Headshot Styling

Project Id: 5
Paper Style Transfer for Headshot Portraits
GitHub repo link

Team Members

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Objective:

Transfering the visual style of an example portrait made by an artist onto another headshot.

Motivation

The editing process to create different renditions of headshot photos to achieve a compelling style requires advanced skills because features such as the eyes, the eyebrows, the skin, the mouth, and the hair all require specific treatment.

The tolerance for errors is low, and one bad adjustment can quickly turn a great headshot into an uncanny image. Many compelling looks require maintaining a visually pleasing appearance while applying extreme adjustments.

Technical Perspective

Given: input portrait photo and an example stylized portrait

Algo: processes input to it the same visual look as example

Output: headshot of input subject as if taken under same lighting and retouched in the same way as the example

Editing headshots is challenging because edits are made locally, lighting is critical (sources, angle of incidence)

Algo that automate the editing of generic photographs often perform poorly on headshots because they are global, or ignore the specificities of headshot retouching (Bae et al., 2006) => limitations of global style-transfer when applied to headshots
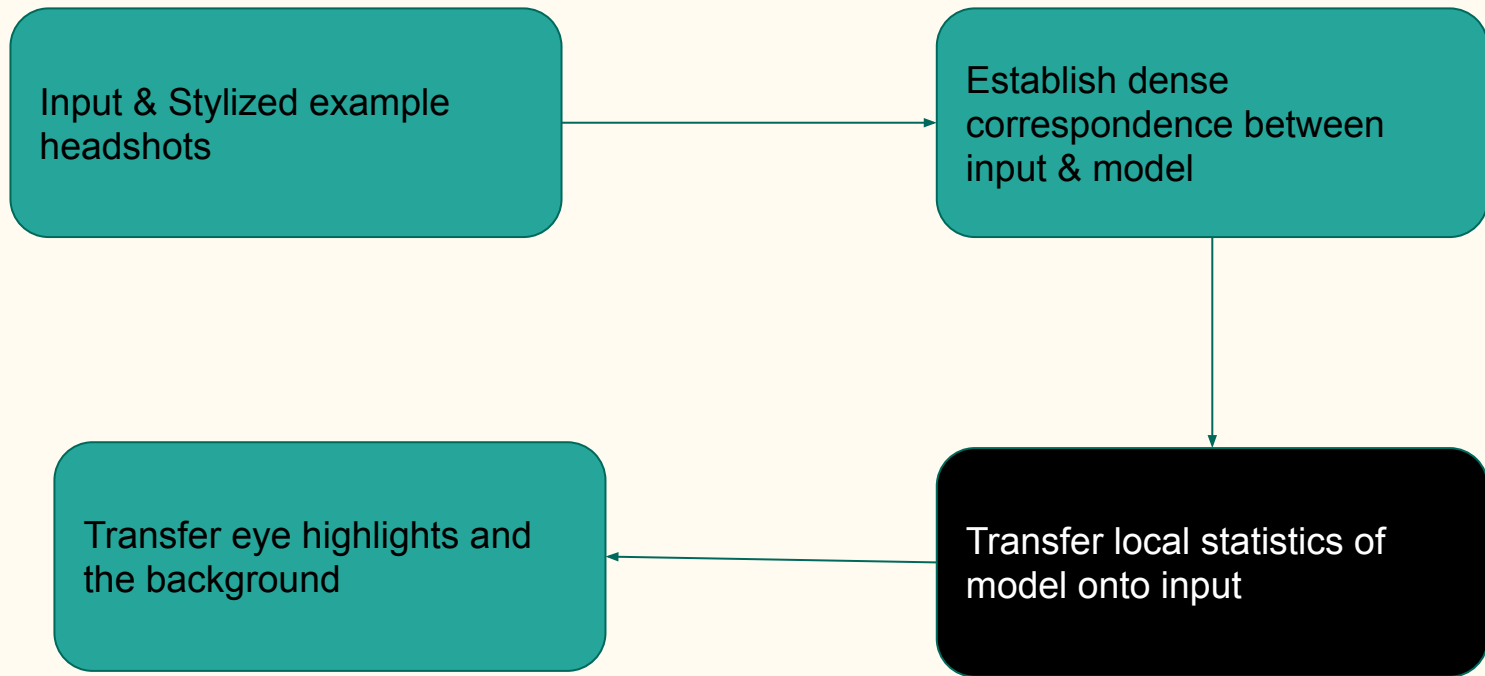
Approach

It is specific to faces.

1. Precisely align the input and example faces using a three-step process

Motivated by the artists' use of brushes and filters with different radii to manipulate contrast in different scales, a new multiscale approach to transfer local statistics of teh example onto the input.

2. Matching the local statistics over multiple scales enables the precise copying of critical style characteristics such as the skin texture, the hair rendition, and the local contrast of the facial features. All these elements exhibit sophisticated spatial frequency profiles, and we shall see that our multiscale algorithm performs better than single- and two-scale methods.
3. Final result is obtained by transferring the eye highlights and matching the example background.

Approach

```
┌─────────────────────────┐          ┌─────────────────────────┐
│                         │          │ Establish dense         │
│ Input & Stylized example│ ───────▶ │ correspondence between  │
│ headshots               │          │ input & model           │
│                         │          │                         │
└─────────────────────────┘          └─────────────────────────┘
                                                  │
                                                  │
                                                  ▼
┌─────────────────────────┐          ┌─────────────────────────┐
│                         │          │                         │
│ Transfer eye highlights │ ◀─────── │ Transfer local statistics│
│ and the background      │          │ of model onto input     │
│                         │          │                         │
└─────────────────────────┘          └─────────────────────────┘
```

Algorithm

1. Tolerant to differences that inevitably exist, even after alignment, between the input and example faces.
2. Ability to exploit a mask to transfer only the face statistics while ignoring those of the background.

When a series of consistently stylized headshots is available, we can automatically estimate the success of this transfer procedure and select the highest ranked example, thereby automatically selecting a suitable reference portrait among the many available.

Problems (in the paper)

Problem 1

Describe an automatic algorithm to transfer the visual style of a given model onto a given input.

Problem 2

A multiscale technique to transfer the local statistics of an image. Explaining how to focus the transfer on a region of interest and how to cope with outliers.

Problem 3

Describe an automatic algorithm to select a suitable example among a collection of consistently stylized headshots.

Results to be obtained

- **Types of Pictures:** Black and white, colored, low-key (i.e. dark), high-key (i.e. light), soft and detailed
- The method discussed transfers the tone and details, for input photos under indoor and outdoor lighting conditions, and subjects of both genders.
- The figure below shows how different styles generate different gain maps. It emphasizes the details on the entire face. (low-key and highly contrasted style)
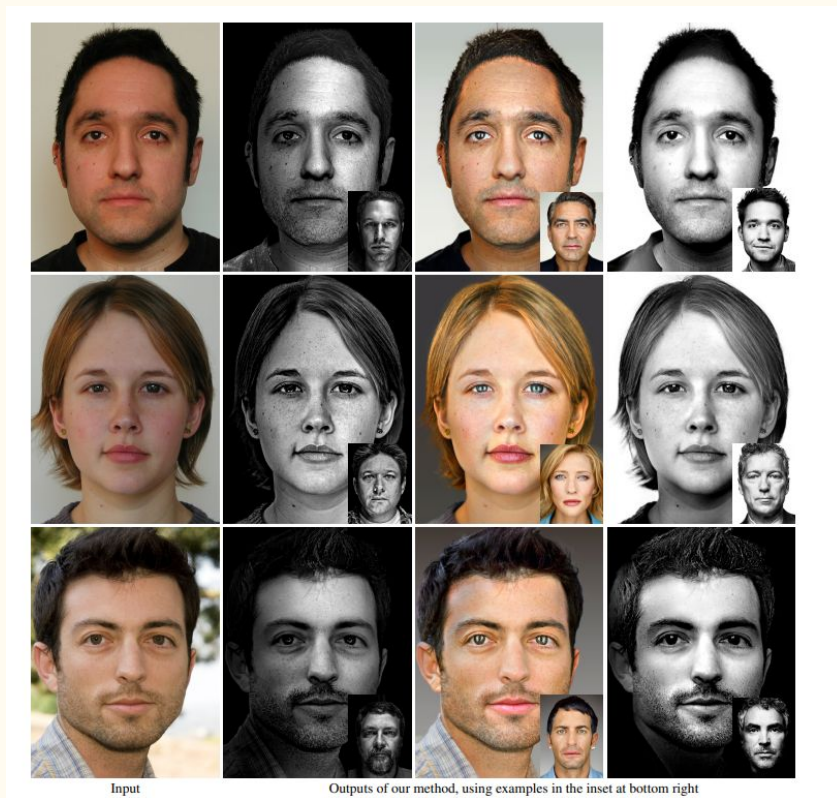

(a) *Gain map at*
$\ell = 2$ *for the low-key*
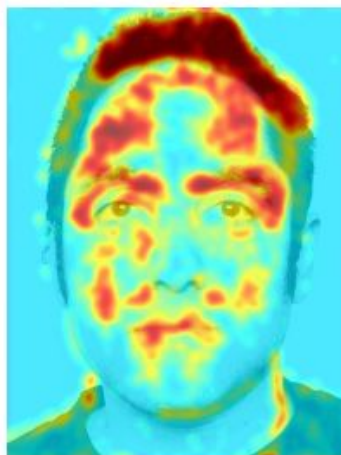
(b) *color style,*
(row 1, col 3)

(c) *nearly all-black-*
and-white style,

Working of the algorithm on different types of images

Input   Outputs of our method, using examples in the inset at bottom right

Timeline

Dense Correspondence | **26oct - 3nov**

Multi-scale transfer of local contrast | **4thnov- 12nov**

Post Processing | **13nov -21nov**

Extending to Video | **21nov - 26nov**

Dataset

Required

- YES
- Edited Example Photos

Procuring

- Available in official reference paper

  website

  LINK:
  https://people.csail.mit.edu/yichangsh
  ih/portrait_web/#code