Smart and suggestive interfaces

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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 ......

Spreadsheet (Microsoft Excel)
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

What we imagine …

- A better UI for this ...
  - Automatic line correction?
  - Symmetric properties?
  - Perpendicularity?
  - ……..

Poor drawing
**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

Multiple candidates are generated.

Select a candidate by tapping.

Confirm (tapping outside).

Confirm.

- 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
- e) 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.