

## Mathematical Toolbox for editing Equations and Geometrical Diagrams and Graphs

**Authors :** Ayola D. N. Jayamaha, Gihan V. Dias, Surangika Ranathunga

**Abstract :** Currently there are lot of educational tools designed for mathematics. Open source software such as GeoGebra and Octave are bulky in their architectural structure. In addition, there is MathLab software, which facilitates much more than what we ask for. Many of the computer aided online grading and assessment tools require integrating editors to their software. However, there are not exist suitable editors that cater for all their needs in editing equations and geometrical diagrams and graphs. Some of the existing software for editing equations is Alfred's Equation Editor, Codecogs, DragMath, Maple, MathDox, MathJax, MathMagic, MathFlow, Math-o-mir, Microsoft Equation Editor, MiraiMath, OpenOffice, WIRIS Editor and MyScript. Some of them are commercial, open source, supports handwriting recognition, mobile apps, renders MathML/LaTeX, Flash / Web based and javascript display engines. Some of the diagram editors are GeoKone.NET, Tabulae, Cinderella 1.4, MyScript, Dia, Draw2D touch, Glify, GeoGebra, Flowchart, Jgraph, JointJS, J painter Online diagram editor and 2D sketcher. All these software are open source except for MyScript and can be used for editing mathematical diagrams. However, they do not fully cater the needs of a typical computer aided assessment tool or Educational Platform for Mathematics. This solution provides a Web based, lightweight, easy to implement and integrate solution of an html5 canvas that renders on all of the modern web browsers. The scope of the project is an editor that covers equations and mathematical diagrams and drawings on the O/L Mathematical Exam Papers in Sri Lanka. Using the tool the students can enter any equation to the system which can be on an online remote learning platform. The users can also create and edit geometrical drawings, graphs and do geometrical constructions that require only Compass and Ruler from the Editing Interface provided by the Software. The special feature of this software is the geometrical constructions. It allows the users to create geometrical constructions such as angle bisectors, perpendicular lines, angles of 600 and perpendicular bisectors. The tool correctly imitates the functioning of rulers and compasses to create the required geometrical construction. Therefore, the users are able to do geometrical drawings on the computer successfully and we have a digital format of the geometrical drawing for further processing. Secondly, we can create and edit Venn Diagrams, color them and label them. In addition, the students can draw probability tree diagrams and compound probability outcome grids. They can label and mark regions within the grids. Thirdly, students can draw graphs (1st order and 2nd order). They can mark points on a graph paper and the system connects the dots to draw the graph. Further students are able to draw standard shapes such as circles and rectangles by selecting points on a grid or entering the parametric values.

**Keywords :** geometrical drawings, html5 canvas, mathematical equations, toolbox

**Conference Title :** ICPAPR 2016 : International Conference on Pattern Analysis and Pattern Recognition

**Conference Location :** Singapore, Singapore

**Conference Dates :** January 07-08, 2016