3.2. Area proportional Venn-2 and Venn-3

The Venn diagrams drawn with two and three curves are worth studying in more detail because of their frequent use in presenting statistical data.





Venn-2. From Ip. Visualizing Multiple Regression. Statistics Education 9(1). 2001 Venn-3. From Tim Hulsen, de Vlieg, Alkema. BioVenn... BMC genomics, 2008 Area proportional Venn-2 can always be drawn exactly using circles

Area of circle a is population of a+ab Area of circle b is population of b+ab use $A=\pi r^2$ to find the radius of the circles.

Then use some numerical method (e.g. bisection) to find the relative position of the circle centres.



Venn-2 software

Populations: a = 2, b = 4, ab = 3 From the applet at: <u>http://apollo.cs.uvic.ca/euler/DrawVenn/index.html</u> (paper is Chow and Ruskey, Graph Drawing 2004)





Area proportional Venn-3 cannot always be drawn with convex curves

Most area specifications cannot be drawn with circles, but approximations are possible. E.g.

http://www.cs.kent.ac.uk/people/staff/pjr/EulerVen nCircles/EulerVennApplet.html

Discussion Point. When is an approximation acceptable?



Drawing Venn-3 with other shapes

Ellipses. More degrees of freedom, but it still not possible to draw all shapes.

Rectilinear. Three rectangles can be used, Once one single set becomes too small, The rectangle has a chunk removed





General Polygons

This is the shape that we consider the best for keeping curves convex: http://www.cs.kent.ac.uk/people/staff/pjr/ConvexVenn3/ diagrams2010.html





Area Proportional Venn-3 current research topics

Theory: There are a number of outstanding results

HCI: Which Shapes are best, and why?

Application: When should we use Exact vs. Approximate diagrams?

