Algorithms for Artistic Stylization and Rendering

Summary

In his talk, Aaron Hertzmann started by introducing us to the concept of Non-photorealistic rendering, which is one of most popular methods of image stylisation that involves adding brush strokes on an input image to make it more look more creative. Doing this iteratively increases the quality of images

Before going into details on building rendering algorithms, he discusses “Occluding Contours”, one of the oldest Computer Graphics paper written in the field. For example, if an artist would certain lines a 3D object is shown, then suggestive contours would represent such lines. He also mentions the Disney film, Paperman that implements this concept.

However, even though these procedural methods perform well, better results can be achieved by looking for patterns within data.

Patch-based texture uses an input image along with a window through it. If the texture of the output window is similar to that of the input image, then we can safely assume that the both of them have the same texture.

In another implementation of the Patch-Based texture are Image Analogies where two images A and it’s stylised form (A-A’) are used. Passing another image B and then the resulting image B’ will be stylised based on A’. However, this is an unsuccessful approach when the image is in RGB.

Using Neural Networks to stylise and render images called Neural Stylization. He described the Feed-forward stylisation and mentioned how it gives poor results. The cycleGAN method, in contrast, learns the transformation itself. It can convert images of similar objects – Horses to Zebras, for instance.

One of the major drawbacks of using NNs, is that the output can’t be controlled completely and therefore, leads to anomalies. To overcome this challenge, spatial control is used.

Despite technology being quite advanced, stylising videos still remains a challenge. In the sense, any processing on videos doesn’t feel natural.

He concluded his talk by showing us examples of various art-styles created using NNs.