

Chapter 15

Embed: Focus + Context

The Big Picture

- **Focus+context idiom**
 - **To embed detailed information about a select set**
 - **the focus – within a single view that also contains overview information – context**
 - **To elide items**
 - **Some items are filtered out completely while others are summarized using dynamic aggregation for context; only the focus items are shown in detail**
 - **Superimpose layers**
 - **A local region of focus information can be moved against the background layer of context information**
 - **Distort the geometry**
 - **Context regions are compressed to make room for magnified focus region**

The Big Picture

③ Embed

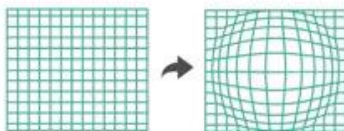
→ Elide Data



→ Superimpose Layer



→ Distort Geometry



Reduce

③ Filter



③ Aggregate



③ Embed



Why embed?

- **To mitigate the potential for disorientation that comes with navigation**
 - **Geometric zooming requires to remember one's navigation history**
 - **Focus+context attempt to support orientation**
 - **By providing contextual information that acts as recognizable landmarks**
 - **An example of nonliteral navigation, similar to semantic zooming**

Why embed?

- **Focus+context is a synthesis of visual encoding and interaction**
 - **Interaction**
 - **Focus set changes dynamically as the user interacts with the system**
 - **Indirect control**
 - **Focus set is inferred via the combination of user's navigation choice and the inherent structure of dataset**

Elide

- **Three set of items**

- **Some items are omitted from the view completely, via dynamic filtering.**
- **Other items are summarized using dynamic aggregation for the context**
- **Only the focus items are shown in detail**

- **Degree of interest (DOI) function**

$$\text{DOI} = \text{I}(x) - \text{D}(x, y)$$

- **I: interest function**
- **D: distance, either semantic or spatial**
- **x: location of an item; y: current focus point**
- **The function is used based on threshold value**

Elide

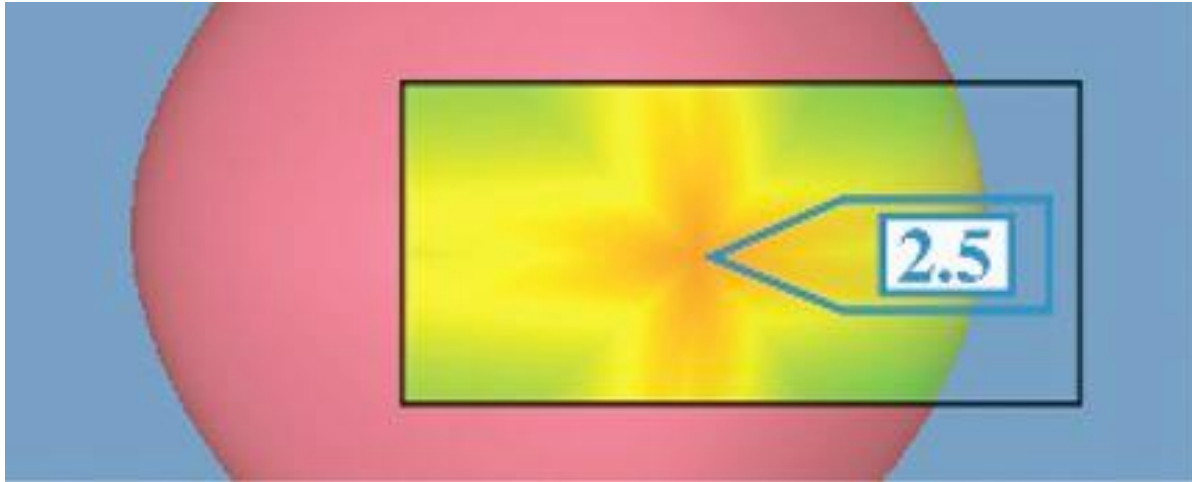
System	DOITrees Revisited
What: Data	Tree.
How: Encode	Node–link layout.
How: Reduce	Embed: elide, multiple foci.
Scale	Nodes: hundreds of thousands.

Superimpose

- **Superimpose**
 - **Background layer: context**
 - **Foreground: focus set**
 - **Limited to local region**
- **Example**
 - **Toolglass and magic lenses**

System	Toolglass and Magic Lenses
What: Data	Spatial, quantitative curvature attribute across surface.
How: Encode	Use given, color by curvature.
How: Reduce	Embed: superimpose.

Superimpose



The Toolglass and Magic Lenses idiom provides focus and context through a superimposed local layer: the see-through lens color codes the patchwork sphere with Gaussian curvature information and provides a numeric value for the point at the center.

Distort

- **Use geometric distortion of the contextual regions to make room for the details in the focus regions**
- **Design choices**
 - **# of focus regions**
 - **Shape of focus**
 - **Radial, rectangular, or completely arbitrary shape**
 - **Extent of the focus**
 - **Global or local**
 - **Interaction metaphor**

Distort

- **Fisheye**

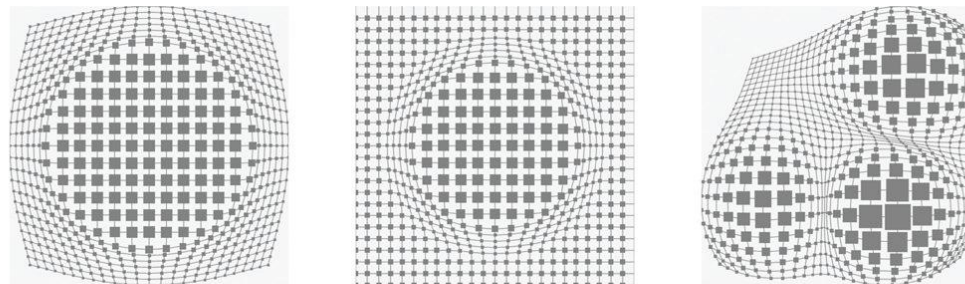
Idiom	Fisheye Lens
What: Data	Any data.
How: Encode	Any layout.
How: Reduce	Embed: distort with fisheye; single focus, local radial region, moveable lens interaction metaphor.

Distort

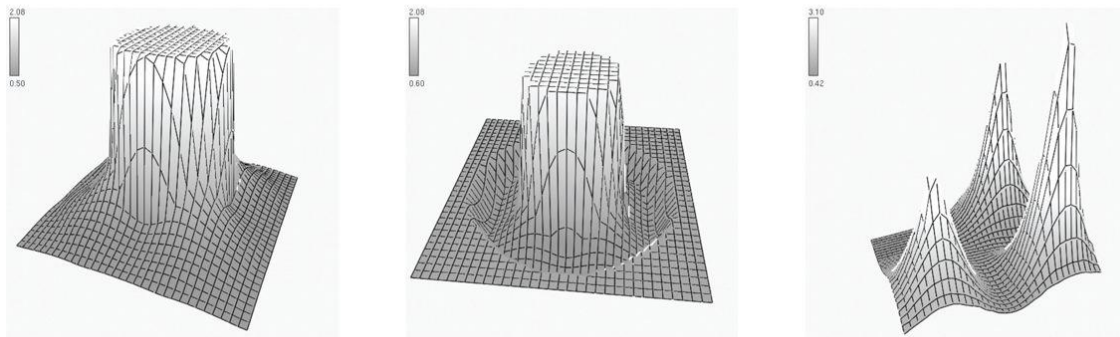
- **Nonlinear magnification fields**
 - **Multiple foci**
 - **Arbitrary magnification levels**
 - **Arbitrary magnification shape**

Distort

Nonlinear magnification fields



(a)



(b)

General frameworks calculate the magnification and minimization fields needed to achieve desired transformations in the image.

(a) Desired transformations. (b) Calculated magnification fields.

Distort

Nonlinear magnification fields

Idiom	Nonlinear Magnification Fields
What: Data	Any data.
How: Encode	Any layout.
How: Reduce	Embed: distort with magnification fields; multiple foci, local arbitrary regions, lens or stretch or data-driven interaction metaphors.