

Pen-Based Proofs

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Abstract

We present a preliminary evaluation of an outgoing project for developing a learning system for pen-based proofs in computer science. The cornerstone of the system is the concept of geometrical sketching dynamically combined with an underlying mathematical model. The system is based on several sophisticated software libraries and packages, such as a gesture-understanding MagicPaper (MIT), the computer algebra system Mathematica, and the theorem-prover Analytica (CMU).

The primary goal of the project is to develop a library of domain-based gesture recognition tools, that eventually will serve as a foundation for future pen-based interfaces to computer algebra systems. The challenge for us is getting the computer to recognize different types of geometrical drawings - to determine which parts of the sketch are intended to represent a circle, a straight line, or a polygon. On a more detailed level, the computer must distinguish a circle from an ellipse, a rectangle from a trapezoid, and so on. Another core technique with smart digital ink is to have the ability to make a distinction between handwritten words and drawings-it is human nature to annotate drawings with names of points and lines. This is an active area of research and a perfect tool for solving the above problems has not yet been developed. Even the direction of research is under question; should handwriting be only an interface or accommodated by voice and/or video recognition?