Technische Universität München
Fakultät für Informatik
Lehrstuhl für Effiziente Algorithmen
Prof. Dr. Ernst W. Mayr
Chintan Shah, Chris Pinkau, Jeremias Weihmann, Johannes Krugel

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Praktikum Diskrete Optimierung

Due date: Monday, 18th June 2012, 12:00

Aufgabe 1 (Edit Distance `edit`)

Implement for each of both variants to solve the problem a function which computes the edit distance between two given ASCII-strings X and Y such that the running times are in $O(|X||Y|)$ (if you use Dijkstra instead of topological sorting for the second method, the running time is allowed to be larger). The strings X and Y are should be given to these functions as parameter of the type `char *`.

Thus, implement the algorithm which uses dynamic programming to compute the edit distance. This function is not allowed to use LEDA, and the computation of the table values should be optimized such that at most $O(\min\{|X|, |X|\})$ memory is used (that means that not the whole table can be stored at once). You don't have to animate this algorithm.

Then implement the second method, i.e. the method that reduces this problem to a shortest-path-problem in a directed acyclic graph. For this variant you can use LEDA and also use your own implementation of Dijkstra, or (for a better running time) an approach based on topological sorting. The resulting graph should be displayed on the screen and the shortest path should be marked. (The computation of the path itself doesn't have to be animated.)

Remarks:

Submit one single program which is started with two parameters. If the first parameter is `matrix`, then the first variant should be used. If the first parameter is `graph`, then the shortest path approach should be used. The second parameter is name of a file which contains X and Y one after another such that each of these strings are followed by "\$\n" which indicates the respective end of the strings. ('\$' is neither part of X nor of Y.) You can use the files `textpair*.txt` as inputs for your program.