

NAME

pvxord - Tool for Parallel Graph Drawing.

VERSION

Version 0.5 9/22/2006

SYNOPSIS

pvxord input_int_file output_coord_file [-a attraction_power] [-b schedule_start starting_coord_file] [-d dimensions] [-e edge_cut] [-f output_int_file] [-h] [-m interval] [-n notice_level] [-r random_seed] [-s graph_scale] [-t iteration_scale] [-u nodes_per_sync] [-v view_scale] [-w weight_power] [-z]

DESCRIPTION

This program supports parallel graph drawing via MPI. A graph is drawn based on a simulated annealing optimization of an energy function where:

$$K_i = D_i + \sum_j 0.02 * a^b * w_{i,j}^c * d_{i,j}^2$$

for each node i where a is a dynamic attraction factor adjusted during simulated annealing, w is the edge weight between two nodes, d is the distance between two nodes, and D is the local density of a node. The default values for b and c are 4 and 2 respectively.

The default number of iterations is scaled with the number of nodes. To decrease or increase the run time, use the **-s**, **-v**, or **-t** options. To improve clustering, increase the *edge_cut* (**-e**) and the *graph_scale* (**-s**).

The program requires a .int file containing nodes and edges as input, and produces a .coord file with node coordinates as output. See **FILE FORMATS** below.

PARAMETERS

-a *attraction_power*

Set the attraction power (b) in the energy function. The default is 4.0

-b *schedule_start starting_coord_file*

Load in a starting set of coordinates from *starting_coord_file*. The schedule start specifies the stage in the optimization protocol at which nodes with preexisting coordinates are allowed to move. For default scheduling, the stages are 0 (liquid), 2 (expansion), 3 (cooldown), 5 (crunch), and 7 (simmer). If 0 is specified, the normal optimization is performed. If 5 is specified, the nodes with coordinates in the .coord file are fixed until the crunch stage. If 8 or larger is specified, the nodes with coordinates in the .coord file remain rigid throughout the optimization. Coordinates for all nodes do not need to be specified in the coord file. If only coordinates for a partial graph are specified, the remaining nodes undergo full optimization.

-d *dimensions*

Number of *dimensions* to do graph drawing in. (2 or 3)

-e *edge_cut*

Set the level of edge cutting between 0 (lowest) and 1 (highest)

-f *output_int_file*

Output a file containing the edges in the graph. Edges which have been cut are not output.

-h Print out the man page for help

-m *interval*

Output intermediate frames during graph optimization after each '*interval*' iterations. The file names are: moviee.####.crd.

-n *notice_level*

Set the degree of program output. Use:

- n 0** No output
- n 10** Normal program output
- n 20** Parameters useful for reproducing the results
- n 30** All output

-r *random_seed*

Set the random seed. The graph is reproducible with the same seed *only* when using the same number of processors.

-s *graph_scale*

Set the scaling on the number of iterations and view size. By default, iterations and view are increased with an increase in nodes. To maintain a constant number of iterations and view size regardless of the number of nodes, use **-s 1**. To see the value of the default *graph_scale* of a given graph, run this program with the **-n 30** option. The value of *graph_scale* can then be decreased (to decrease the run time) or increased (to improve the clustering) as needed. See also '**-v**' and '**-t**' to set the view size and iteration scales independently.

-t *iteration_scale*

Set the scaling for the number of iterations. (See **-s**)

-u *nodes_per_sync*

Number of nodes to move on each processor before synchronization occurs.

-v *view_scale*

Set the scaling for the view size. (See **-s**)

-w *weight_power*

Set the exponent for edge weights in the objective function. The default is 2. Increasing this number can improve clustering.

-z Perform graph drawing around a sphere.

FILE FORMATS

The format for the .int output file is:

```
number_of_nodes  
nodeid_1 node_id2 edge_weight  
nodeid_1 node_id2 edge_weight  
...
```

where the node id's must be numbers with 1 as a starting index and the edge weights must be positive and scaled between 0 and 1.

The format for the .coord output file (or input file) is:

```
node_index node_position  
node_index node_position  
...
```

The format for the edges output file (**-f**) is the same as the .int file.

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SEE ALSO

sim_to_int(1), hi_embed(1), pygraph(1)