Multi-Perspective Images

Images that depict more than can be seen from any single viewpoint, yet remain interpretable

--- J. Yu

Motivation

• Artists often deviate from perspective projection
  • Alter projection for each object
  • Curvilinear, nonlinear, inverted

• Express mood, feeling, idea
• Improve comprehensibility
• Visualize spatial relationships

Giorgio de Chirico’s Mystery and Melancholy of a Street

Slide by M. Agrawala, D. Zorin, T. Munzner
Artistic Expression

• Viewing Anomalies
  Cezanne’s *Still Life with Fruit Basket*

Schematic from Loran (1943)

van Eyck’s “Ghent Alterpiece” (1432)

Anamorphic Projection

2 Centers of Projection:
- Orthogonal PP
- Slanted PP

Hockney’s “Pearblossum Highway” (1986)

Hockney-style Collages

Panography Group at Flickr.com
Visualization

- Artificial Perspective
- Multiple parallel projections
- Orient receding parallel towards vanishing point
- Some area comparisons possible

53rd Street Map (Guarnaccia 93)
Slide by M. Agrawala, D. Zorin, T. Munzner

Multi-Perspective Cameras: Fisheye Lens Image

Pushbroom Camera

http://grail.cs.washington.edu/projects/stereo/
Slit Panoramas

- Strip panoramas created by horizontally translating a 1D vertical strip camera past a scene
- Orthographic projection along horizontal axis; perspective projection along vertical axis
- Main Problem: closer squashed; further stretched

Multi-Perspective Images

A multi-perspective image incorporates many perspectives into a single, locally-coherent image
A moving window slides across the panorama, selecting frames for creating an animation

Multi-Perspective Panoramas

from Disney's film Pinocchio, 1940
Multi-Perspective Panoramas

Fisherman’s Evening Song, Xu Daoning, 11th century

Extracted frames

Input Video

Space-time scene manifolds, Y. Wexler and D. Simakov, Proc. ICCV, 2005
Multi-Perspective Panoramas

Space-time Scene Manifolds. Y. Wexler, D. Simakov in ICCV 2005

Cyclographs

http://grail.cs.washington.edu/projects/stereo/

Parabolic Panoramas

perspective image

parabolic panorama

Space-Time Images

Etienne-Jules Marey’s Chronophotographs, 1888

Andrew Davidhazy
Hyperlapse Videos

- **Hyperlapse** is an exposure technique in time-lapse photography, in which the position of the camera is being changed between each exposure in order to create a tracking shot in timelapse sequences.
- The camera is typically moved through very long distances.
- Apps available from Microsoft and Instagram, for example.

First-person Hyperlapse Videos

Johannes Kopf  Michel F. Cohen  Richard Szeliski
Microsoft Research

research.microsoft.com/hyperlapse