

**NAME**

**gvmap** – find clusters and create a geographical map highlighting clusters.

**SYNOPSIS**

**gvmap** [ *options* ] [ **-o** *outfile* ] [ *files* ]

**DESCRIPTION**

**gvmap** takes as input a graph in DOT format, finds node clusters and produces a rendering of the graph as a geographic-style map, with clusters highlighted as countries, in xdot format.

In the input graph, each node must have position, width and height information (*pos*, *width* and *height* attributes, respectively) defined, and nodes must not overlap.

By default, **gvmap** will generate the clusters from the data. If desired, the input graph can specify cluster information by giving every node a *cluster* attribute whose value is a small positive integer. (It works best if *cluster* values are all integers in the interval [1,K] for some K. Nodes sharing the same *cluster* attribute value will be put into the same cluster. **N.B.** For the *cluster* attribute to be used, all nodes must have a valid value.

If the *-D* flag is used, **gvmap** will use the top-level cluster subgraphs to determine the clustering. Any nodes not in such a cluster will be put into a single catch-all cluster.

If the input specifies the desired clustering as described above, it can also specify a desired coloring by having some node in each cluster provide a *clustercolor* attribute. **N.B.** Unless one specifies *-c0*, only the *clustercolor* of the last node in a cluster has an effect. In addition, unless one uses *-O*, **gvmap** may permute the given colors.

**OPTIONS**

The following options are supported:

- a k** The integer *k* specifies the average number of artificial points added along the bounding box of the labels. Such artificial points are added to avoid a country boundary cutting through the boundary box of the labels. Computing time is proportional to *k*; hence, for large graphs, a small value of *k* is suggested. If *k* = -1, a suitable value of *k* is automatically selected based on the graph size. By default *k* = -1.
- b v** The real number *v* specifies the line width used to draw the polygon boundaries, with *v* < 0 for no line. By default *v* = 0.
- c k** The integer *k* specifies color scheme used to color the countries. By default *k* = 1.

Acceptable values are:

- 0 : no polygons
- 1 : pastel
- 2 : blue to yellow
- 3 : white to red
- 4 : light grey to red
- 5 : primary colors
- 6 : sequential single hue red
- 7 : sequential single hue lighter red
- 8 : light grey

**-c<sub>opacity</sub>=xy**

Specifies a two-character hexadecimal string specifying the opacity of the polygons.

- C d** The integer *d* specifies the maximum number of clusters (countries) allowed. By default *d* = 0, which means that there is no limit.
- d d** The integer *d* specifies the random seed used during color assignment optimization that maximize color difference between neighboring countries.
- D** If specified, the graph's cluster subgraphs are used to specify the clustering.

- e** If specified, edges will be included in the final output.
- g c** Specifies the bounding box color. If not specified, a bounding box is not drawn.
- h k** The number of artificial points added to maintain a bridge between endpoints. By default, this is zero.
- highlight=k**  
Only draw cluster *k*. By default, all clusters are drawn.
- k** If specified, increases the randomness of outer boundary.
- l s** Use the string *s* as a label for the drawing.
- m v** Generate a margin of *v* points around the drawing. By default, this is determined by **gvmap**.
- O** Do NOT do color assignment optimization that maximizes color differences between neighboring countries
- o <file>**  
Put output in <file>. Default output is stdout
- p k** Indicates what level of points should be shown. By default, no points are shown.  
Acceptable values are:  
0 : no points  
1 : all points  
2 : label points  
3 : random/artificial points
- Q** Use modularity quality for clustering rather than the default modularity clustering.
- r k** The number of random points *k* (integer) used to define sea and lake boundaries. If 0, auto assigned. By default *v* = 0
- s v** The real number *v* specifies the depth of the sea and lake shores in points. If 0, auto assigned. By default *v* = 0.
- t n** Make *n* attempts to improve cluster contiguity.
- v** Verbose mode.
- z c** Specified the polygon line color. Default is black.
- ?** Print usage and exit.

## EXAMPLES

Given a graph `foo.gv`, one way to generate a layout and highlight the clusters is to first select a layout engine with a suitable overlap removal method, then feed the output to `gvmap`, and finally render the map using specific graphics format. For example, the following pipeline creates a map with edges in semi-transparent light gray and nodes laid out using `sfdp`:

```
sfdp -Goverlap=prism foo.gv | gvmap -e | neato -n2 -Ecolor=#55555522 -Tpng > foo.png
```

The shell script `gvmap.sh` provides a shorthand for such pipelines. For example, the above pipeline can be achieved using

```
gvmap.sh -Ae -Ecolor=#55555522 -Tpng foo.gv > foo.png
```

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## SEE ALSO

`gvmap.sh(1)`, `sfdp(1)`, `neato(1)`, `gvpr(1)`

E. R. Gansner, Y. Hu, S. G. Kobourov, "GMap: Visualizing graphs and clusters as maps," *Proc. Pacific Vis.* 2010, pp. 201-208.