Notes

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Articles

Displacement Interpolation Using Lagrangian Mass Transport

Link pdf
Mass Transport Problem :
Transportation Simplex $->$ Earth Moving Distance
Network simplex algorithm (*with block search pivoting ??*) from LEMON graph library $->$ general min-cost flow problems Transportation simplex have worst case complexity in $O(n^3)$ but generally behaves in $O(n^2)$ in some context.

Limitation : Problem size $->$ cost matrix storage too heavy for GPU memory. Presented method working for interpolation between two distributions, future work idea : interpolation between N distribution (texture mixing)
Radial basis function ?

Minimum-cost flow algorithms: An experimental evaluation

Link pdf
Minimum-cost flow algorithms in the LEMON library :

Spanning tree data structures :
ATI (Augmented Threaded Index) vs XTI (eXtended Threaded Index) XTI apparently have better performance for network simplex.
Additional improvement : a reverse thread index is also stored for each node to represent the depth-first traversal as a doubly-linked list.
For initialization of the initial spanning tree solution, adding an artificial root with additionnals arcs between the nodes and the new roots provides better performances.

Pivot rules :
simplest pivot rules : *best eligible* and *first eligible*.

block search pivot rule : cyclically examines certain subsets (blocks) of the arcs and select best candidate at each iteration. Block size seems quite important parameter, set the size proportionally to $|A(G)|$ between 1% and 10%. Article experiments suggest $block\_size = \lfloor\sqrt{m}\rfloor$ with (m = $|A(G)|$, the number of arc in graph G)

candidate list pivot rule : method that examines arcs and build a list of most eligible arcs. The list is then used for at most K iterations. If an arc becomes non-eligible, it is removed from the list. Article suggest : $L = \lfloor\sqrt{m}/4\rfloor$ and $K = \lfloor L/10\rfloor$.

altering candidate list pivot rule : improved version of *candidate list pivot rule* presented in the article. It maintain a list of size K of eligible arcs at each iteration, extending and removing arcs only searching in one arc block with size B. Article suggest $B = \lfloor\sqrt{m}\rfloor$ and $K = \lfloor B/100\rfloor$.

Ressources

repository of Optimized version of Simplex Network from LEMON : `https://github.com/nbonneel/network_simplex`
Simplex algo for mincost flow problem : *Network Optimization: Continuous and Discrete Models, p. 201*