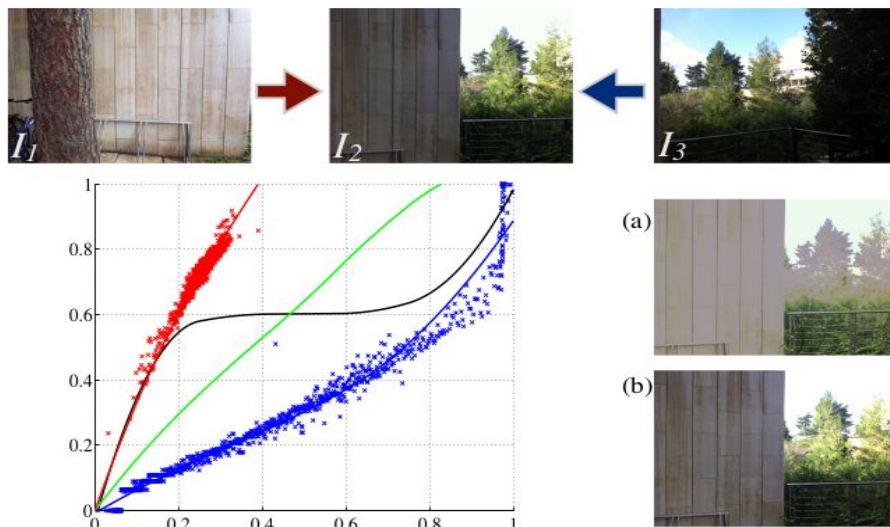
### 2. Accelerating Match Graph Construction

- Pairwise Matchability Classifier
- Link Prediction Strategy

### 3. Appearance Consistency Optimization

- Ensuring that pixels depicting the same content have the same color across different images.
- Avoiding unsightly visual artifacts, such as gradient reversals or severe loss of contrast.
- attempting to preserve as much as possible the original dynamic range of each photo.

### 4. Propagating User Edits



**Figure 3:** Comparison between the affinity terms in Eq. (4) and Eq. (6). Here,  $I_1$  and  $I_3$  are fixed and the goal is to propagate their appearance to  $I_2$  by fitting a monotonic curve (only luminance for simplicity) that takes into account the two opposite relationships. The red and the blue points are sampled from the correspondence between the pairs  $(I_2, I_1)$  and  $(I_2, I_3)$  respectively. The red and the blue curves were fitted to the red and the blue points respectively (Eq. 5). The black curve was fitted by all points (Eq. 4). The green curve was fitted by points sampled uniformly from the red and the blue curves (Eq. 6). (a) Result of applying the black curve on  $I_2$ . (b) Result of applying the green curve on  $I_2$ .

## 5. Application on Videos, Panaroma and Stitching

- a. Videos are a classic example of consistent images and several frames require similar transformations.
- b. Panorama require multiple images to be stitched together, which also require color transformation on the images for better view.
- c. Image Registration and Image stitching contains images from multiple timelines and hence require similar transformation while creating a database.

## Division of Tasks

### 1. Shubh

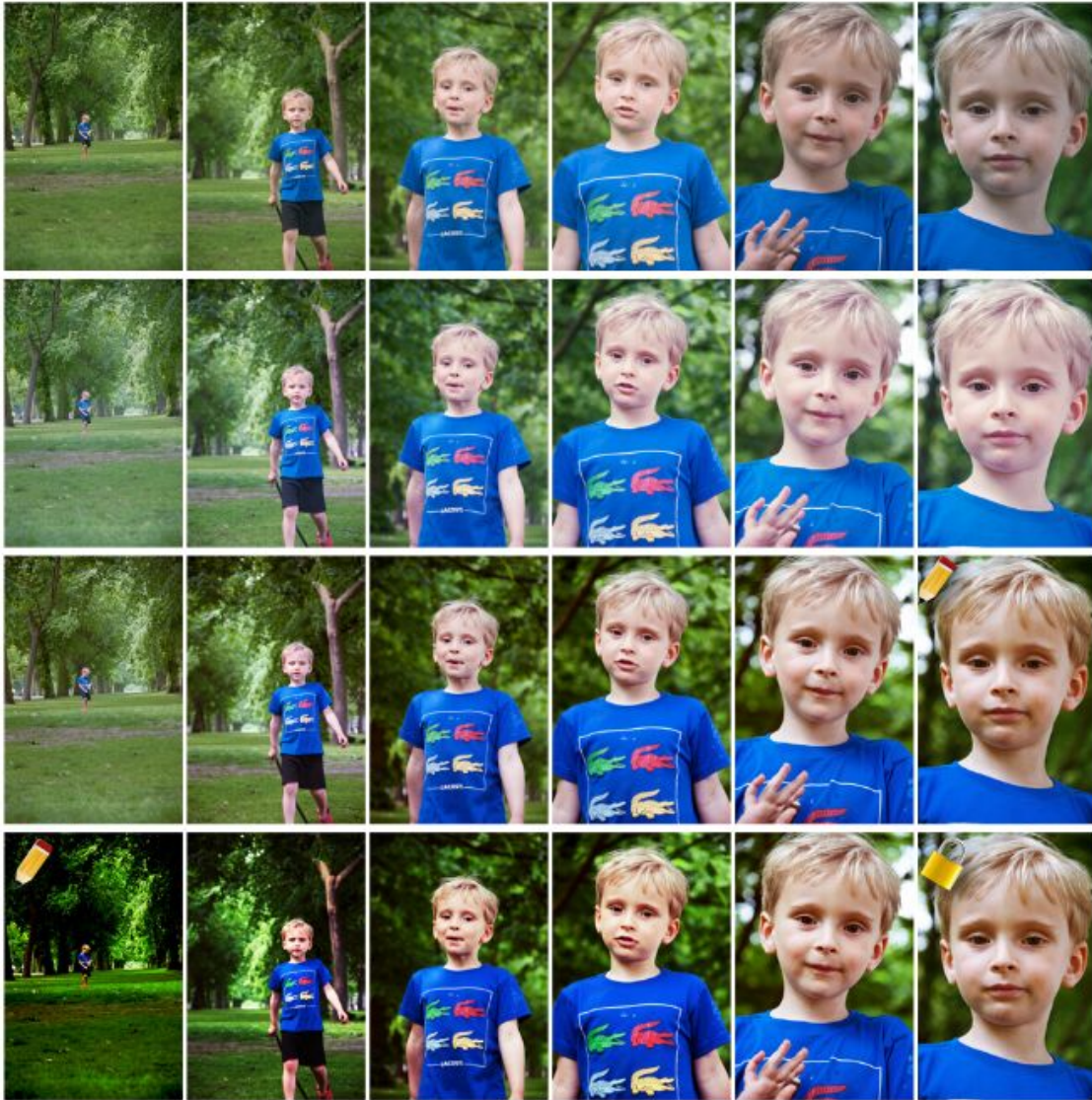
- a. Non-Rigid Dense Correspondence (NRDC) and match graph
- b. Dataset collection for accelerating match graph construction
- c. Accelerating Match Graph Construction
- d. Apply method on videos

### 2. Trunapushpa

- a. Propagating User Edits
- b. Color transformation model
- c. Appearance Consistency Optimization
- d. Apply method on panorama



## Results and Evaluation



**Figure 8:** *Propagating appearance from multiple photos using our method. First row: Input photos with color and exposure differences. Second row: Automatic consistency using our method. Third row: Propagating appearance from the rightmost photo. Fourth row: Propagating appearance from two photos at once.*

## Milestones

Milestone	Expected Date of Completion
Read the research paper and understand the various techniques used using online resources	2th October 2018
Creating link's and match graph using optimized classifiers	20th October 2018
User edit integration	25th October 2018
Appearance Consistency Optimization	30th October 2018
Testing and Optimization	5th November 2018
Applying method on videos and panorama	13th November 2018
Prepare the final presentation and report	19th November 2018
Presentation and Project Submission	23rd/29th November 2018