Human Computer Interaction

6. Smart and suggestive interfaces (A)

National Chiao Tung Univ, Taiwan
By: I-Chen Lin, Assistant Professor
Introduction

- How to manipulate complex structures (e.g. in a higher dimension) with simpler interface devices?

- How to beautify (correct) noise-prone interaction?

- How to simultaneously improve the efficiency, learnability, etc.?
Introduction (cont.)

- Difficult to deal with all aspects in a general-purpose interface.

- Let’s focus on special-purpose systems.
  - Manipulation of complex structures
    - With prior knowledge or constraints
  - Beautification
    - Automatic or suggestive
    - Don’t forget “undo” and “confirm”
  - Usability improvement
    - Embedding utility tools into interfaces
    - Immediate feedback
The concepts of prediction, suggestion, and confirmation have been already popularly used.
Smart or suggestive interfaces
Smart or suggestive interfaces...

Suggestive tools (MS Visual C++ 6.0)
Smart or suggestive interfaces

- Techniques behind the concepts
  - Intelligent agents
  - Empirical rules
  - Learning tech.
  - ........

- How to apply these simple concepts to other applications?
E.g. Sketching System

- A better UI for this ...
  - Automatic line correction?
  - Symmetric properties?
  - Perpendicularity?
  - ........
**Pegasus:** 2D Geometric Drawing System

- Beautify the freestrokes by geometric constraints.
  - Inferring underlining geometric constraints

- Generating multiple candidates to solve ambiguity.

- Evaluating the most plausible candidate.

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Supported relations

a) Connection (to a vertex)

b) Connection (to a segment)

c) Parallelism

d) Perpendicularity

e) Alignment

f) Congruence

g) Symmetry (Horizontal)

h) Interval Equality
**Drawing Examples**

- Connection
  - Symmetry
    - (Flipped Congruence)
- Connection
  - Horizontal Alignment
- Connection
  - Congruence
- Connection
  - Vertical Alignment

**a)** Multiple candidates are generated.

**b)** Multiple Possibilities

**c)** Confirm (tapping outside).

**d)**

**e)** Select a candidate by tapping.

**f)** Confirm.

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- **Existing Segments**
- Primal or Currently Selected Candidate
- Multiple Candidates
- Geometric Constraints Satisfied by the Candidate
Pegasus: 2D Geometric Drawing System
Pegasus: 2D Geometric Drawing System

- Interactive beautification and predictive drawing for rapid prototyping.

- Limitation & future work in this system
  - Selection among a large number of candidates
  - Selecting reference segments
  - Curves, patterns, etc.
  - 3D objects
3D Geometric Drawing System

- How to extend the concepts in the previous system?
  - Connection
  - Parallelism
  - Perpendicularity
  - Symmetric properties
  - Interval equality
  - ... ...

- Manipulating 3D objects with 2D devices
  - Active or constraint planes
3D Geometric Drawing System

- A suggestive interface
  - Hints according to geometric constraints
  - Patterns

3D Geometric Drawing System

a) draw a line on the ground  b) choose a temporary drawing plane

c) draw a line on the drawing plane  d) choose a rectangle

c) unhighlight lines  f) draw a line on the ground

g) highlight a line  h) choose a rectangle

a) original scene  b) highlight the second line  c) click a candidate and prediction occurs  d) original scene  e) highlight a line and prediction occurs  f) click a candidate and the next prediction occurs
3D Geometric Drawing System
3D Geometric Drawing System

- For rapid prototyping.
- Cons and pros of suggestions and predictions.
- Learnability: more complex than the 2D case.
- Considering other special-purpose interfaces.