

Human Computer Interaction

6. Smart and suggestive interfaces(A)

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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

Smart or suggestive interfaces

- The concepts of prediction, suggestion, and confirmation have been already popularly used.

● ACM CHI (Intl. Conf. on Human Factor in Computer Systems)⁴⁾
● ACM UIST (ACM Symposium on User Interface Software and Technology)⁴⁾
● ACM I3D (ACM Symposium on Interactive 3D Graphics and Games)⁴⁾
● ACM SIGGRAPH (Intl. Conf. on Computer Graphics and Interactive Techniques)⁴⁾
● IEEE TVCG (IEEE Trans. Visualization and Computer Graphics)⁴⁾
● IEEE CG & A (IEEE Computer Graphics and Application Periodical)⁴⁾
● ACM VRST (ACM Symposium on Virtual Reality Software and Technology)⁴⁾
● IEEE VR (IEEE Conf. on Virtual Reality)⁴⁾

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自然輸入

koto Okabe, Shigeru Owada, Takeo Igarashi, "Floral diagrams and interactive flower modeling using botanical structural constraints"

Intelligent phonetic input

Smart or suggestive interfaces

Microsoft Excel - score.xls

檔案(F) 編輯(E) 檢視(V) 插入(I) 格式(O) 工具(T) 資料(D) 視窗(W) 說明(H) Adobe PDF(E)

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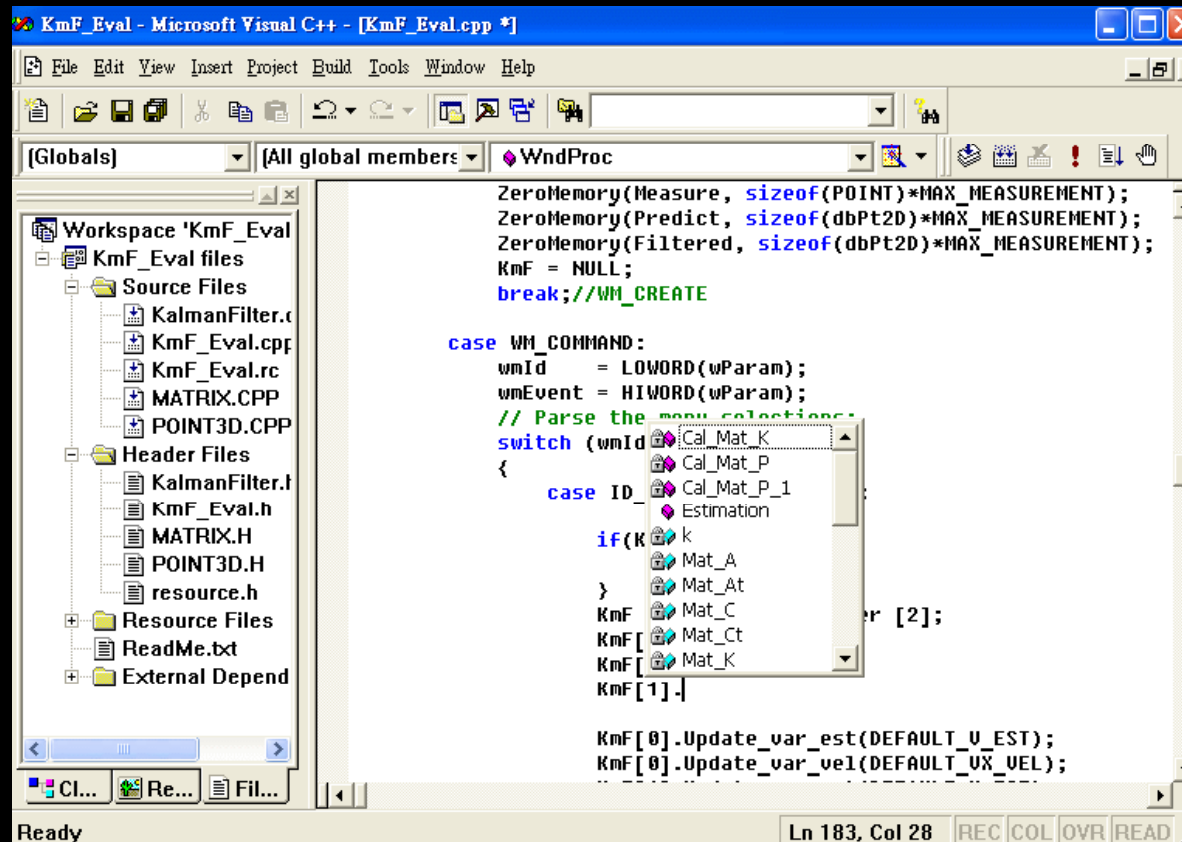
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14	8	資料系4B								0	13					W	W	
15	9	資料系4B	82		100		89		9.4	3.13	46					78		82
16	10	資料系4B	80		35		87		7.5	2.5	23			1		59		63
17	11	資料系4B	99		112		87		8.2	2.73	50					82		86
18	12	資料系4B	60		80		87		8.2	2.73	25					63		67
19	13	資料系4B	83		90		65		5.7	1.9	35					63		67
20	14	資料系4B	82		97		87		7.5	2.5	45					76		80
21	15	資料系4B	68		90		65		5.7	1.9	39					62		66
22	16	資料系4B	60		81		87		7.5	2.5	32					65		69
23	17	資料系4B	77		120		87		8.2	2.73	60					84		88
24	18	資料系4B	60		70		75		0	0	48					63		67
25	19	資料系4B	77		100		87		8.2	2.73	68			0.5		84		88
26	20	資料系3A	56		35		75		0	0	58					60		64
27	21	資料系3A	111		120		97		8	2.67	69					95		99
28	22	資料系3A	86		100		95		6	2	62			0.5		85		89
29	23	資料系3A	105		110		93		5.5	1.83	72			3		95		99
30	24	資料系3A	102		120		95		8.1	2.7	58					90		94
31	25	資料系3A	84		108		81		5.8	1.93	47					76		80
32	26	資料系3A	69		112		85		5.9	1.97	60					80		84
33	27	資料系3A	75		113		91		8.8	2.93	64					85		89
34	28	資料系3A	70		100					0	7					W	W	
35	29	資料系3A	97		113		99		8.5	2.83	46					85		89

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Spreadsheet (Microsoft Excel)

Smart or suggestive interfaces



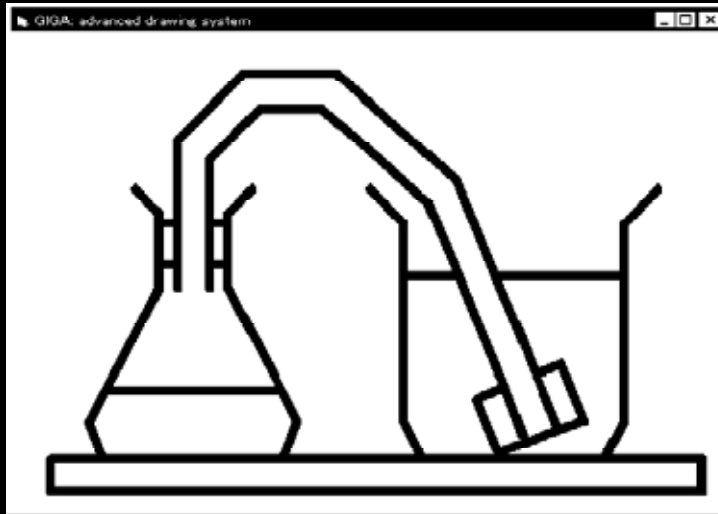
Suggestive tools (MS Visual C++ 6.0)

Smart or suggestive interfaces

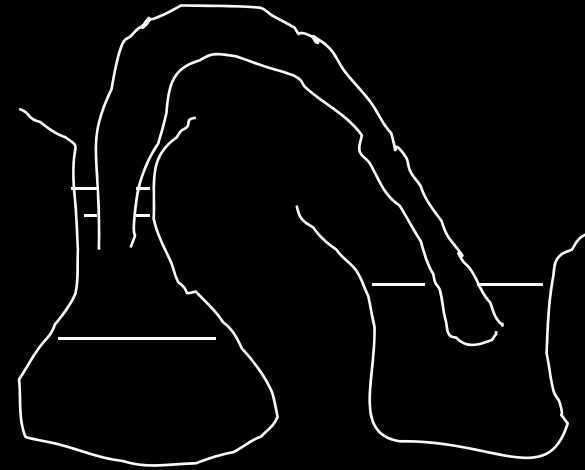
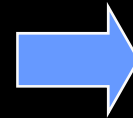
- Techniques behind the concepts
 - Intelligent agents
 - Empirical rules
 - Learning tech.
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- How to apply these simple concepts to other applications?

E.g. Sketching System



What we imagine ...

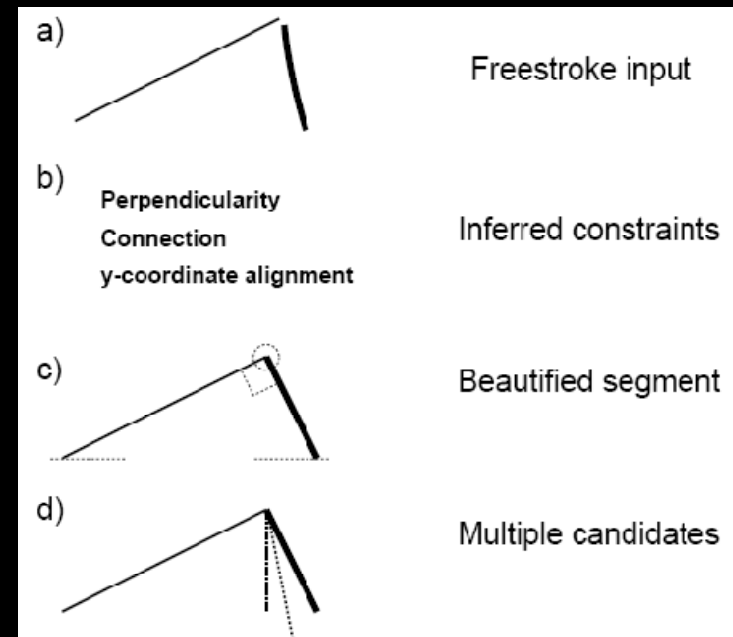


Poor drawing

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

Pegasus: 2D Geometric Drawing System

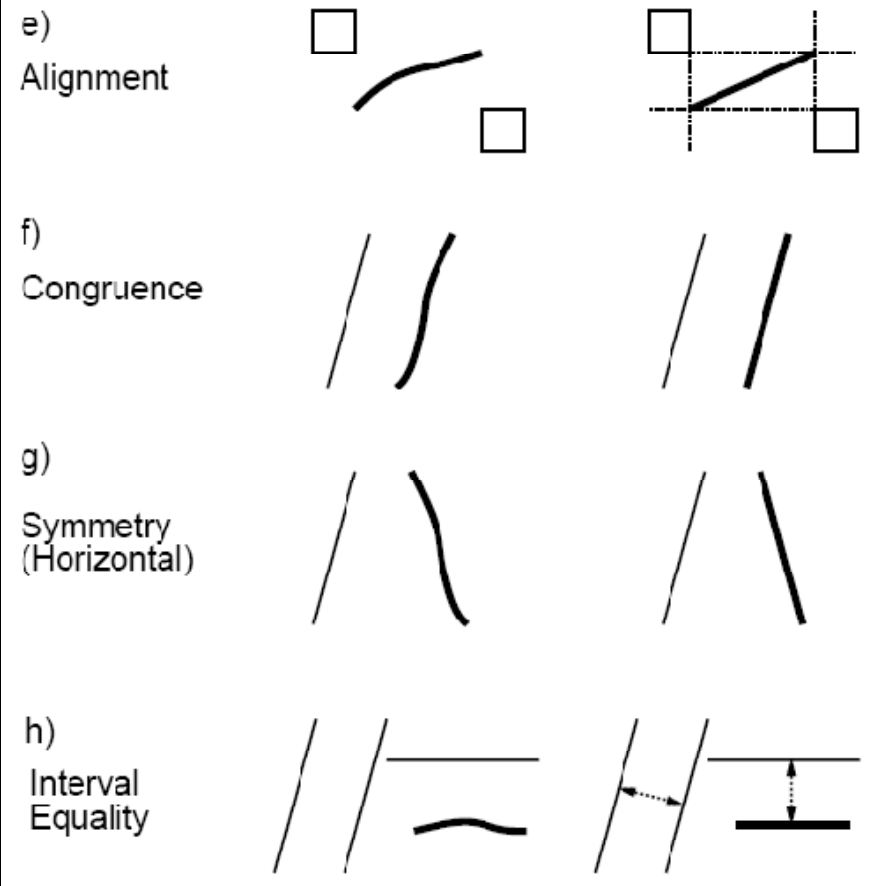
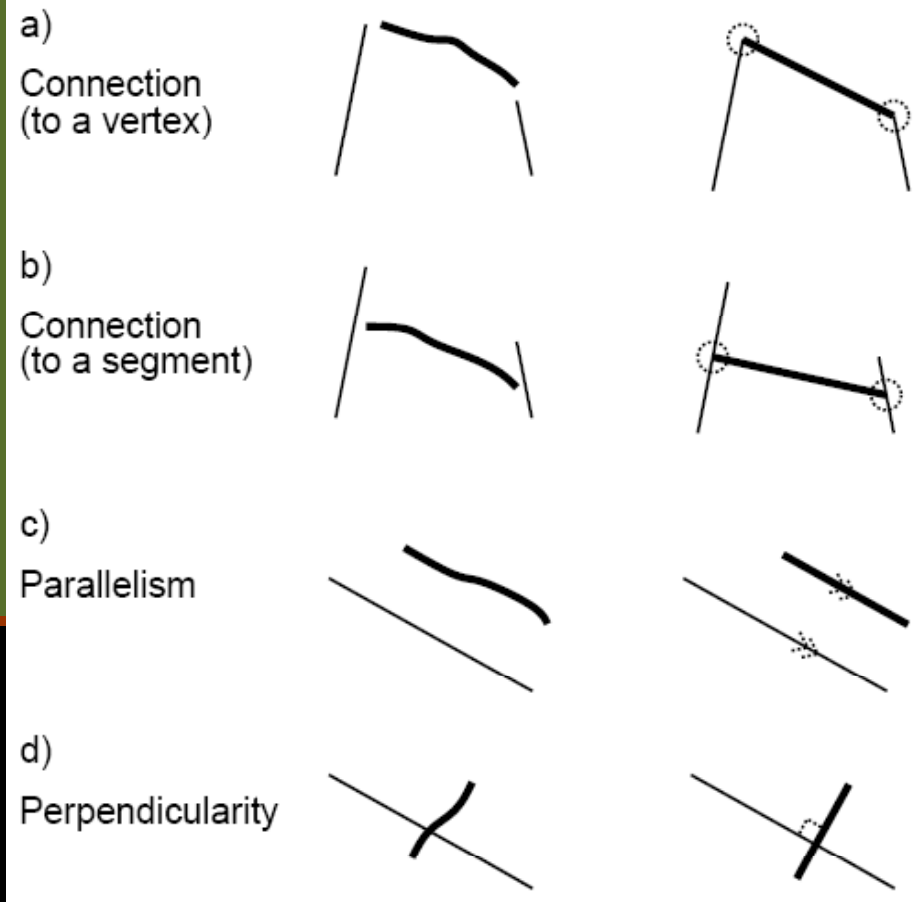
- Beautify the freestrokes by **geometric constraints**.
 - Inferring underlining geometric constraints
 - Generating multiple candidates to solve ambiguity.
 - Evaluating the most plausible candidate.



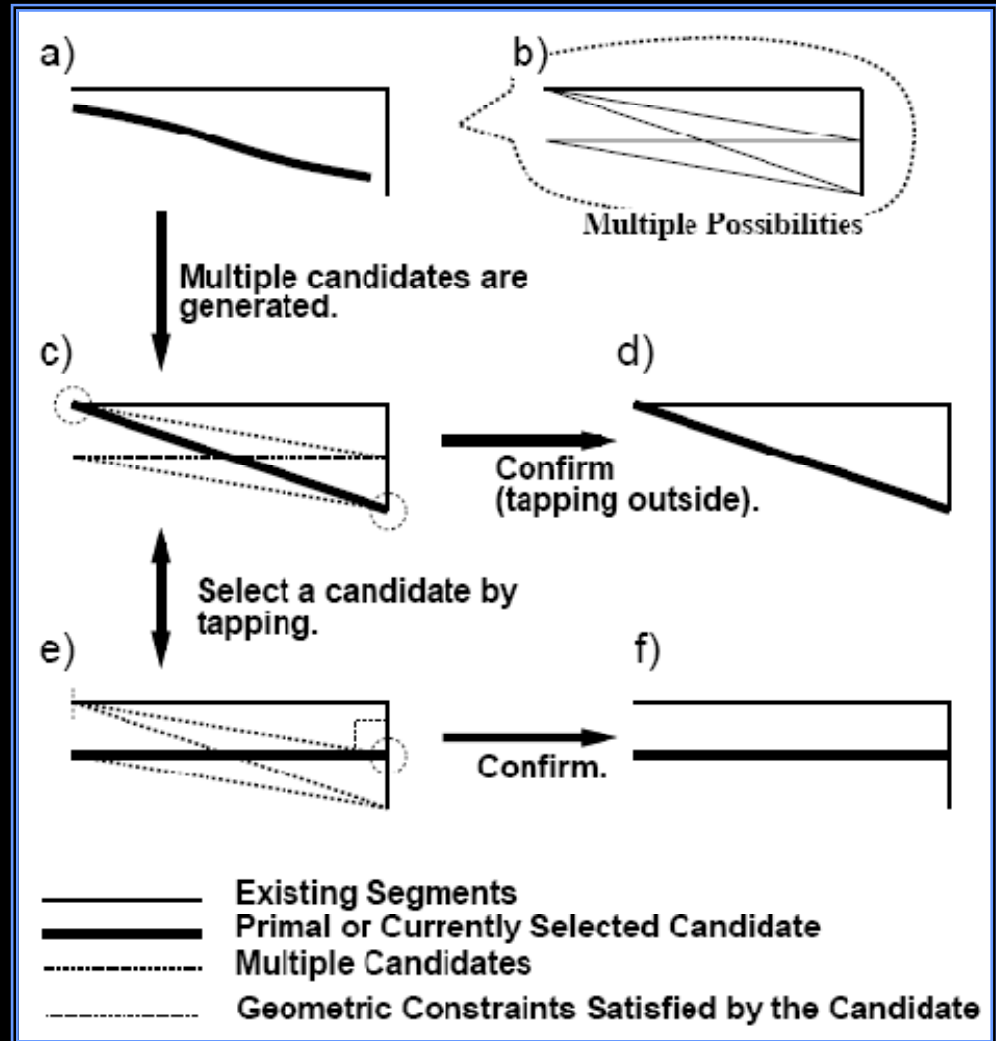
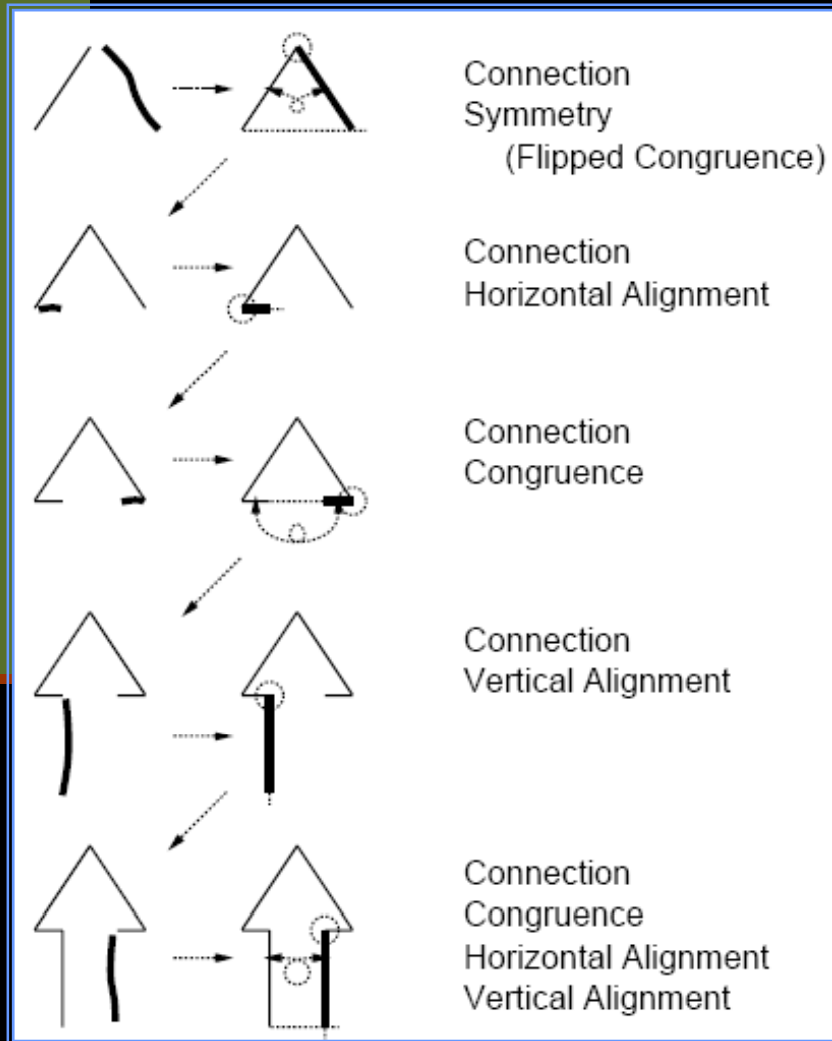
• T. Igarashi, S. Matsuoka, S. Kawachiya, H. Tanaka "Interactive Beautification: A Technique for Rapid Geometric Design", ACM UIST'97, pp.105-114.

• T. Igarashi, S. Matsuoka, S. Kawachiya, H. Tanaka, "Pegasus: A Drawing System for Rapid Geometric Design", ACM CHI' 98 Summary, pp.24-25.

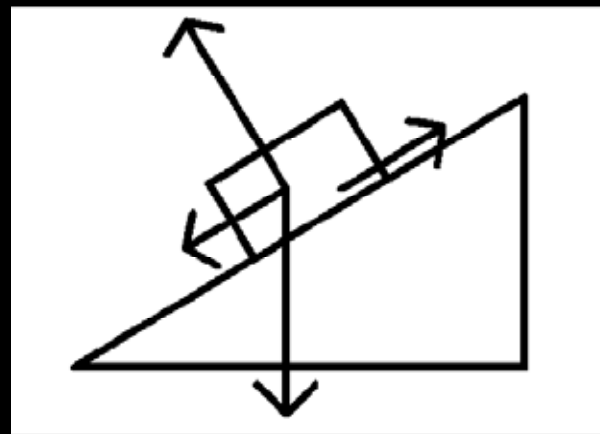
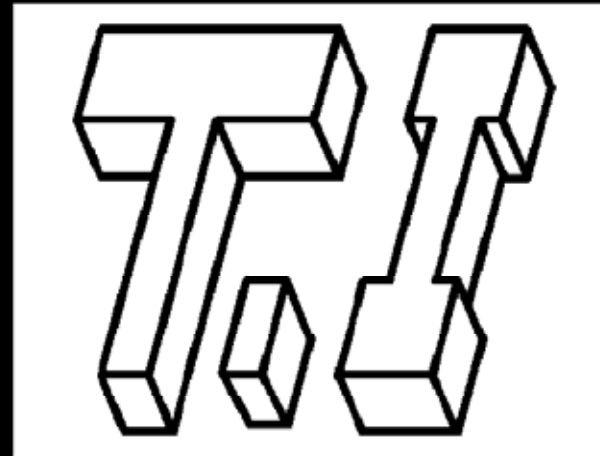
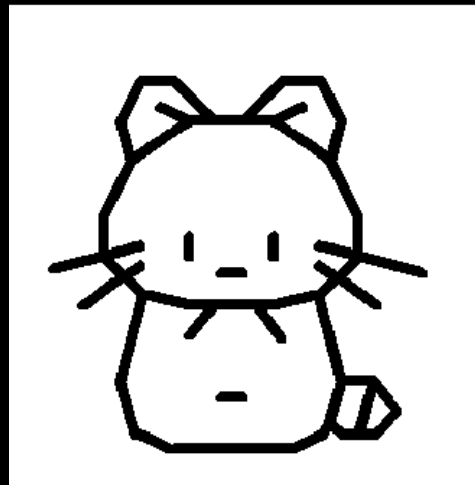
Supported relations



Drawing Examples



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

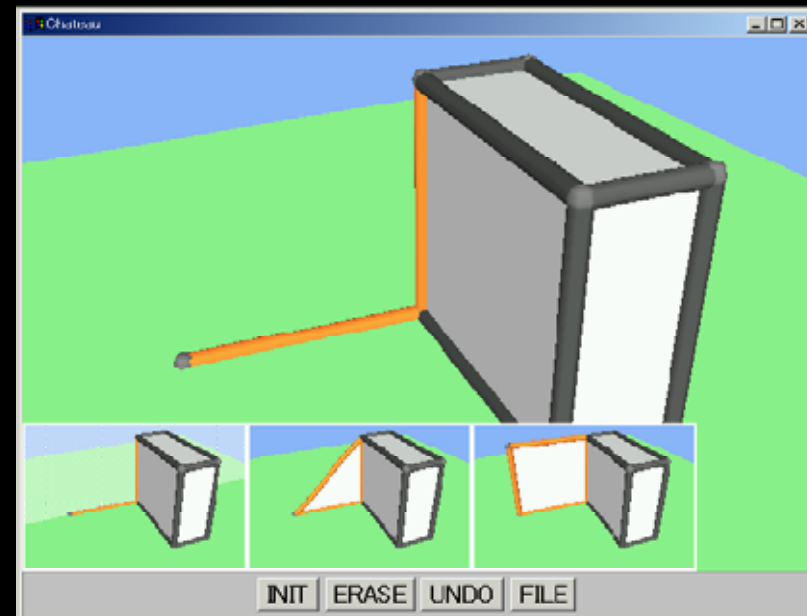
3D Geometric Drawing System

- 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

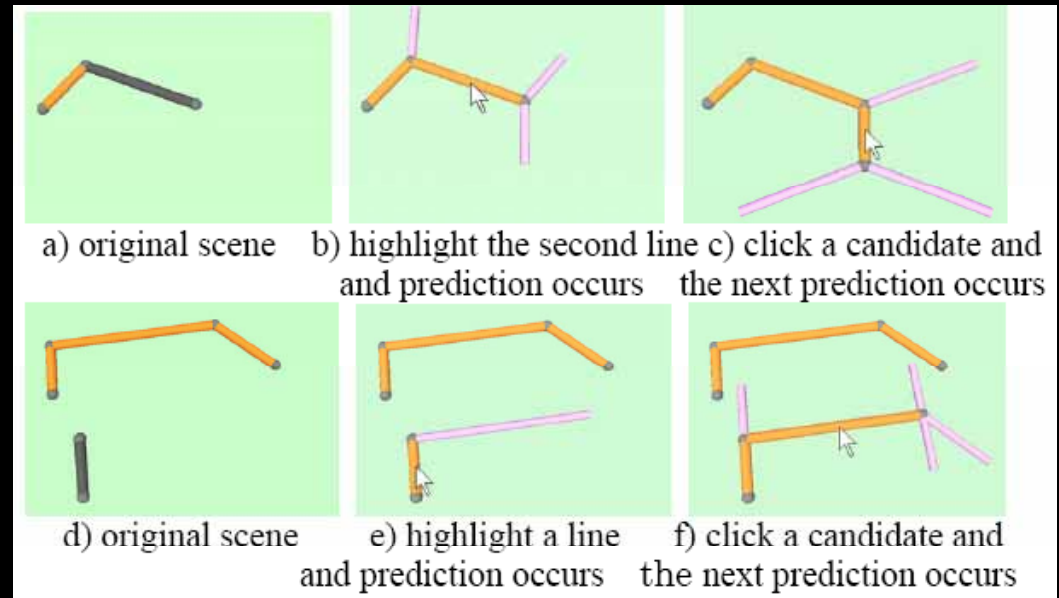
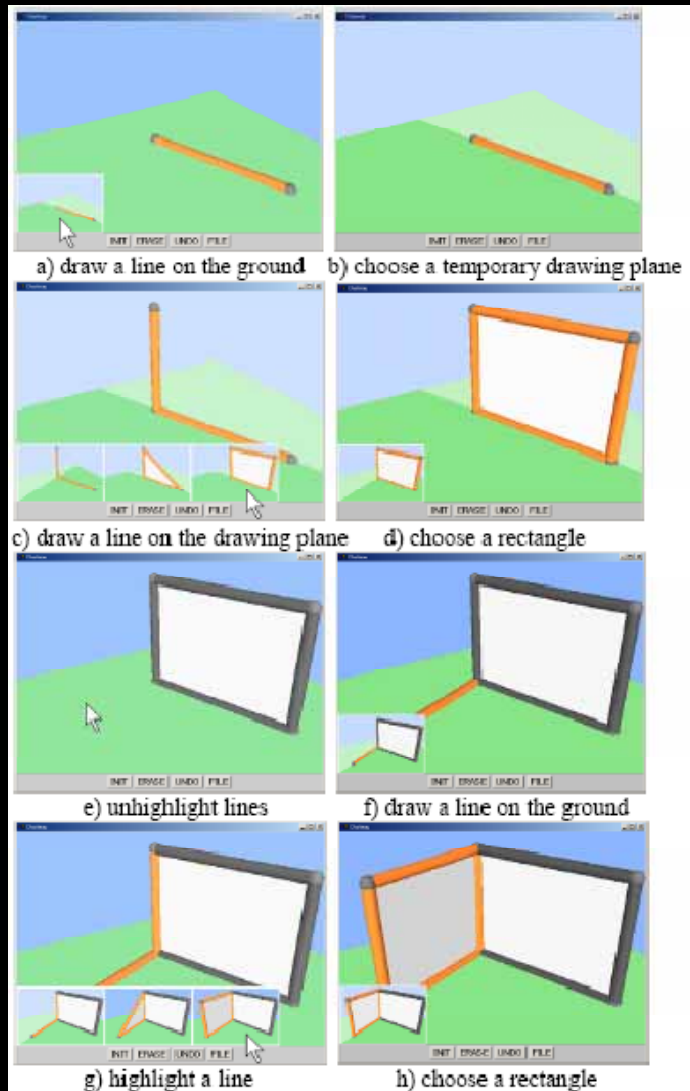
3D Geometric Drawing System

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

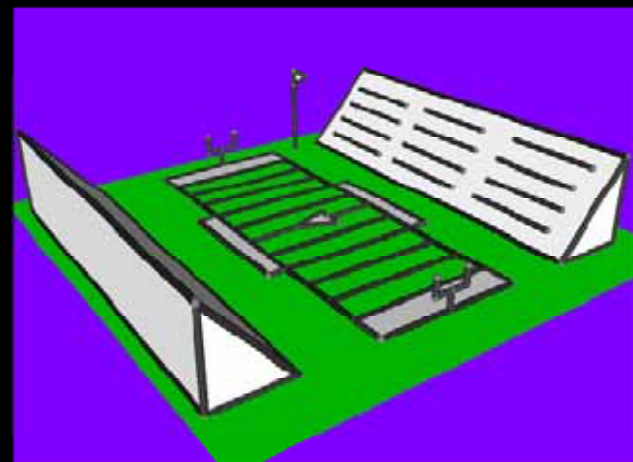
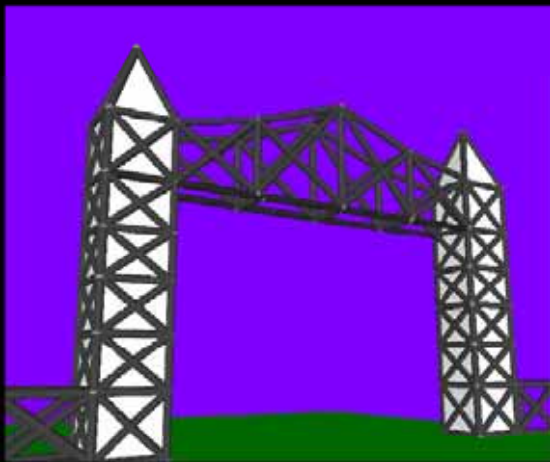
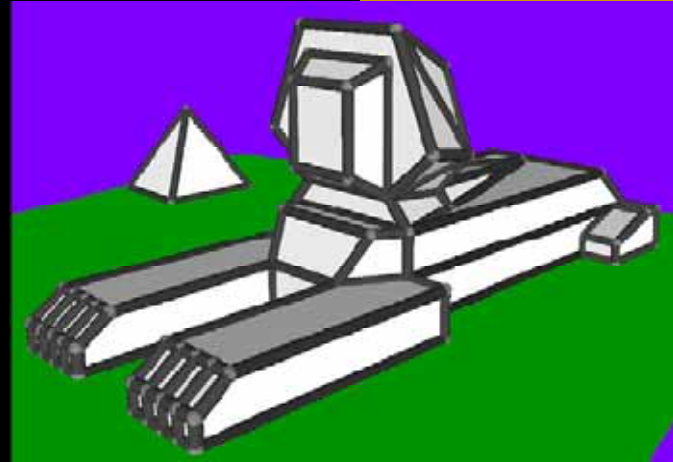
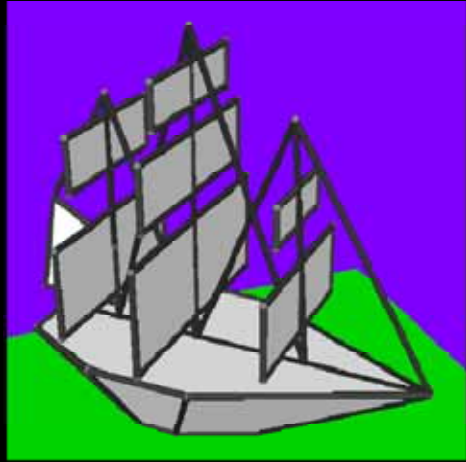


T. Igarashi, J.F. Hughes, "A Suggestive Interface for 3D Drawing ", 14th Annual Symposium on User Interface Software and Technology, ACM UIST'01, Orlando, Florida, November 11-14, 2001, pp.173-181.

3D Geometric Drawing System



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.