VE477
Introduction to Algorithms

Lab 5

Manuel — UM-JI (Fall 2019)

Goals of the lab

- Course application
- Data sctructures
- Python Object Oriented Programming

Unless specified otherwise, all the programs are expected to be completed in Python.

1. Graph representations:
   (a) Implement a class for sparse graphs;
   (b) Implement a class for dense graphs;

   In each case implement at least the following methods:

   - `AddEdge`
   - `RemoveEdge`
   - `AddVertex`
   - `RemoveVertex`
   - `IsAdjacent`[1]
   - `GetEdgeWeight`
   - `SetEdgeWeight`
   - `GetVertexValue`
   - `SetVertexValue`
2. Implement Dijkstra algorithm (3.13) using Fibonacci heaps;
3. Bellman-Ford (algorithm 3.17);
4. Compare the efficiency of Bellman-Ford and Dijkstra in terms of (i) complexity and (ii) running time;

[1] `v.IsAdjacent(u)` checks if vertices v and u are adjacent.