**An augmenting path** is a simple path from source to sink which do not include any cycles and that pass only through positive weighted edges.

**A residual network graph** indicates how much more flow is allowed in each edge in the network graph.

If there are no augmenting paths possible from 𝑆 to 𝑇, then the flow is maximum.

The result i.e. the maximum flow will be the total flow out of source node which is also equal to total flow in to the sink node.

**Implementation:**

* An augmenting path in residual graph can be found using DFS or BFS.
* Updating residual graph includes following steps: (refer the diagrams for better understanding)
  + For every edge in the augmenting path, a value of minimum capacity in the path is subtracted from all the edges of that path.
  + An edge of equal amount is added to edges in reverse direction for every successive nodes in the augmenting path.

• **Residual Capacity**: For each edge (u,v) in the original network with capacity c(u,v) and current flow f(u,v), the residual capacity r(u,v) is defined as c(u,v)−f(u,v).

• **Reverse Edges**: If there is a flow f(u,v) from u to v, a reverse edge (v,u) with capacity equal to f(u,v) is added to allow for the possibility of reducing the flow in subsequent iterations.

**Augmenting Flow**

An augmenting path is a path from the source s to the sink t in the residual network, where each edge in the path has a positive residual capacity.

The augment flow is the process of increasing the flow along this path by the smallest capacity edge in the path (the bottleneck capacity).

This is because the flow cannot exceed the capacity of the smallest edge on that path.

**Residual Network**

A residual network is a transformed version of the original flow network.

It represents the available capacity for additional flow and helps in finding augmenting paths.

The residual network is created by considering the capacities of the edges after accounting for the current flow

The Ford-Fulkerson algorithm is a fundamental method for solving the maximum flow problem in a flow network.

The goal of the maximum flow problem is to find the greatest possible flow from a source vertex s to a sink vertex t in a flow network, where each edge has a capacity that limits the amount of flow it can carry.

Here's an overview of the algorithm and its implementation’







