Literature Review – 3

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Papers for review:

- Mastering Sketching: Adversarial Augmentation for Structured Prediction (Primary)
- Style and Abstraction in Portrait Sketching (Reference)

Style and Abstraction in Portrait Sketching

Authors used data-driven approach for their experiment presented in this paper. They used sketches from number of artists who draw faces of people to reference photographs. Data is analyzed in two levels where each level is responsible for model creation and to process abstraction. Central idea of their project revolves around a term 'Visual Abstraction' whic means - Visual concepts that are difficult to describe are probably easy to illustrate. A concept that is difficult to describe is easy to illustrate. Authors asked seven artists to draw faces of human faces from reference photograph while giving them different time limits from four and half minutes to fifteen seconds. These sketches ranges from more realistic to more abstract sketches as time reduces.

These skecthes are further observed under strokes level. Authors used their observations from data generated from sample of sketches. Further they catagorize these strokes into three major properties: shading strokes, complex stroke and simple strkoes. Authors used statistical modelling method 'Active Shape Models' to study the shape variation for a specific artists in the different levels of abstraction. They also demonstrate use of their work which help future research for converting photographs to realistic sketches in the given style and abstraction level.

Authors describe previous work on portraits synthesizing from photographs with an emphasis on work that is data-driven as their motivation to work on this project. From previous works on similar domain, they learnt few topics such as Mimicking a particular style, Synthesizing abstracted drawings, etc.

While getting sketches from artists, all sketches were captured using WacomPen to allow them to use brush paramaeters except erasing or undoing strokes. Artists were allowed to see images for some specified time in decreasing order every time before drawing abstraction. Finally they gathered 672 sketches from seven artists at four abstraction levels with

around 8000 strokes for each artists. In further process of post-processing, they manually fit a template of 2D triangulated face model to each of the sketches. Finally it was analyzed in two levels: stroke analysis and geometric shape analysis. The term 'stroke analysis' is used to represent a unit of human recognition and 'Shape Analysis' automatic analysis of geometric shapes.

They further distributed their experiment in three parts. In experiment 1, eight faces were randomely picked out of 23 and selected the corresponding drawing from the seven artists. These eight sketches consists of two images each containing four of the faces presented in 7 rows and further observed for results. In experiment 2, idea was similar to experiment 1 but, participants matched synthesized sketches to a collection of real sketches and vice versa. In experiment 3, survay Gizmo.com was used to show participants a single image at a time and ask them - "Is this image created by computer of human?" Also further this sent for further observations.

They conclude their paper by giving some limitations to their experiment and future work they planned. Some limitations includes face portraits and sketching. They are plannig to expand their research in building a deformation model based on individual facial features excluding whole face.

Mastering Sketching: Adversarial Augmentation for Structured Prediction (Primary)

Integral framework for training sketch simplification networks which convert challenging rough sketches into clean line drawings is the main idea behind this project. Their purpose is to represent a simplification network with a discrimination network. Such a approach has two main advantages: discriminating network is aware of structure in line drawings thus it encourages output sketches of the simplification network which try to prove it wrong. Also networks can be trained with additional unsupervised data - rough sketches and line drawings can be added to improve quality of the sketch simplification. Observing such results, we can train network to convert simple line sketches into pencil drawings. Here authors propose a novel approach for sketch simplification and its inverse.

Their project combines fully convolutional sketch simplification network with discriminating network. This simplification network is trained to simplify sketches and trick the discriminating network. Authors peroformed their experiment on many challenging rough sketches. They also perform their framework on inverse sketch simplification problem which is generating pencil drawings from line drawings. Although there are some flaws in previous works, by using their adversarial augmentation framework, a model can be successfully trained to convert clean sketches into rough sketches.

Authors introduces 'Sketch simplification' which is a approach to assist user by adjusting the stroke using geometric contraint, merging stroke, fitting Bezier curves. This all are based on heuristics. There are many approaches like: one which requires all strokes and their drawing order is input, another require raster images, some converts processing stage into image and then into graph and there is one recently proposed approach which simplify sketches into raster image and also converts rough sketches or fully convolutional networks which is named as fully automatic approach. Even though approach requires large amount of supervised data, pairs of rough sketches, sketch soimplification, dataset construction and this resulting model is trained with data to convert poorely to real rough sketch.

While actual experiment, authors used supervised data from previous works to train their models which consists of 68 pairs of rough rough sketches with their respective clean sketches. Many clean and rough sketches were taken from Flikr and other sources. Further it is classified into sub-parts of the experiment. First experiment was to compare withn the state of the art and learning to sketch. For this they used post-processing approach but results were negative resulting in large blurry section and it failed to preserve fine details. Experiment 2 performed two perpetual usert studies with processing 99 images with both are approach and LTS with the output came to be overlapping and strokes were not simplifying. In experiment 3, they applied their approach to the inverse problem of sketch simplification which is pencil drawing generation. Input and output of the training data was swapped for sketch simplification and to train new models. In experiment 4, the main advantage was that it has ability to exploit unsupervised data, and we were able to see clear benefit in images farely different from those in training data. Experiment 5 is extension of our framework which introduced single image optimization and results were more accurate even when considered hard images. Experiment 6 performed qualitative comparison. Data was same as a modelling or supervised data which produce non-blurry and crisp blind results.

This approach makes good use of unsupervised data it still has an important dependency on high-quality supervised data. This framework can also be used to optimize a single input for situations in which accuracy is valued more than quick computation.

References:

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Style and Abstraction in Portrait Sketching

2] EDGAR SIMO-SERRA, SATOSHI IIZUKA, and HIROSHI ISHIKAWA, Waseda University

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