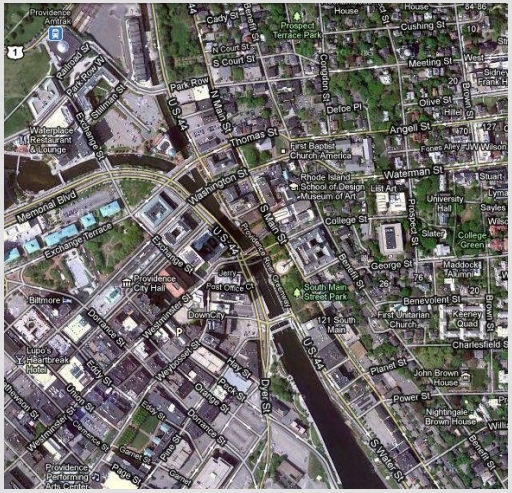
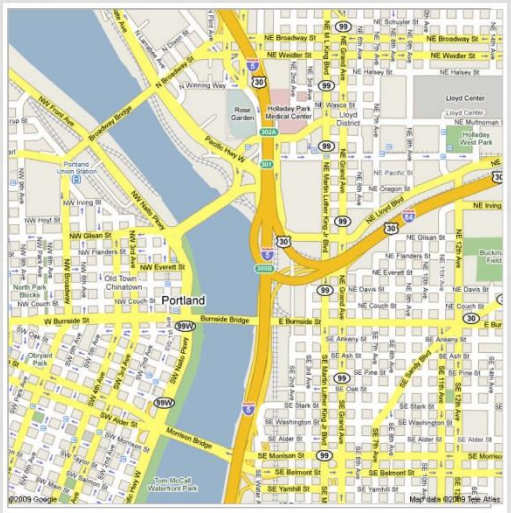
PROCEDURAL ADFS

THE NEXT FRONTIER

BACKGROUND

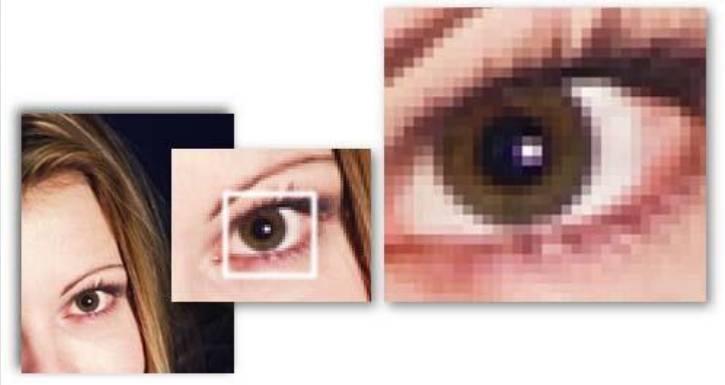
- Two common representations in computer graphics include **images** (pixels) and **SVG** (Structured Vector Graphics)
- Both forms typically overlay scalable type on top to identify elements



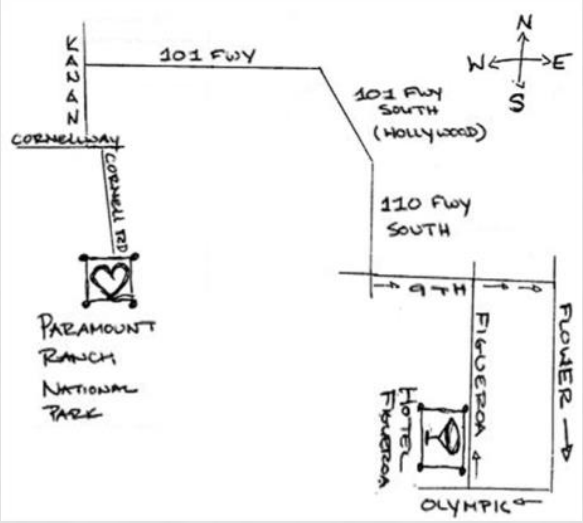


BACKGROUND

- Images provide rich texture and detail but don't scale without pixelization artifacts and require considerable space



- They also provide no level of abstraction which can help when trying to convey various forms of information or when trying to edit a particular element



Abstraction yields clarity

BACKGROUND

- SVG is compact and can be scaled to any size without loss of quality but lacks the texture and richness of images

SVG: Small & scalable, but lacks texture & richness of images

Image: Rich with texture but not scalable and big

THE NEXT FRONTIER

- What's needed is a representation that provides the richness of pixels with the scalability and size of SVG
- A new form of ADFs provide such a representation

SVG: Small & scalable, but lacks texture & richness of images

Image: Rich with texture but not scalable & big

New algorithms and data structures

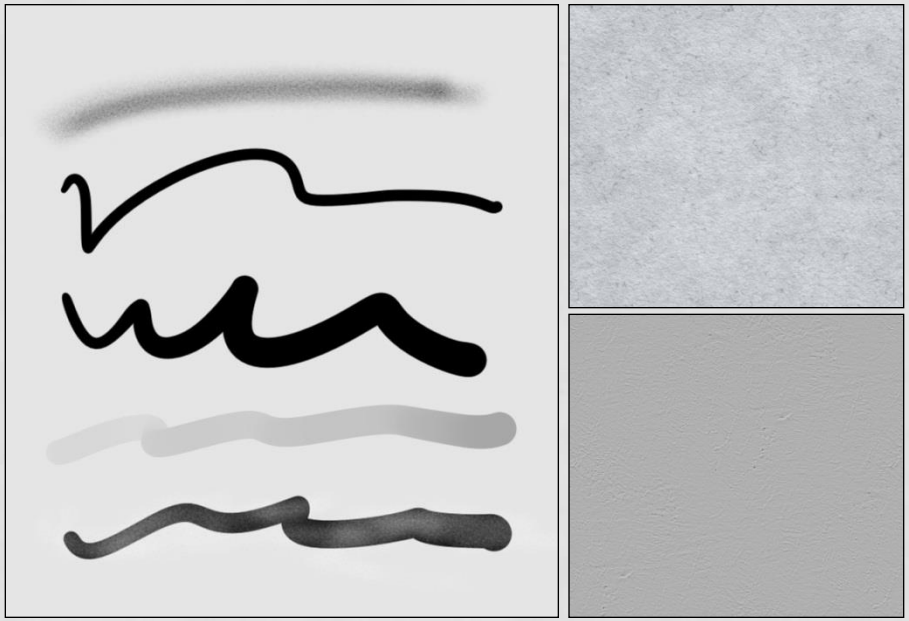
Procedural ADFs: Small, scalable, rich with texture

PROCEDURAL ADFS

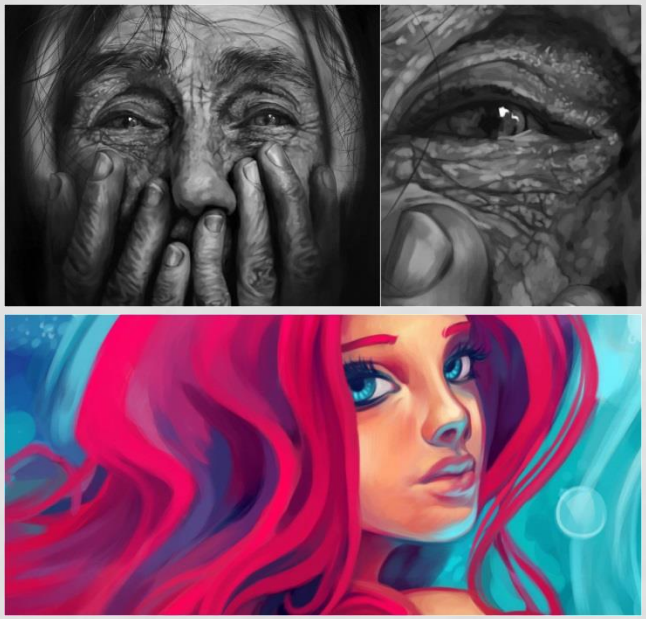
- Similar to Saffron, a detail directed distance field is used to represent geometry such as variable width strokes and solid regions
- The distance field is either explicitly represented in a data structure or generated on demand when required
- The distance field is supplied as input, along with other parameters, to a procedural texture generator which both modifies the geometry and adds texture and color
- The procedural component provides rich texture and detail with **infinite scalability**

PROCEDURAL ADFS

- A small set of primitive procedural ADFs (i.e., a set of basis functions) can be combined to produce a very broad range of appearance styles

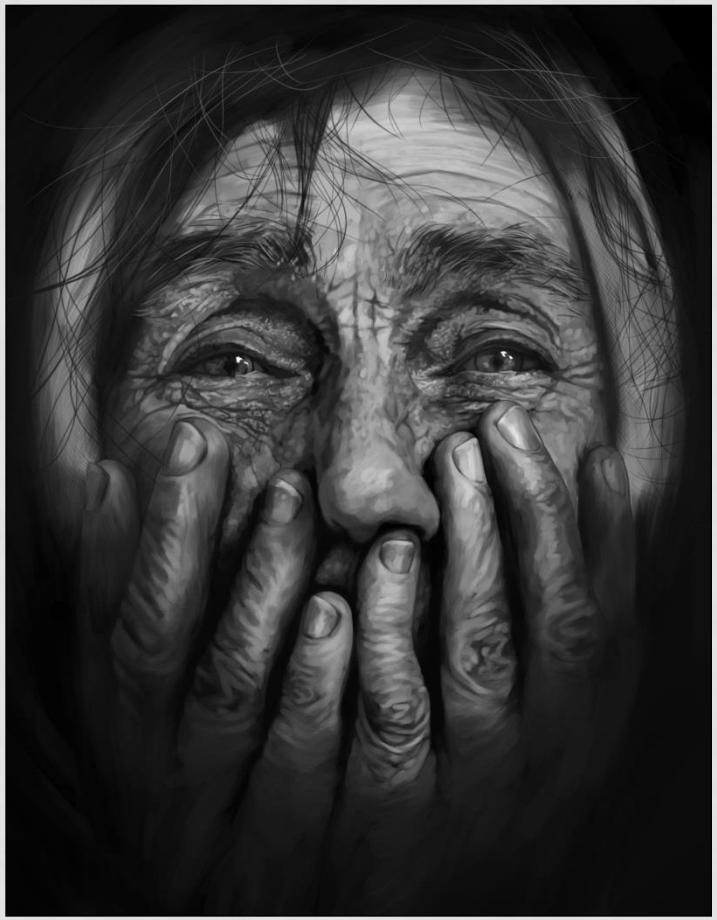


Primitive Procedural ADFs



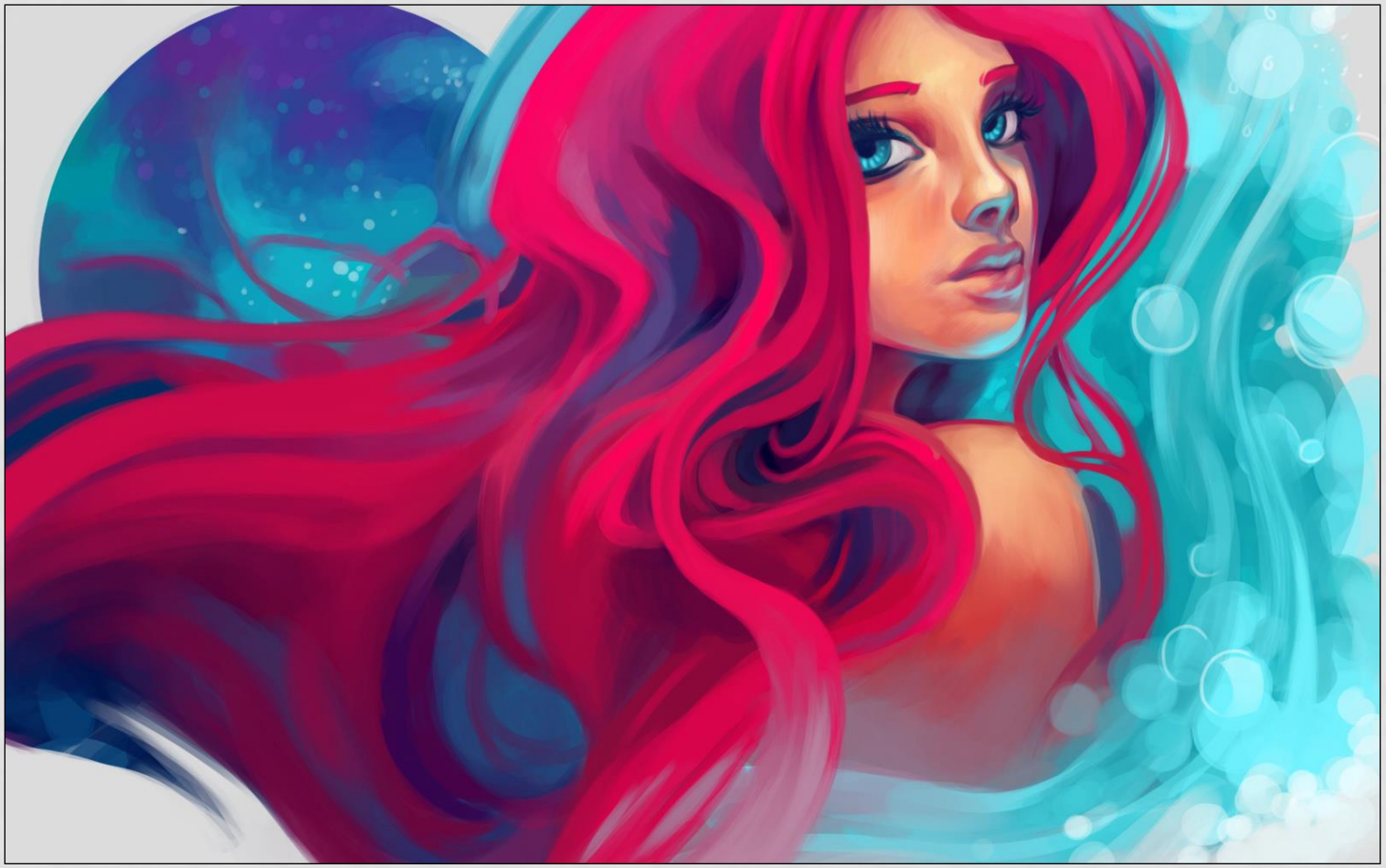
Broad Range of Styles

PROCEDURAL ADFS: EXAMPLES



Procedural ADFs: Small, scalable, rich textures, broad range of styles

PROCEDURAL ADFS: EXAMPLES



Procedural ADFs: Small, scalable, rich textures, broad range of styles

PROCEDURAL ADFS: EXAMPLES

Procedural ADFs: Small, scalable, rich textures, broad range of styles

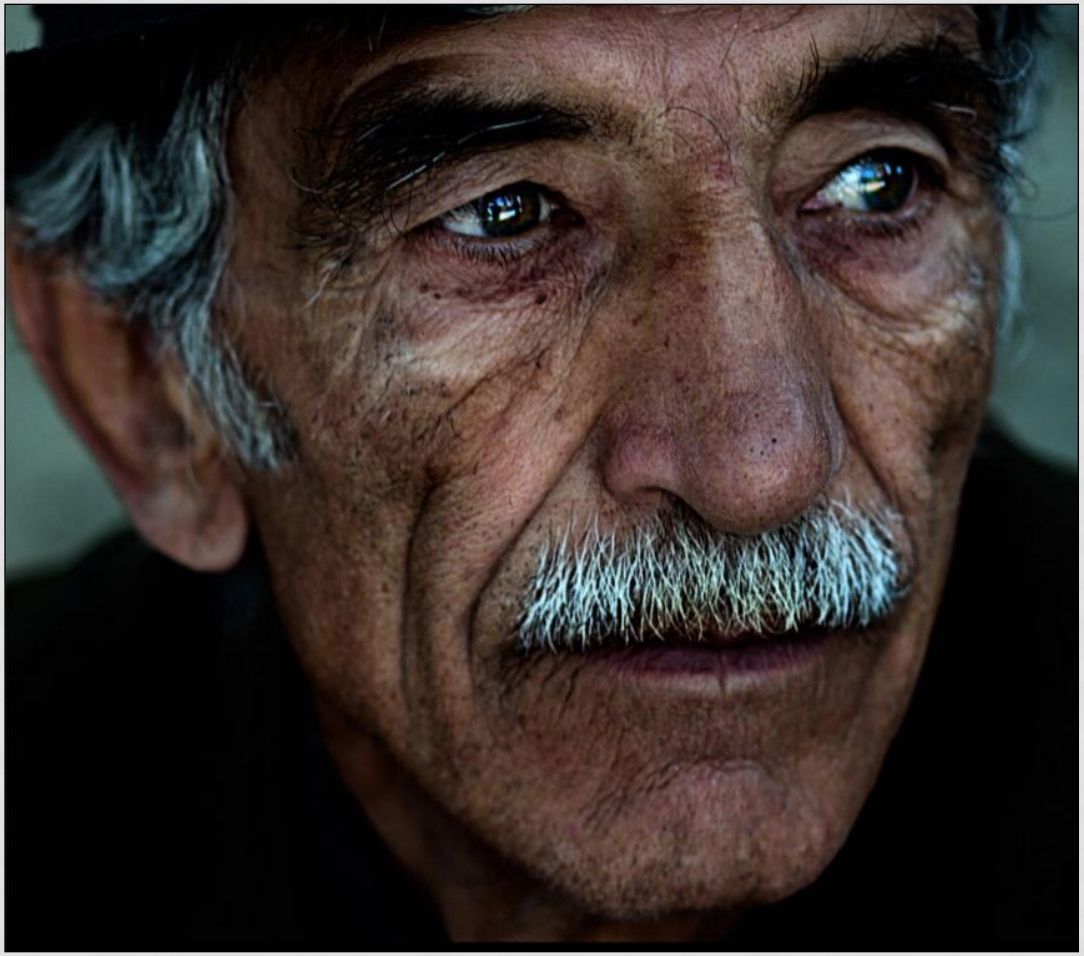
PROCEDURAL ADFS: EXAMPLES

Procedural ADFs: Small, scalable, rich textures, broad range of styles

PROCEDURAL ADFS: EXAMPLES

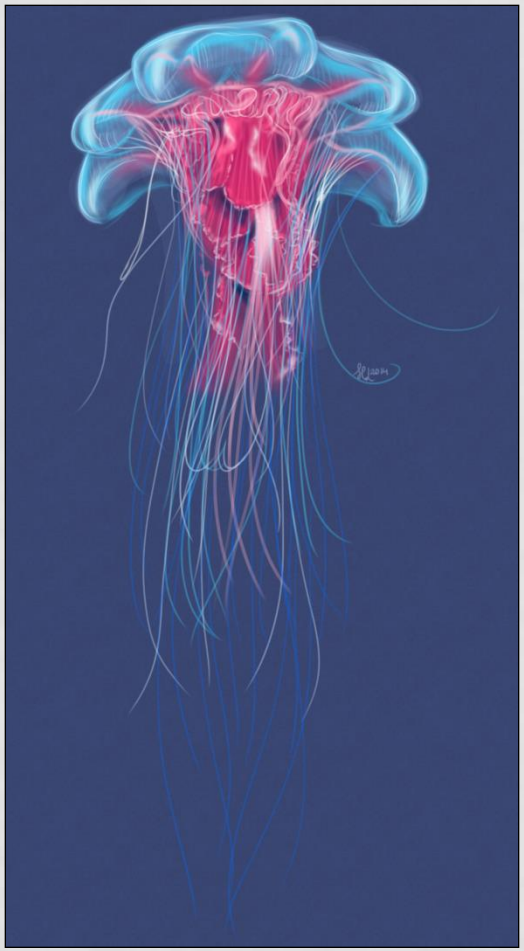
Procedural ADFs: Small, scalable, rich textures, broad range of styles

PROCEDURAL ADFS: EXAMPLES



Procedural ADFs: Small, scalable, rich textures, broad range of styles

PROCEDURAL ADFS: EXAMPLES

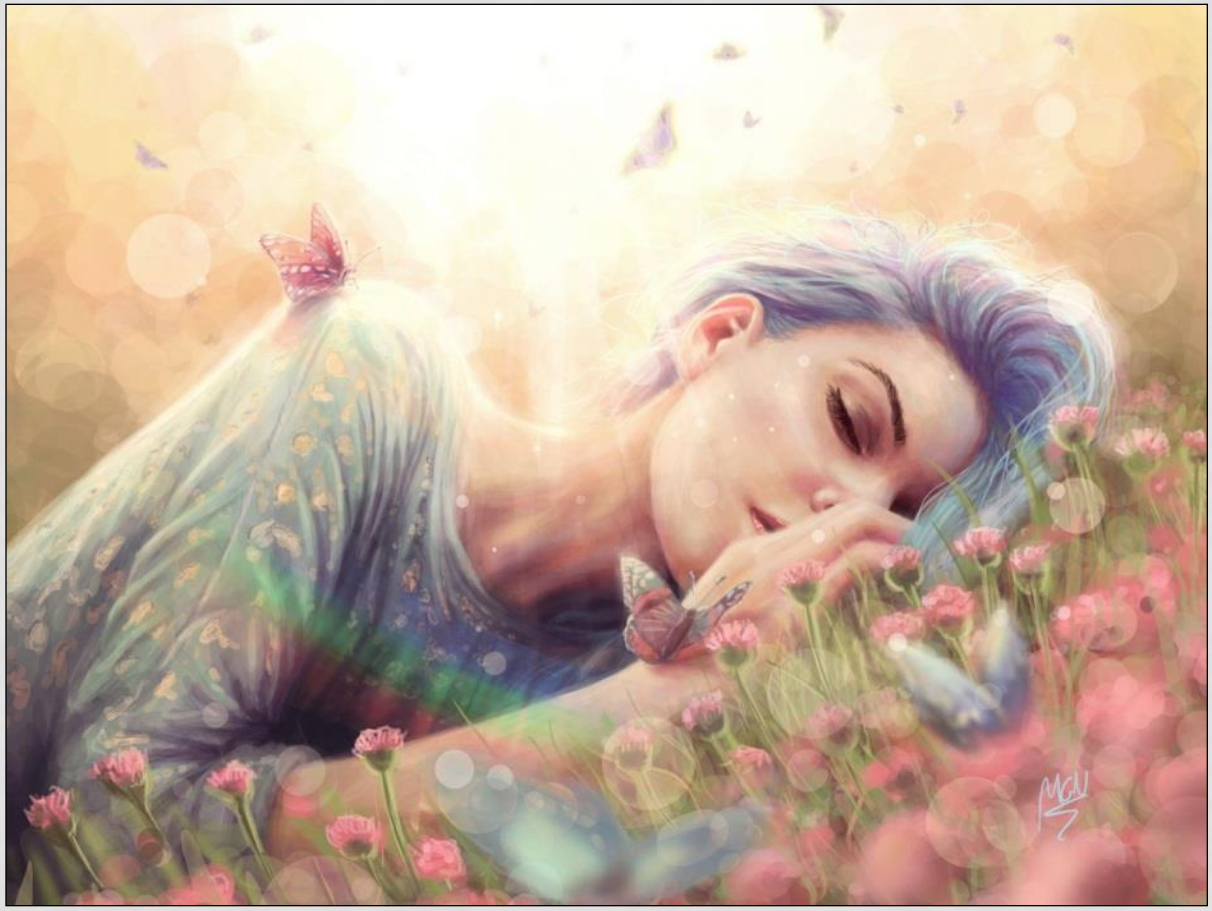


Procedural ADFs: Small, scalable, rich textures, broad range of styles

PROCEDURAL ADFS: EXAMPLES

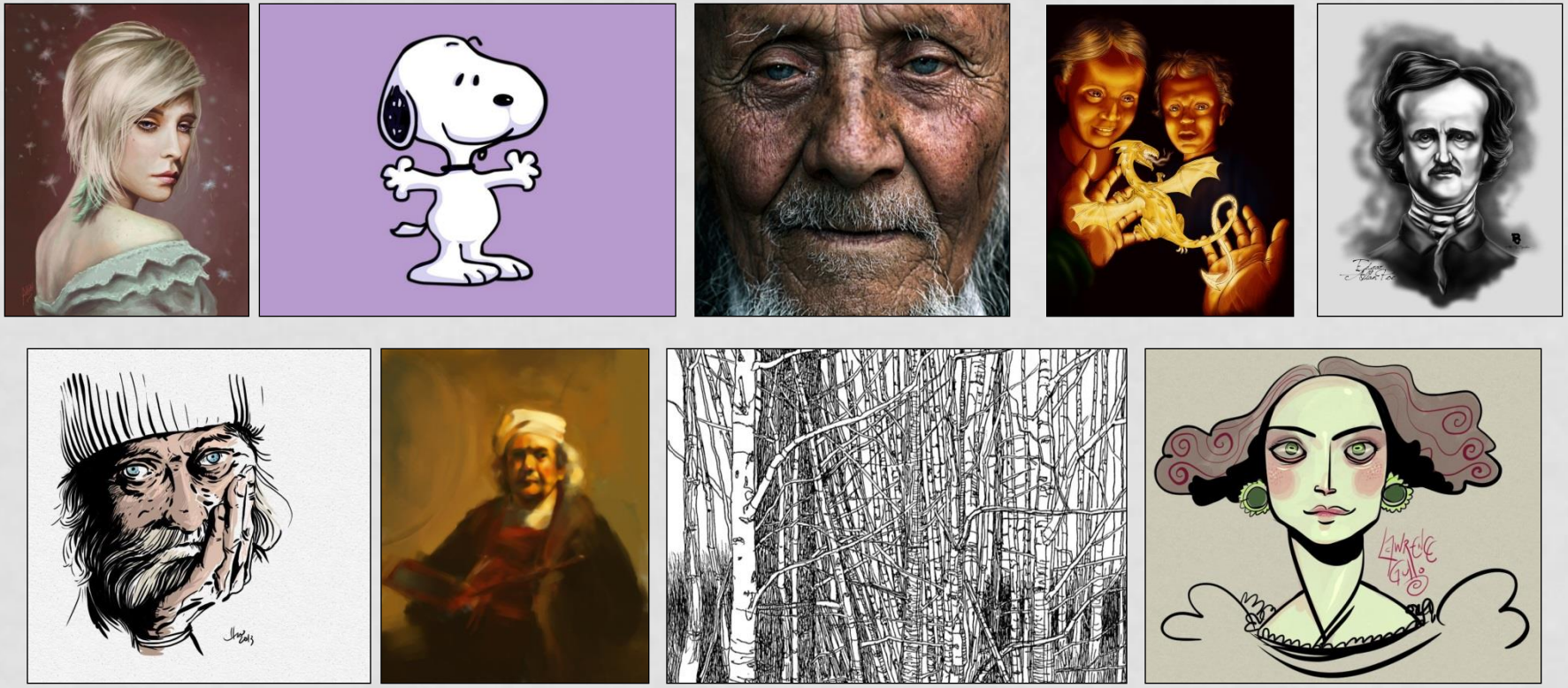
Procedural ADFs: Small, scalable, rich textures, broad range of styles

PROCEDURAL ADFS: EXAMPLES



Procedural ADFs: Small, scalable, rich textures, broad range of styles

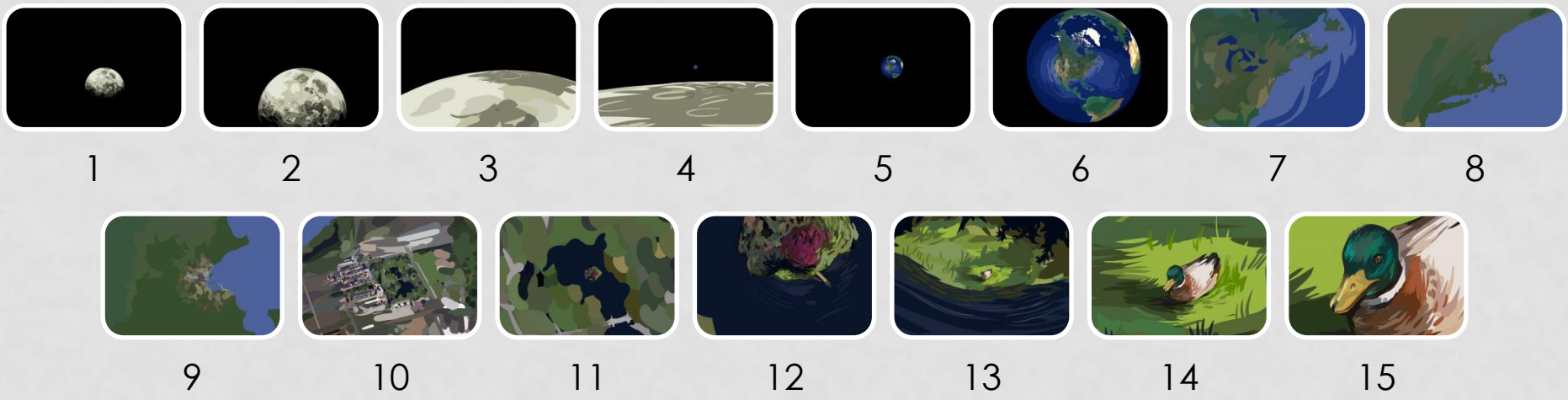
PROCEDURAL ADFS: EXAMPLES



Procedural ADFs: Small, scalable, rich textures, broad range of styles

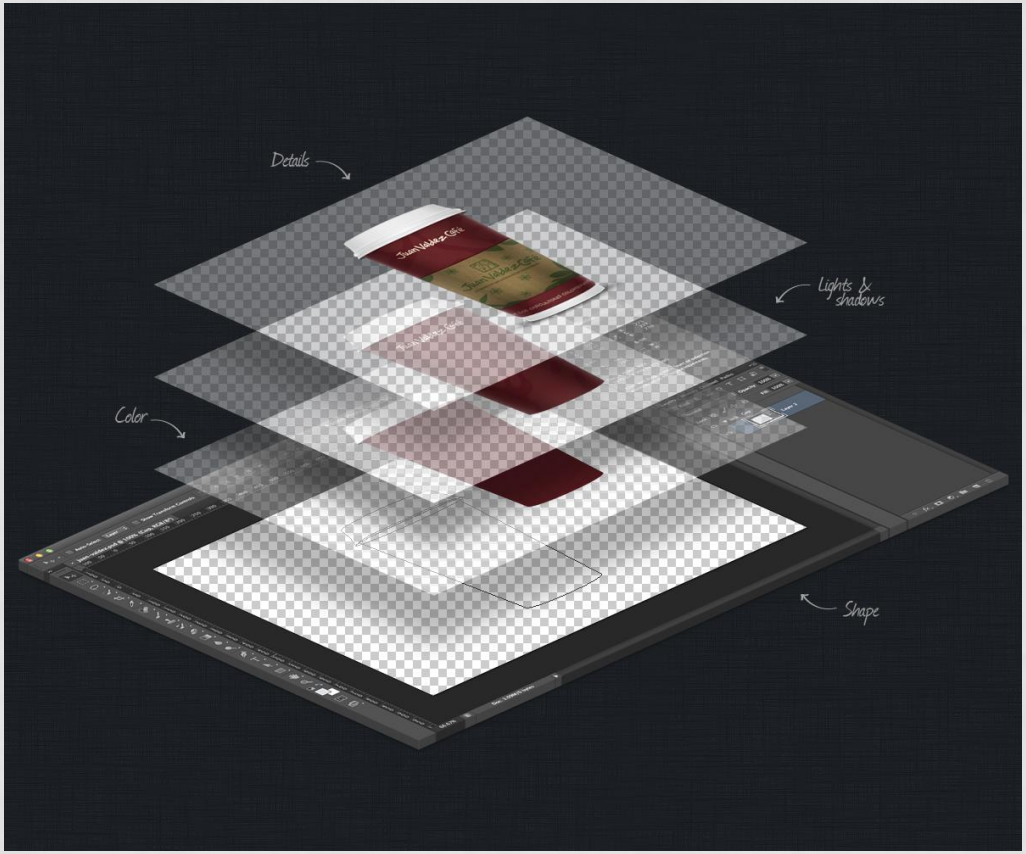
SEAMLESS INFINITE ZOOM

- Procedural ADFs enable a 50 trillion to 1 dynamic zoom range
- Scaling is artifact free and seamless with no fades and other video tricks used to avoid popping



LAYERS

- Procedural ADFs support layering, an essential tool for deconstructing a target image into its parts
- All forms of image creation benefit from this technique



SUMMARY OF ADVANTAGES

- Richness of pixels with the scalability and size of SVG
- Seamless infinite zoom
- Easily supports layers
- Fast by exploiting the massive parallelism inherent in GPUs
- Proven high quality rendering
- Amenable to stylization for different looks and levels of abstraction