Image curves reconstruction by means of robust features

André Luís Mendes Fakhoury

Supervisor: João Batista do Espírito Santo Neto

Instituto de Ciências Matemáticas e de Computação, ICMC-USP
andrefakhoury@usp.br

Objectives

The main goal of this research project is to extract robust features in $\mathbb{R}^2$ to reconstruct curves obtained from images. It aims to analyse image preprocessing algorithms, contour extraction of objects, analysis of important points from curves and the respective reconstruction of the original curve.

Materials and Methods

The development steps of the project can be seen in the diagram from figure 1. The prepro-
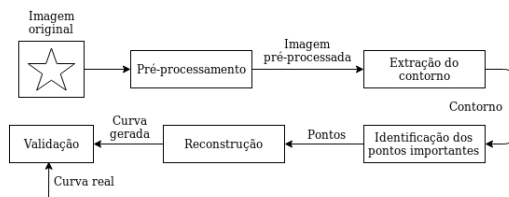

Figura 1: Block diagram of development.

cessing aims to eliminate noise on the contour, allowing the extraction of a curvature that better fits it. The identification of important points is done calculating the discrete curvature of the contour. The curve reconstruction is based on a method describe by Sorkine [1] using a few points (called anchor) and connectivity information, by a discretization of the Laplace-Beltrami operator.

Results

Some results were obtained on closed curves in $\mathbb{R}^2$, extracted from images of leafs and human faces. The method was also tested on $\mathbb{R}^3$ curves, open curves and polygonal meshes. The figure 2 shows an example from the analysis of a tree leaf.
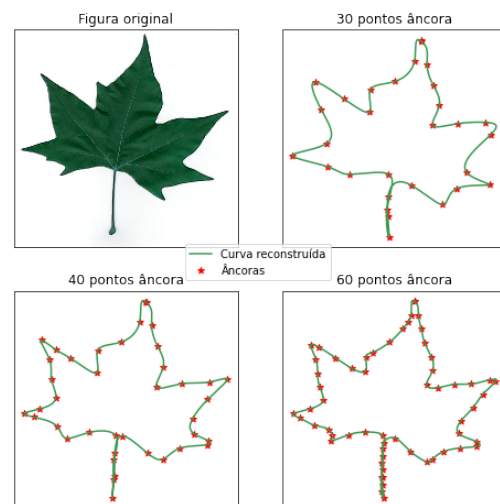

Figura 2: Reconstruction of an image of a leaf.

Conclusions

The discrete Laplace-Beltrami operator allows a good reconstruction, given that the anchor points are sufficiently numbered and chosen (for example, using the curvature). However, some details of the original mesh can be lost, as they are not always chosen by the algorithm.

References

[1] SORKINE, O. Differential representations for mesh processing. *Computer Graphics Forum*, European Association for Computer Graphics, v. 25, n. 4, p. 789–807, 2006.

Support