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Study and Analysis of Networks Flows

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Abstract

Acknowledgment

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2.1 Augmenting path algorithms

2.1.1 Introduction

The idea behind the augmenting path algorithms is as follows : As long as there is a path from the source to the sink, we send flow along this path. And so on until there is no more path from the source to the sink.

An available path from the source to the sink is called *augmenting path* and to find it, we use the *residual graph*. A *residual graph* is a double oriented graph with the available capacities. For instance here is a graph with its *residual graph*:

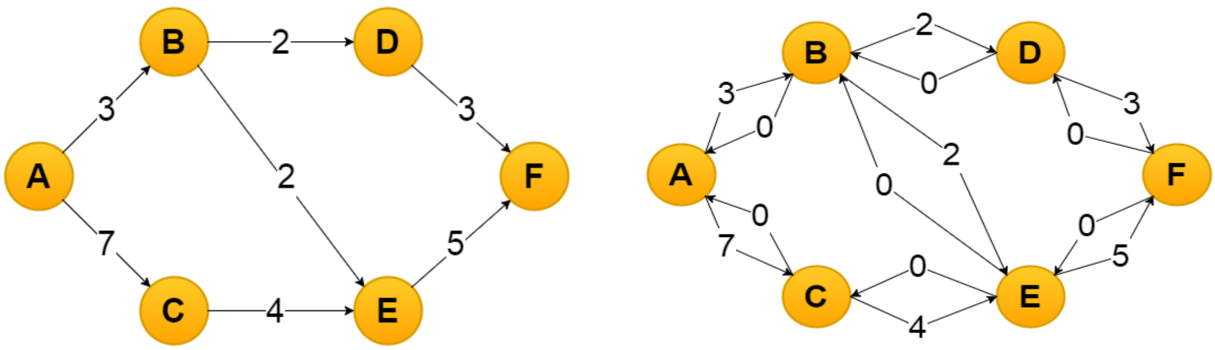

Figure 2.1: Graph with its residual graph

When an *augmenting path* is found, we send a flow equivalent to the minimum capacity of the edges of this path. We update the *residual graph* and then we look for a new augmenting path.

Here is the *residual graph* after sending 4 units of flow through the *augmenting path* A-C-E-F :

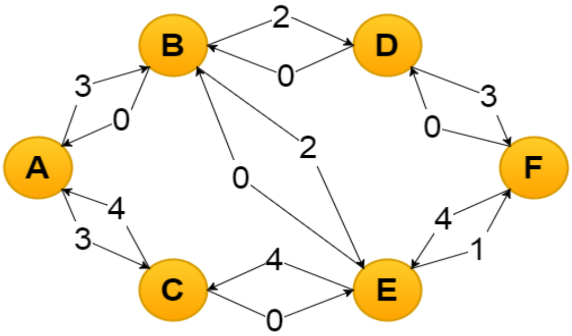

Figure 2.2: Residual graph

The pseudo-code of the augmenting path algorithm is given here :

```
Look for an augmenting path;
while There is an augmenting path do
    Send flow through this path;
    Update the residual graph;
    Look for an new augmenting path;
end
```

2.1.2 Ford-Fulkerson vs Edmonds-Karp

Je cause de la diffÃ©rence entre FF et EK

2.1.3 Complexities

Petite intro pour dire que c'est polynomial

Ford-Fulkerson

Edmonds-Karp

Il faut dÃ©montrer que la complexitÃ© grand O est pas possible?

2.2 Pre-flow algorithms

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