HCI For Pen Based Computing Cont.

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CSE 481 B
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Key points

- UI Metrics
  - Task completion time
  - Accuracy
  - Fluidity
  - Robustness
  - Feedback
  - Correctability

Basic tasks

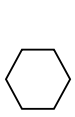
- Targeting
- Tracing
- Mode indication

Composite Tasks

- Selection
- Free form input
- Domain based input

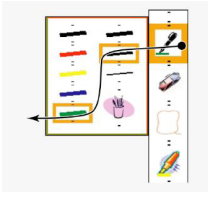
Basic pen operation

- Crossing
  - Operation triggered by a stroke crossing a line segment



CrossY: Crossing based UI

- Specify operations by drawing through

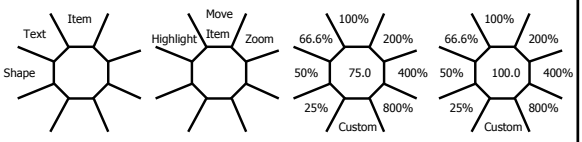


Hierarchical crossing

- Principle – multiple commands without lifting the pen

Flow Menu

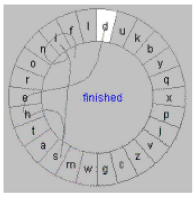
- Use movement through octants for control information



Abstract writing

- Enter text with specialized, stroke based recognition
  - Optimized for automatic recognition
  - Not human readable
  - Character based or word based

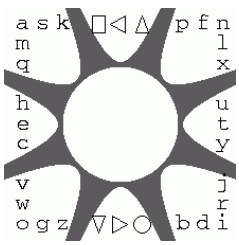
Cirrus (Georgia Tech)

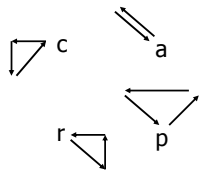


interaction

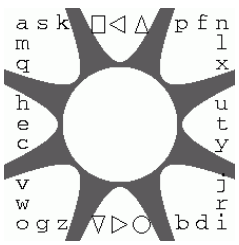
education

Quikwrite [Perlin, NYU]

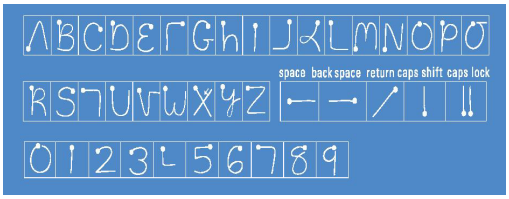




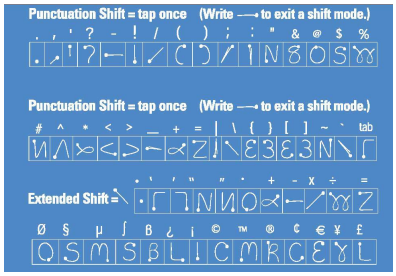
Write helloworld



Graffiti (Palm)



More



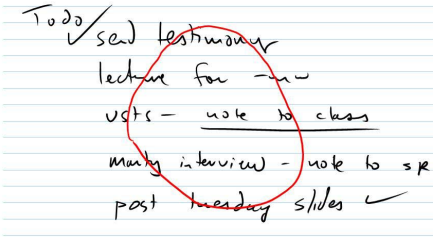
Graffiti

- Mostly single stroke
- Close to standard alphabet (learnability)
- Write only
- Location written for additional meaning

Selection problem

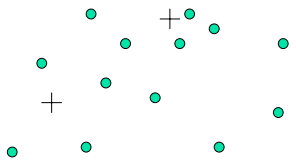
- Identify one or more graphical elements from a domain
- Mechanisms
  - Bounding Region
  - Geometric defined by stroke
  - Distance from cursor

If the red circle is a selection tool, what is selected?



Bubble cursor

- Selection radius depends on object proximity



Recognition UIs

- UIs based on attaching meaning to ink
  - Gestures
  - Diagram recognition
  - Handwriting recognition
    - Free form
    - Constrained recognition

Gestures

- Commands issued with a single stroke
- May be drawn or invisible
- Support from SDK
  - Register gestures to be recognized
- UI Issues
  - Similar to keyboard short cuts
    - Speed up for experts
    - Hard to learn / remember

Gestures

- Ambiguity
  - Distinction between gestures
  - Distinction between gesture and other ink
- Robustness
  - Handling misrecognized gestures
    - False positive
    - False negative
  - Gesture initiated actions should be undoable

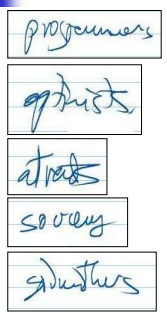
Diagram recognition

- Challenges to recognition
  - Even simple shapes are hard!
  - Variation in drawing
  - Ink artifacts

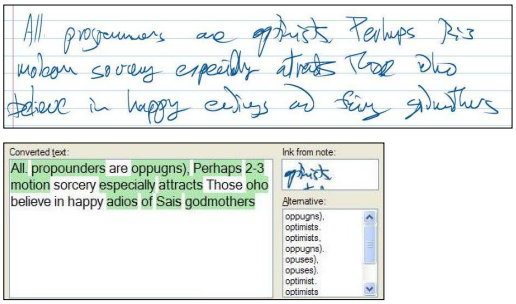
Text recognition

- We will have a great lecture later in the course!
- Basic approach
  - Collect a huge amount of data
  - Use data to train neural net

Handwriting Recognition: Identify the following words



Recognition results



Recognition scenarios

- What level of error is tolerable
- How is feedback provided to the user on recognition
- How does the user specify corrections?

Other details

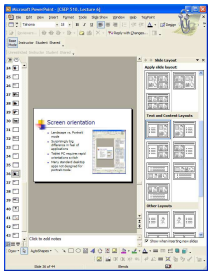
- Hands, obstructions, orientation

Obstructions and handedness

- Hand blocks the screen
- Accommodate left and right handedness
  - Menu direction
  - Context menus
- Difficulties at the edge of the screen

Screen orientation

- Landscape vs. Portrait mode
- Surprisingly big difference in feel of applications
- Tablet PC requires rapid orientations switch
- Many standard desktop apps not designed for portrait mode



Thursday Presentations

- Key points
  - Project scoping
  - Technical Challenges being addressed
  - Schedule and plans

Logistics

- Presentation Order
  - D, C, B, A
- Submit PPTs and Screenshots