**Matching a Bipartite graph.**

Course: Algorithms Analysis & Design II.

Course Code: CSC315.

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Department: Computer Science.

Instructor: Assoc. Prof. Fatty M. Salem.

Link: <https://github.com/BonyGeorge/Job_Vacancies_Project> .

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**[2] Abstract:**

In our recent years, we have been

using the graph-based object representation more often till it became a more popular than ever. The graph edit distance emerged is as powerful and more flexibility graph which is used to assign different tasks such as: Pattern Recognition, Machine Learning and Data Mining.

**[3] Keywords:**

Graph based representation, Pattern, Pattern Recognition, Machine, Machine Learning, Graph edit distance, Bipartite graph matching, Image feature matching.

**[4] Introduction:**

The **bipartite graph (G)** or also called **bigraph** is a graph which its vertices are divided into parallel sets or we can also say two adjacent sets of independent vertices which are **U sets** and **V sets** that are connected with **edge E** and there is no connection between each set vertices.

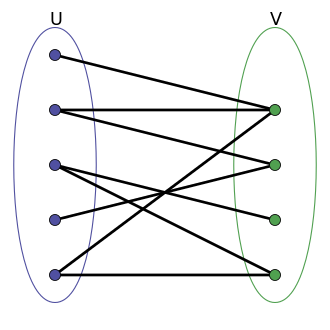


Fig (1): Simple bipartite example.

**[5]** **Importance & Applications:**

1 – Machine Learning.

2 – Pattern Recognition.

3 – Data Mining.

4 – Image Features matching.

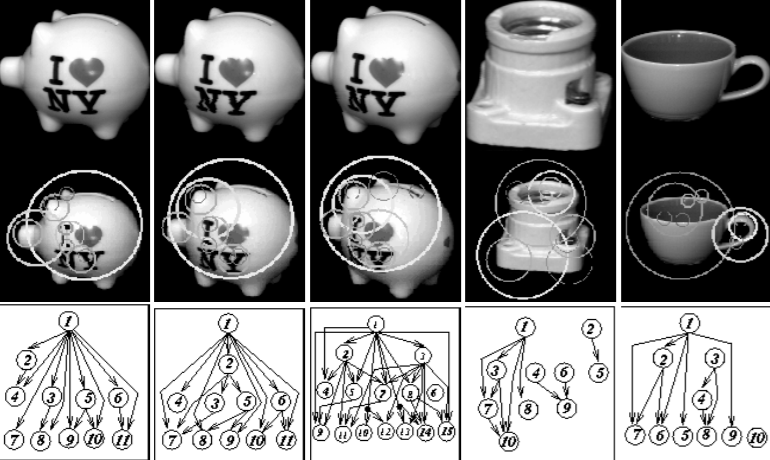


Fig (2): Example of Pattern Recognition using Maximum Bipartite Matching.

**[6] Inputs & Outputs:**

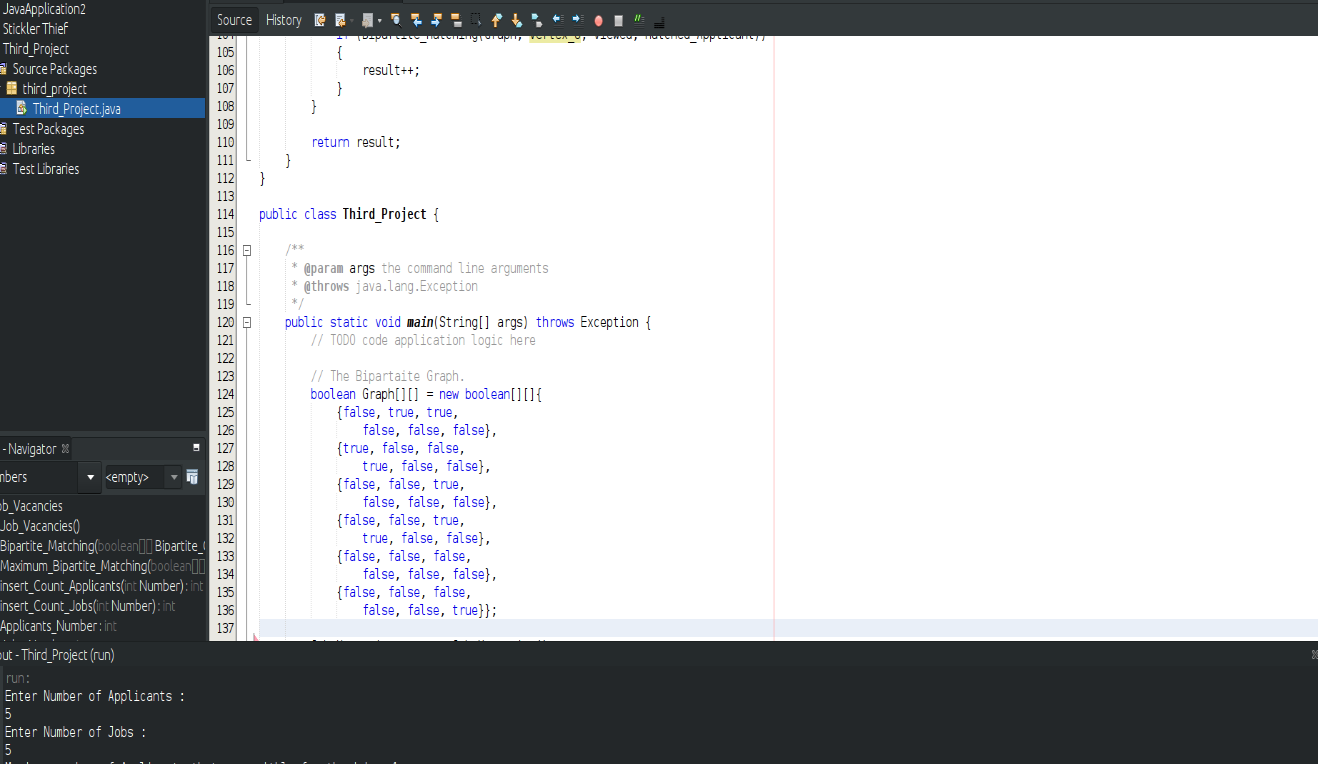
 At the beginning of the program it will ask you to insert how many applicants you have and how many jobs are available. After inserting them in number values the program will calculate automatically the maximum flow (How many applicants are suitable for a job) by using the **Ford Fulkerson** Maximum flow algorithm.

Fig (3): Inserting inputs in the program.

**[7] Techniques:**

The maximum bipartite matching problem has many techniques to be solved by but most of the people nowadays, prefer using the Ford Fulkerson maximum flow algorithm.

From these techniques are:

1 – Greedy Algorithm.

2 – Augmenting Path Algorithm.

3 – Ford Fulkerson Algorithm.

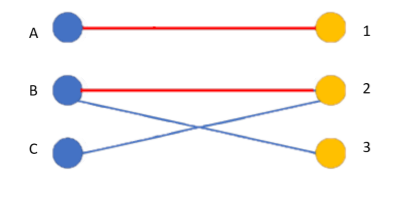


Fig (4): Example of Augmenting Path Algorithm.