The goal of task

The goal of this project is to build an AI system that could generate different drawings using some simple shapes as the starting point. For example, if I give a circle and a triangle to the system as input, the system should return some creative drawings that only using circles and triangles as basic elements. However, the size and number of those circles and triangles could be vary in order to form a meaningful image.

How do you think people might solve this task and general idea of the AI system

I think people usually solve this kind of visual creativity task using their imagination, and we are not doing imagination by wandering without limitation, instead I think imagination is based on our experience or memory. When I were given a set of starting shapes and were told to create meaningful drawings using those starting shapes, the first thing I would think about is to find something in my memory that looks like a starting shape and use those things to construct a meaning image and use several starting shapes to replace them. In this way, I created an image that both has a meaningful sense and contains only starting shapes.

Therefore, I think my creative thinking AI system should perform in a similar way: it needs an imagery space which contains many simple meaning images just like I have in my memory. It also needs a complete and precise mechanism to judge whether a starting shape(or some combination of them) looks like a part of an image, and a method that use those shapes to replicate that image in order to generate a new drawing.

Why interesting

I think this kind of AI system is interesting, because it is interesting to see a computer to automatically generate creative drawings as if it really is creating something and you will have so much fun to see the clumsy drawings sometime it returns just like a baby draws.

The inputs to the model

The inputs of model should be a list of starting shapes. The starting shapes are supposed to be extracted from an input image.

The outputs to the model

The outputs of model should be an image that describes a simple concept or conveys a meaningful information such as a cat is sitting on a tree or simply a figure of a robot.

How the System works

First, my system has a “imagery space”, which is a bunch of simple pictures that describe simple concept such as a cat, a face and an apple. Then the system will break those pictures into pieces according to their colors or connectedness or some other rules. For each of those small pieces, the system will use one or more starting shapes to fit them, pick the best fit pattern as the representation of the piece, and record fitting area percentage at the same time. Then the system will combine those representations into one picture according to their spatial relationship in original picture and compute overall fitting area percentage. After generate all of the pictures, the system will output first five pictures that have higher overall fitting area percentage.

My AI system can be divided into three part. The first part is called learning, in the learning process the system will load sample pictures into imagery space and break them down into different pieces according to their colors. These pieces then are

The second part is called fitting, in the fitting process the system will analyze each piece of every image in the imagery space and use the most appropriate starting shape to fit the piece. Then generate a best fitting drawing for each image.

The last part is called picking, in the picking process the system will select the image that have better overall fitting performance as the output of the system.

Learning:

This is the process that the system emulate human to get knowledge about some simple concept of real world objects so that the system could generate meaningful rather than random images. First, the system will load every image in the imagery space (which is located on the disk) into working memory and then break them into pieces according to the color.

Mental Model

Every piece of the is an image-based shape object maintained by

#imagery space

One detailed example

The input of my system should be a list of starting shapes. First, my system has a “imagery space”, which is a bunch of simple pictures that describe simple concept such as a cat, a face and an apple. Then the system will break those pictures into pieces according to their colors or connectedness or some other rules. For each of those small pieces, the system will use one or more starting shapes to fit them, pick the best fit pattern as the representation of the piece, and record fitting area percentage at the same time. Then the system will combine those representations into one picture according to their spatial relationship in original picture and compute overall fitting area percentage. After generate all of the pictures, the system will output first five pictures that have higher overall fitting area percentage.