HW3 Report
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I. Environment
OS: macOS 10.13.6
Language: Python3.6
Editor: Visual Studio Code

II. Method

- **<u>Parse strings from input.txt</u>**

  The strings in the input file are not easy to parse to a neat form, because there are no characters in the beginning of the file to indicate that how many tables are there and how many cases in each tables are to be evaluated.

  Thus, I first parse all the strings, which are separated by '\n', into an array, and loop through the array to find the locations, where split all the strings into different sets. In each sets consist of one table and multi cases.

  Finally, the raw strings in the input file can be parsed into an array for the following processes.

- **<u>Build multistage graph for finding the appropriate choice for each courses</u>**

  I build a multistage graph as fig1 to represent the resource allocation problem, with source node at start of graph, representing initial stage, set of nodes at each stage of each state and sink node at end of graph, which is a collapsed representation of the final state.

  Each node is characterized by V(i, j) , which holds the value obtained from initial stage up to current stage by committing j resources. Each node also stores its predecessor node.

  Each arc is characterized by E(m, n), which holds the value obtained by spending n resources on project m.

  In the forward direction, which means starting from source node and ending at sink node, each node in different stage is linked by several possible nodes in previous stage. Current node chooses the maximum value among addition of the value of possible nodes and the value of relevant arc. In the end, the sink node holds the maximum profit under committing certain amount of resources.

III. Results

Please refer to the output file.

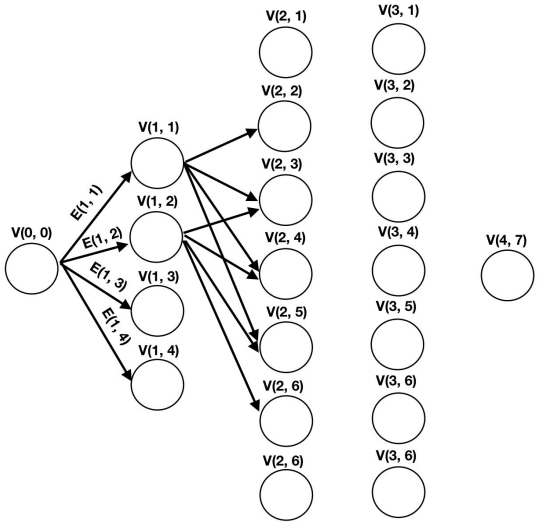

Figure 1. Multistage graph