Intelligent Dynamic Geometry

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In this paper, we will introduce a new piece of software developed by us, which is capable of drawing geometry diagrams automatically. Most previous dynamic geometry software uses construction sequences with ruler and compass as input. But, geometry diagrams in textbooks are usually described declaratively, and the task of converting such a description to constructive form is usually done by human. This makes the use of these software cumbersome. For some diagrams, to find a constructive solution is quite difficult and many techniques were developed for ruler and compass construction since the time of ancient Greek. This new software is trying to mechanize some of the ad hoc methods of ruler and compass construction and to provide an *intelligent dynamic geometry software*, which accepts declarative description of geometry diagrams as input and draw the diagrams automatically. The intelligent dynamic geometry software can be used to input and to manipulate geometric diagrams more easily.

Drawing a diagram with this software has four steps.

Drawing a Sketch The user may use the mouse to draw a sketch of the diagram. Some of the topologic relations such as a point is on a line, a line is tangent to a circle is automatically captured by the software based on the sketch.

Add Geometric Conditions The user may add more geometric conditions to the sketch, such as two lines are parallel, two points has a certain distance, two lines form a certain angle, etc.

Generate a Construction Sequence For each geometric condition added, the software will automatically generate a construction sequence for the diagram with ruler and compass. This construction sequence is similar to the input accepted by most previous dynamic geometry software.

Generate the Diagram The software will determine the positions of the geometric objects in the diagram according to the construction sequence and the sketch. This step is similar to the input procedure of the ordinary dynamic geometry software, but is done automatically according to some strategies.