

# GBR 2011, MÜNSTER

## SPEEDING UP GRAPH EDIT DISTANCE COMPUTATION THROUGH FAST BIPARTITE MATCHING

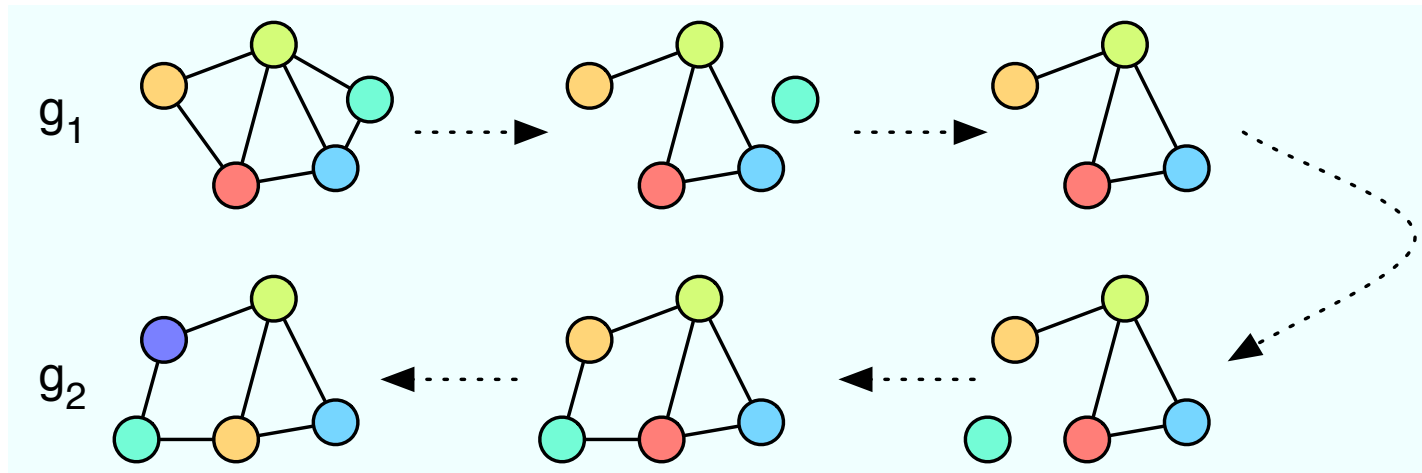
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# Graph Edit Distance



- The graph edit distance  $d$  of two graphs  $g_1$  and  $g_2$  is the minimum cost sequence of edit operations that transform  $g_1$  into  $g_2$
- Graph edit distance is very flexible and powerful and has been frequently used
- However, its computational complexity is exponential

# Suboptimal Graph Edit Distance

- In previous work, we have proposed a suboptimal solution to the graph edit distance computation problem, based on bipartite matching:
  - K. Riesen and H. Bunke. Approximate graph edit distance computation by means of bipartite graph matching. *Image and Vision Computing*, 27(7):950-959, 2009.
- Graph edit distance computation is formulated as an assignment problem
- Munkres algorithm gives us an optimal solution to the assignment problem; it has a time complexity of only  $O(n^3)$
- The solution is only suboptimal w.r.t. the graph edit distance problem
- Nevertheless the method has been shown to yield almost the same accuracy in classification and clustering as an optimal solution

# Contribution of the Current Paper

- Investigation of two additional algorithms:
  - *J. Munkres. Algorithms for the assignment and transportation problems. In Journal of the Society for Industrial and Applied Mathematics , volume 5, pages 3238, 1957.*
  - H.W. Kuhn. The Hungarian method for the assignment problem. Naval Research Logistic Quarterly, 2:8397, 1955.
  - R. Jonker and T. Volgenant. A shortest augmenting path algorithm for dense and sparse linear assignment problems. Computing, 38:325340, 1987.

# Some Experimental Results

Data Set	Munkres/ Volgenant Jonker	Hungarian/ Volgenant Jonker
Letter	1.2	1.1
Digit	2.4	1.6
GREC	1.4	1.2
AIDS	5.8	3.3
Protein	2.5	1.7
Fingerprint	2.1	1.6
Mutagenicity	18.6	10.2

More experimental results and more thorough descriptions of the proposed approach during the poster session.

Thank you for your attention.