

Data-Driven Line Drawing Analysis and Synthesis

Contact:

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This postdoc position is part of the D³ project funded by the European Research Council (ERC). This 5-year project aims at developing a new generation of 3D modeling tools that allow designers to create 3D objects by sketching. To achieve this goal, we plan to build a group with complementary expertise in computer graphics, computer vision, geometry processing and machine learning. See our recent papers for preliminary result [1,2].

A major challenge towards the automatic reconstruction of 3D models from drawings is to understand how designers draw 3D shapes. A first part of this postdoc will be to gain such understanding by building and analyzing a large database of professional design drawings and 3D models. We plan to hire professional designers to obtain this data, although the details of the capture protocol remain to be defined (what shapes should designers draw, how should we record their drawings, how can we register the drawings and the 3D models, etc). In particular, we would like to record designers as they draw to recover the entire sequence of strokes that form the drawing. We believe that such temporal information can greatly facilitate further analysis. Potential solutions include the use of instrumented software, or the use of video processing algorithms to extract drawing sequences from timelapse videos [3]. We plan to hire an engineer to assist the postdoc in developing the necessary capture tools.

Building a database of professional drawings will then open a number of research directions, such as analyzing how the lines drawn by designers relate to geometric features of the shape [4], and analyzing how different designers represent the same shape in their own style. More importantly, the gathered drawings will be a rich source of data to develop novel by-example algorithms for line drawing analysis and synthesis. For instance, we would like to automatically classify different types of lines in a drawing (construction lines, contours and silhouettes, hatching, etc) to drive constrained-based optimizations for 3D reconstruction [2]. We would also like to develop new non-photorealistic rendering algorithms capable of rendering arbitrary 3D objects in the style of a particular designer.

This 2-year postdoc will take place in the GraphDeco group at Inria Sophia Antipolis, situated in the beautiful French Riviera (<https://team.inria.fr/graphdeco/>). The salary is around 2100 euros per month (after tax), following the Inria salary grid. All standard French public service, short term contract benefits apply: holidays, onsite subsidized restaurant etc. The position would ideally start in February 2017.

Bibliography

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[2] True2Form: 3D Curve Networks from 2D Sketches via Selective Regularization

Baoxuan Xu, William Chang, Alla Sheffer, Adrien Bousseau, James McCrae, Karan Singh
ACM Transactions on Graphics (SIGGRAPH Conference Proceedings) – 2014

[3] Decomposing Time-Lapse Paintings into Layers

Jianchao Tan, Marek Dvorožňák, Daniel Šýkora, Yotam Gingold
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[4] Where Do People Draw Lines?

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