

## **DEVELOPING A JAVA SOFTWARE TOOL FOR ORIENTED MATROIDS**

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Many algorithms in Computational Geometry are derived by a standard duality transformation, and many of their properties are understood better in one or the other of the dual settings.

As part of a summer internship, we worked on developing a Java software that would facilitate the visualization of dualities for educational and research purposes. The design of this software tool was inspired by the Model View Control paradigm for project design, where the same set of objects can be viewed in different frameworks. This programming approach is strongly object oriented and requires the programmer to separate the application, user input, and display logics. The Model is an interface independent application. We have a linked list called "SetOfPoints" as our model. The View is responsible for maintaining an updated view of the model and must be notified of changes to the model. We can view our model in three different views, namely a Point Frame (primal view), a Line Frame (dual view), and an Information Window. The Control, which is implemented as Menu Bar options in our project, initiates changes to the model, which can be viewed in the frames.

Our software tool consists of three basic frames: Point Drawing Frame, Line Frame, and Information Frame. The points drawn by the user on the active frame, Point Drawing Frame, are translated into lines on the passive frame, Line Frame. The coordinates of these points as well as the attributes of the Point Drawing Window are simultaneously displayed on the Information Window. Our main goal was to make the interface as user friendly as possible. We have provided options for the user to change the attributes of the points, change the appearance of the frames, and a help page that has detailed documentation on the usage of the menu items. The options provided to the user to study the duality of the points include changing the interpretation of points and manipulating their properties.

Having created the kernel, our future goals are to implement other algorithms and dualities such as line segments. Furthermore, switch the modes of the frames, making the Line Frame active and the Point Frame passive. This research project is being conducted under the supervision of Professor Ileana Streinu, from the Department of Computer Science, Smith College. Updated versions of the program can be accessed at the following URL:

<http://cs.smith.edu/~streinu/Projects/Duality/AnApplet.html>

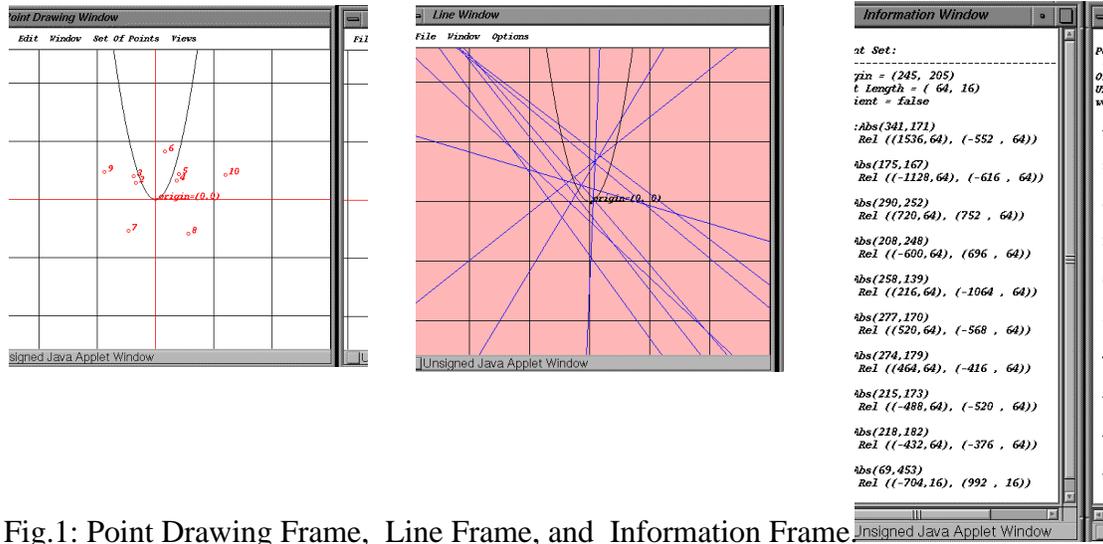


Fig.1: Point Drawing Frame, Line Frame, and Information Frame