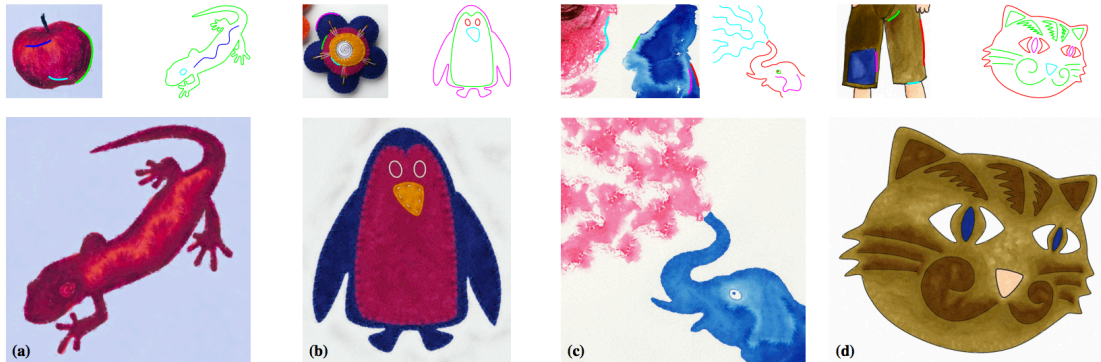# Painting by Feature: Texture Boundaries for Example-based Image Creation

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In this paper, the authors provided an intuitive approach that allows painting of digital images in the visual style of arbitrary example images. They introduced a reinterpretation of the brush and the fill tools. Their approach mainly focuses on the interpretation of the main features in painting, which they are strokes and lines. Existing algorithms of synthesizing images focus on synthesizing 2D textured areas without enforcing consistency to the boundaries. The proposed approach provides a natural look without noticeable visual discontinuities. The main contribution of this paper is a novel algorithm for interactive synthesis of line features that utilizes a randomized graph traversal mechanism. A state of the art texture synthesis algorithm is also used for area features transferring.

The proposed approach is based on three central concepts:

Line feature: which is the representation of any curvilinear structure in the image like edges and contours. It basically represents any boundary between two textured areas. Using a feature palette in the form of one or more images, the user selects the line feature by simply drawing a path along the desired feature. The proposed algorithm refines the user's approximate path by using a gradient-based approach that runs in real-time and synthesis the line feature using a randomized graph model. The degree of randomness in the synthesizing algorithm ensures better results than techniques based on tiling the texture.

Area feature: is any 2-dimential region that has the semantics of a texture. Texture synthesizing is more straightforward than line feature synthesizing. However, to maintain consistency with the line features, boundary conditions are considered by applying the nearest neighbor search.

Feature palette: is an arbitrary set of input images that reflect the desired visual style. Hence, any image can be used as a features palette.

Example of different stylizations with the same stroke input (top left).

Reference:
Lukáč, Michal, et al. "Painting by feature: texture boundaries for example-based image creation." *ACM Transactions on Graphics (TOG)* 32.4 (2013): 116.