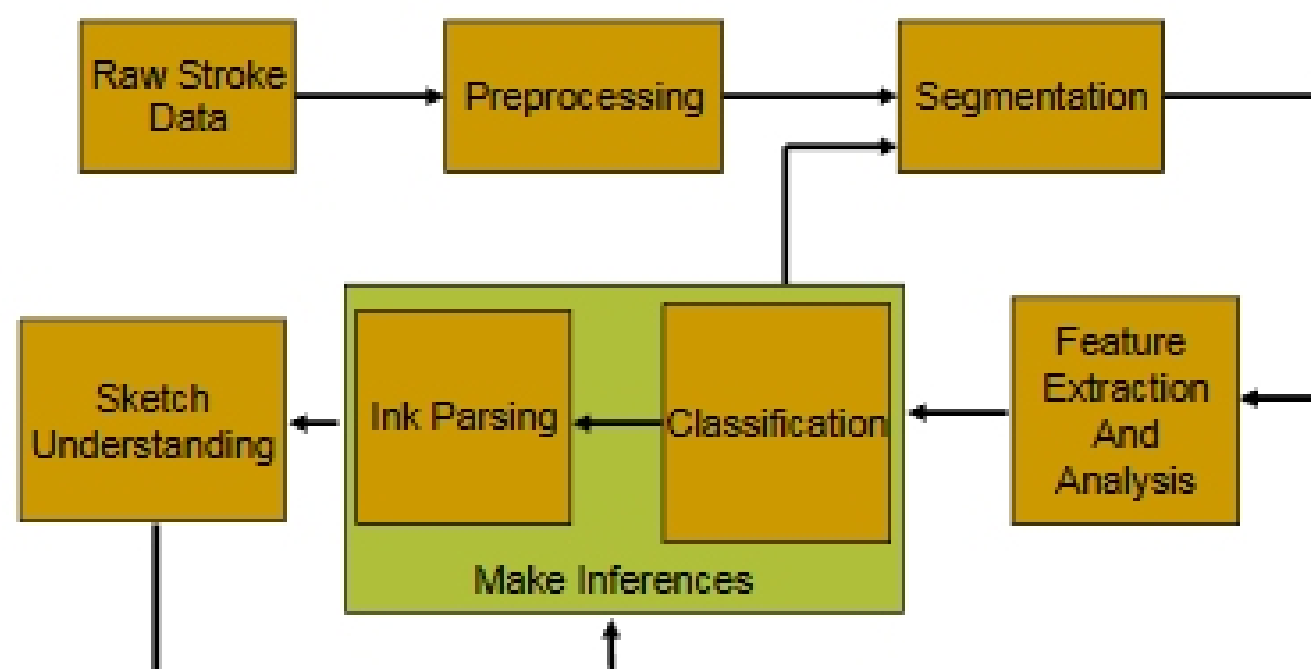


Ink Parsing in Sketch-Based Interfaces

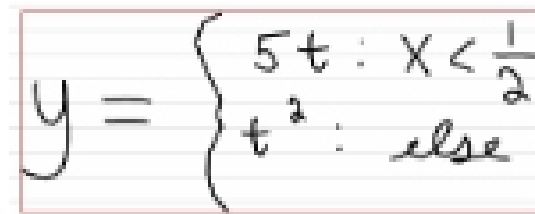
Lecture #10: Ink Parsing
Joseph J. LaViola Jr.
Fall 2007

Recall Pen-Based Interface Dataflow

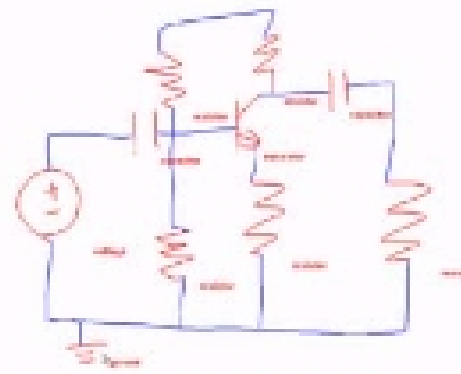


Sketch Parsing

- Often recognition of strokes is insufficient
 - except for gestures
- Require an understanding of spatial relationships
 - good examples are mathematical expressions
- Higher level classifications
 - is it a word or a drawing?



A handwritten mathematical expression on lined paper: $y = \begin{cases} 5t & : X < \frac{1}{2} \\ t^2 & : \text{else} \end{cases}$



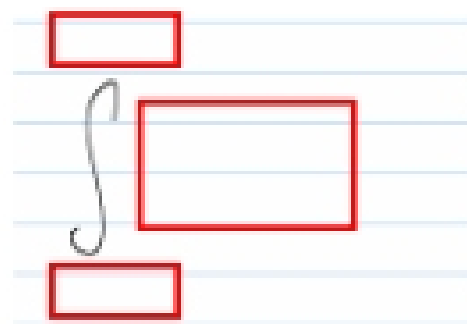
www.engr.ucr.edu/~stahov/research/lcsparc.htm

Approaches to Sketch Parsing

- Top down vs. bottom up
- Focus on mathematical expressions
 - 2D (coordinate) grammars
 - graph rewriting
 - useful for other types of parsing as well (diagrams, tables, lists, etc...)
 - projection profile cutting
 - procedurally coded syntax rules
 - stochastic grammars
- Other parsing approaches
 - conditional random fields
 - statistical visual languages
 - many others

2D Grammars

- **Grammar + spatial relationship rules**
 - useful if a well defined syntax exists
 - looks for key symbols
- **One Approach – Box Grammar**
 - divide input into distinct areas based on symbol found



Graph Rewriting

- **Expressions represented as nodes and arcs**
- **Rewrite rules applied to graph to reduce it progressively**
 - rules are also subgraphs
 - graph reduced to single node representing expression