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Additional information

<http://www.eulardiagrams.org/eulerAPE>

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Enquiries

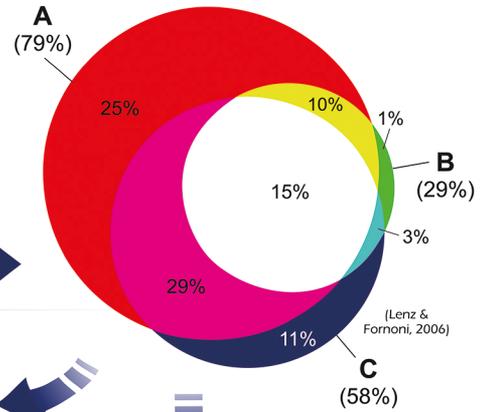
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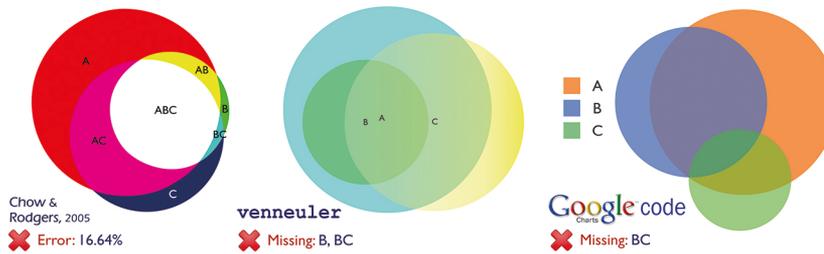
Drawing Area-Proportional Venn-3 Diagrams using Ellipses

Problem

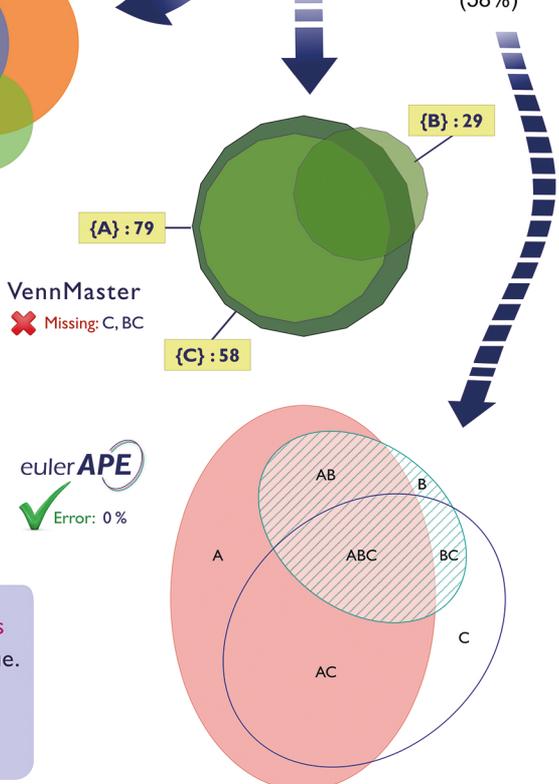
Area-proportional Venn-3 diagrams are used extensively in areas such as biosciences, business and criminology to intuitively represent **containment**, **intersection** and **exclusion** of data, and visualize **proportions** to facilitate data analysis. However, since none of the current **automatic diagram drawing techniques** produce exact proportions, confusing diagrams are used.



Drawing Techniques



- Circles** usually produce diagrams with inexact area-proportions or missing regions.
- Polygons** could solve these issues, but their irregular shapes impede understanding.
- Ellipses** have more degrees of freedom than *circles* and unlike *polygons* have a desirable, smooth shape. Thus, they are more likely to produce exact diagrams.

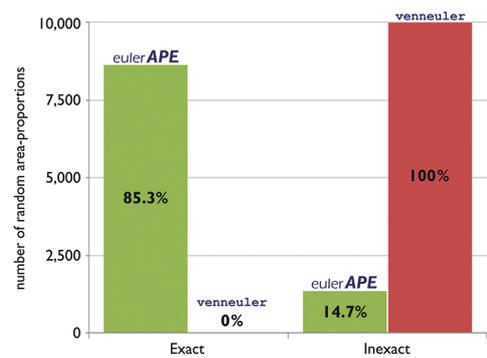


eulerAPE draws area-proportional diagrams using **ellipses** and a **hill climbing** optimization search technique.

Exact area-proportions are drawn in 85% of random cases.
Inexact diagrams are still far better than diagrams drawn with circles.

Effectiveness

Diagrams for **random area-proportions** were drawn using **eulerAPE** and the leading circle-based method, **venneuler**.



A **significant improvement** in accuracy is evident with **eulerAPE** and thus, using **ellipses**, more exact area-proportions can be drawn.

Also, **eulerAPE** handles **local minima** effectively:
 it draws an exact diagram for **100%** of area-proportions that can be represented accurately.

