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Foundations Of Algorithm  
Homework 4

12/02/2019

(a) Input to the Algorithm

My input is a csv file with 5 columns.

- 1) Source Airport
- 2) Destination Airport
- 3) Departure Time
- 4) Arrival Time
- 5) Capacity of the flight.

Assumptions :- Im directly giving the capacity of flights in the input csv file to decrease the complexity of the problem.

(b) Pseudo Code of the Algorithm

\*\* Main Function

Begin:

Nodes  $\leftarrow$  get nodes from input file

FlowNetwork  $\leftarrow$  add every edge to the corresponding start node as a list

# Calling function CalculateMaxflow()

Output = CalculateMaxflow()

End

\*\* Calculate MaxFlow()

Begin:

```

source ← from nodes
sink ← from nodes
path = FindPath( source, sink, path, 0 )
while path NOT NULL:
    update flow on the edges
    flow = residual capacity
    edge-flow += flow
    edge-backflow -= flow
    path = FindPath( source, sink, [], 0 )
    return sum of flows from edges on
    end source node.
End.

```

```

** FindPath ( source, sink, [], previous-NodeTime )
    Begin!
    if departureNode == ArrivalNode
        return path
    end
    for edge ← flownetwork[node]
        residualCapacity = edge-capacity -
                           edge-flow
        if ( residualCapacity > 0 and
              edge not in path and
                previous-NodeTime < edge-dept ):
            path = FindPath( edge, sink, path, .. )
            if path NOT NULL;
                Return Path.
        end

```

End      end      end

(c) Time Complexity of the Algorithm

$M = \text{No. of Edges}$

Let  $f^* = \text{maximum flow of the Network}$

Complexity =  $O(Mf^*)$

(d) Output of the code when executed on the dataset

Total No. of Node = 10  
Total No. of Edges = 56      } from input file  
Output = 5271