Stroke clustering for stylized animation automatic in-betweening

Proposal for an master internship at IRIT (Toulouse)

Location: Laboratoire IRIT, STORM research team, Université Paul Sabatier – Toulouse
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Context. Animation movies show great media of artistic expression (see Fig. 1), allowing artists to convey powerful narrations, while not being limited to the existing range of shapes and motions. Unfortunately, they are significantly tedious and time consuming to produce. It is particularly the case for 2D animation composed of sets of marks, such as paint or drawings.

Standard stroke-based rendering methods can automatically produce stylized content made of marks such as paint strokes [3] or hatching [2]. They either focus on a specific style or technique to propose a fully automatic process, or allow to tweak style along large sets of parameters [1], which may not be the more intuitive solution for an artist. They usually do not take into account style features related to motion, which is an important aspect of animation design [4].

Figure 1: Two examples of hand-painted animated movies: La Traversée (left) was made using a technique of glass painting, while Loving Vincent (right) is composed of a series of oil painted frames.

Internship Project. The high level goal of the project is to ease the creation of stroke based rendering animation, with the look and feel of hand made animation. One key question is how to capture user style and automatically create new frames of the animation. This kind of approach mixes an animated input (a 3D scene in our framework) with style information (digital painted frames in this proposal). The goal of the internship project is to analyze user created frames and generate intermediate frames in the same style. The first step is to define a metric to cluster strokes in a given frame. Theses clusters could be linked
to an underlying 3D scene, which guides the animation. The second step is to identify links between the clusters extracted from two frames, and then provide a interpolation scheme to create in between frames.

**Candidate’s profile.** Potential candidates for the thesis should have:

- Master student in Computer Science, or equivalent.
- Strong background in real time computer graphics, mathematics, and c++ programming.
- Additional skills in some of the following topics would be appreciated: expressive rendering, user interface, numerical optimization.
- Fluent french or english speaking.

**Application.** Send your application to David Vanderhaeghe (vdh@irit.fr) with

- a complete CV,
- high education grades report
- reference name/email address

**About STORM-IRIT** STORM is a research team part of the IRIT Laboratory (UMR CNRS 5505). We conduct research on computer graphics, including geometric modeling, 3D animation and rendering. See our webpage for more details about recent research https://www.irit.fr/STORM/site/. The PhD will take place on the Rangueil campus, in the IRIT building, south of Toulouse, nearby all facilities and ground public transport to reach the city.

**References**


