



Figure 1. Application workflow

1. Introduction

Virtual Loom is a tool developed under the H2020 SILKNOW project (Portalés et al. 2018). This software incorporates historical weaving techniques to produce 3D models of more than 30 kinds of fabrics, given an input image of a fabric or a technical drawing. Virtual Loom's has been designed as a wizard that guides the user through the production process of models considering profane users in textile processes and historical weaving techniques (Figure 1). We have included a "freestyle" weaving technique that eliminates all historical restrictions to experiment and open new possibilities to a wider audience.



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2. Image Selection and Processing

The input information for the application is an image together with information related to the fabric (area, symmetries, technique, etc.). Based on this information and through image analysis, the design is extracted. With all this, Virtual Loom generates a 3D model of the fabric at the strand level that can be explored from an integrated visualizer in the last step of the wizard.



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3. Technique definition and clustering

In this phases, you can configure the number of pictorial elements you want to obtain, in addition to the type of technique you want to use in the weaving process. The software allows the selection of different yarns (according to structure, material and colour).

The image is analyzed using OpenCV and it is posterized based on the number of colours that the user has selected.

Each plain colour of the posterization will be an area of the fabric and will be separated into a black and white image for subsequent processing by the Virtual Loom 3D module.



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4. Yarn level 3D modelling

Virtual Loom has different types of yarns integrated to be able to represent the possible 3D models according to the different techniques implemented. These yarns are mainly, representations of silk, cotton and metallic threads, since they are the most used in historical fabrics between the 15th and 19th centuries that are considered in SILKNOW.



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5. Results

These are some of the results that we can obtain from pictures taken from different fabrics. The resulting model can be exported to STL format for printing on a 3D printer (Figure 2 and 3).



Figure 2. Espolín with damassé ground



Figure 3. Damassé fabric

References

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