File   Edit   Tools   Instructor   Help

Just Truss Me: Truss Recognition

Department of
Computer Science
& Engineering

Travis Kosarek
Texas A&M University
&
Dr. Tracy Hammond
Texas A&M University

Sketch Recognition Lab @ TAMU
http://srl.cs.tamu.edu

Motivation

In entry-level engineering courses, students are required to learn and understand basic statics problems. These problems are hand drawn and do not always have unique solutions. Due to time constraints this type of homework cannot be graded efficiently.

To alleviate the time constraints faced with grading truss diagrams, we developed a sketch based application named Mekanix. Mekanix provides the student with the identical functionality of pen and paper, but also offers real-time feedback when a mistake is made.

A **truss** is a complex shape that can be constructed from a combination of polygons and lines.
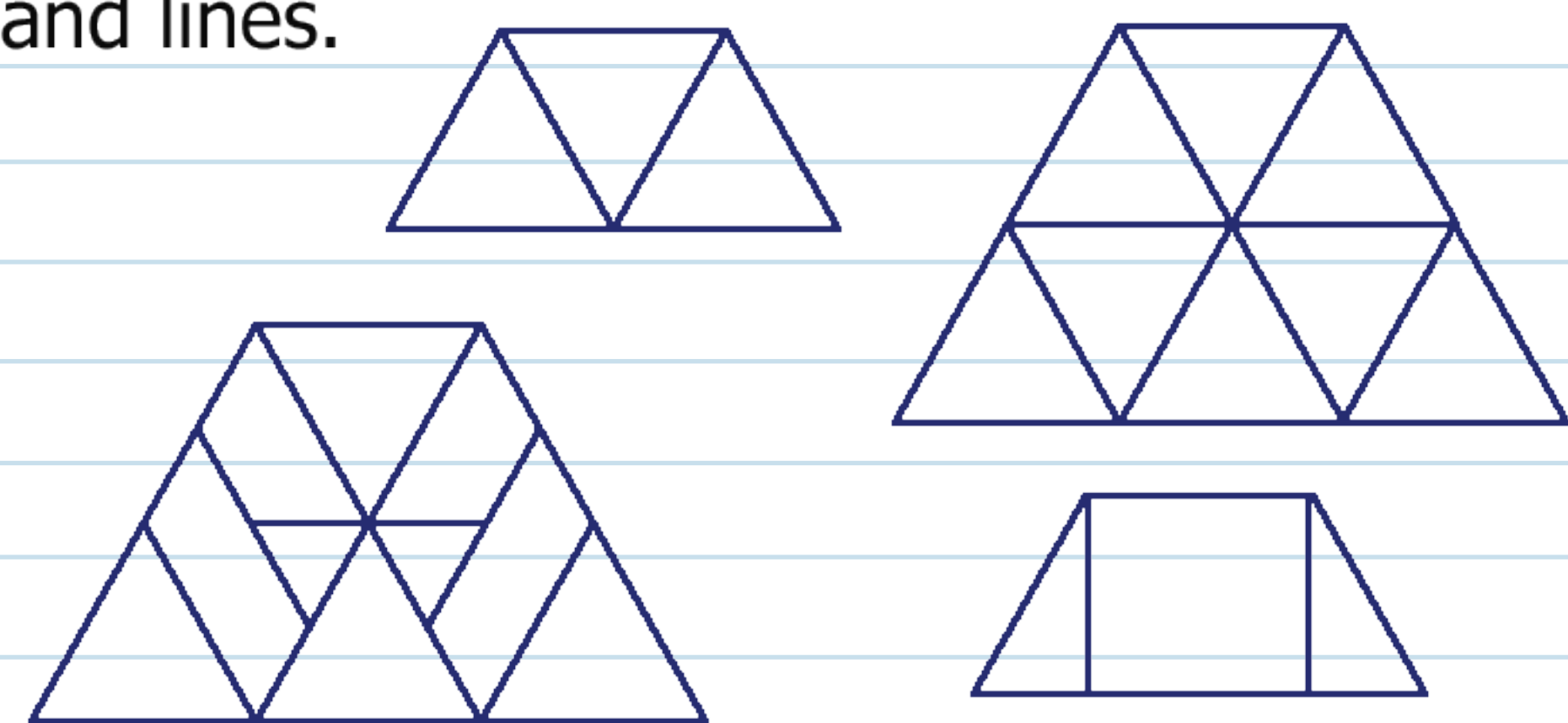
Due to the complexity of truss diagrams and the variability of the drawing order of strokes that form trusses, we developed an algorithm to recognize trusses drawn in any stroke order.

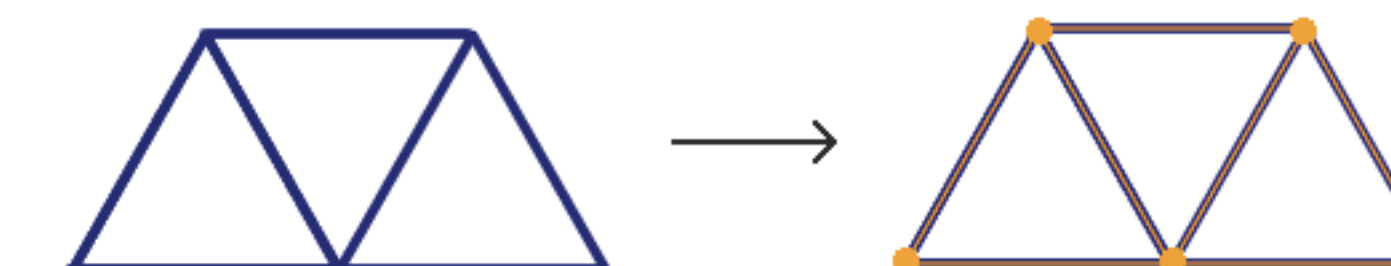## Simple Truss Recognition

1. Recognize a polygon.

2. As strokes are added to the sketch, try to combine the polygon and the recently added strokes into a truss.

Problems with Simple Truss Recognition

1. An additional truss recognizer must be explicitly defined for every combination of lines, polygons and trusses.

2. Identical trusses can be drawn with different sets of strokes. This makes recognition difficult for complex trusses where many stroke combinations may exist.
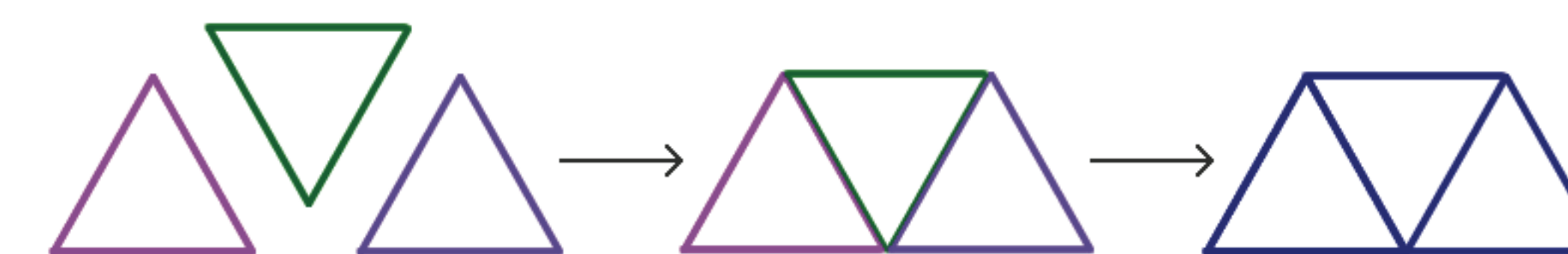
Solution: Intelligent Truss Recognition

1. Divide strokes into smaller segments at intersection points.

2. Use a shortest path algorithm to find the smallest possible polygons.

3. If any polygon shares an edge with another polygon, combine them into a truss.