

27. Generating Drawings from Photos

GitHub Repository:

https://github.com/Digital-Image-Processing-IIITH/dip-m22-project-bahubali_vfx

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Goal:

To implement an algorithm that makes use of Image processing techniques like Canny Edge Detection, Image Segmentation techniques like K-Means Clustering (in different Colour space) and some suitable Colour Image Processing Techniques to convert a photo into its sketch(drawing) equivalent.

Problem Definition:

Given an image, there are many premium photo editing tools that allow the artist to apply his own artistic touch to create such photos, many of them have inbuilt functions to create such Non-Photo-Realistic (NPR) photos.

Many times these inbuilt filters are not so easily customizable and often require user customization to achieve desired results. The problem statement required us to build a pipeline to convert an image to a drawing using Image Processing Techniques.

The pipeline components have to be more user customizable in terms of hyperparameters to provide more flexibility.

How will It be Done?

Obtain segmented image of face such that various facial features get representation. The segmentation should also take in consideration the lighting conditions as well as the notion

of how farther are the segments. Ideally it will work for any picture but for most common uses and distinctive results we are using facial pictures.

We are going to have four components:

- Line Drawing Generation with the help of:
 - ☐ Edge Detection Methods
 - ☐ Line Integral Convolution
- Regions of Interest Identification using saliency values to identify how important each pixel is and to extract colours from those regions of interest to fill them in later.
 1. Using this we can create a saliency map and then use binarization (using Otsu's thresholding) to distinguish between background and foreground.
 2. Performing binarization can create noise as well as holes so we'll use some morphological operations to compensate.
- Colour Generation using K means clustering in the LAB colour space and then assigning different colours to the different segments in the segmented image to preserve the colour spread information.
- Blending. To get the final drawing output, the line sketch is applied on the generated colors. The pixels lying on the line sketch are replaced with gray pixels. The color of the line sketch can be chosen by the user. Finally to give some depth to the drawing, we apply an element-wise product between the drawing and the grayscale version of the input image.

Expected Results FromThe Project:

A pipeline design based algo which allows users to change parameters so that the image looks better according to user perception. Artificial drawing of the face of a person. The algo is more flexible than the standard filters available.

Project Milestones and Timeline

- ☐ Reading relevant papers and finalising on the implementation: **24th Oct**
- ☐ Starting on a final structure of the algorithm helper functions: **29th Oct**
- ☐ Line Drawing Generation: **1st Nov**
- ☐ Regions of Interest Identification: **5th Nov**
- ☐ Mid Evaluation: **9th Nov**
- ☐ Colour extraction: **10th Nov**
- ☐ Blending: **20th Nov**
- ☐ Preparing a Project report: **25th Nov**
- ☐ Final Presentation: **27th Nov**

Datasets needed?

Well currently no specific datasets are needed, any facial image will do just fine as the input, but for more organised studying we are using the “Labeled Faces in the Wild” Dataset.

It can be accessed here: <http://vis-www.cs.umass.edu/lfw/>