

# Testing Reweighted Random Walk Method (RRWM) for Graph Matching

June 19, 2015

We consider two graphs  $G_1 = (V, D, E)$  and  $G_2 = (V, D, E)$ , where  $V = \{v_i\}_{i=1}^{n_1(n_2)}$  is the set of nodes,  $D = \{d_i\}_{i=1}^{n_1(n_2)}$  is the set of node attributes and  $E = \{e_j\}_{j=1}^{m_1(m_2)}$  is the set of graph edges.

We want to test the behaviour of the *RRWM* in case of matching two graphs with a common sub-graph. The results of tests are represented below. In the first case, graphs  $G_1$  and  $G_2$  are almost similar (except for one additional node and missing edge in  $G_2$ ). In the second and third tests, one graph is a sub-graph of the other. In the fourth case both graphs have a common sub-graph.

We can see, that RRWM had achieved good results in all case. Notable, that the algorithm was able to detect common structure of the graphs in all tests.

**Case 1:**  $V(G_1) \cap V(G_2) = V(G_1)$ ,  $n_1 = 17$ ,  $n_2 = 18$

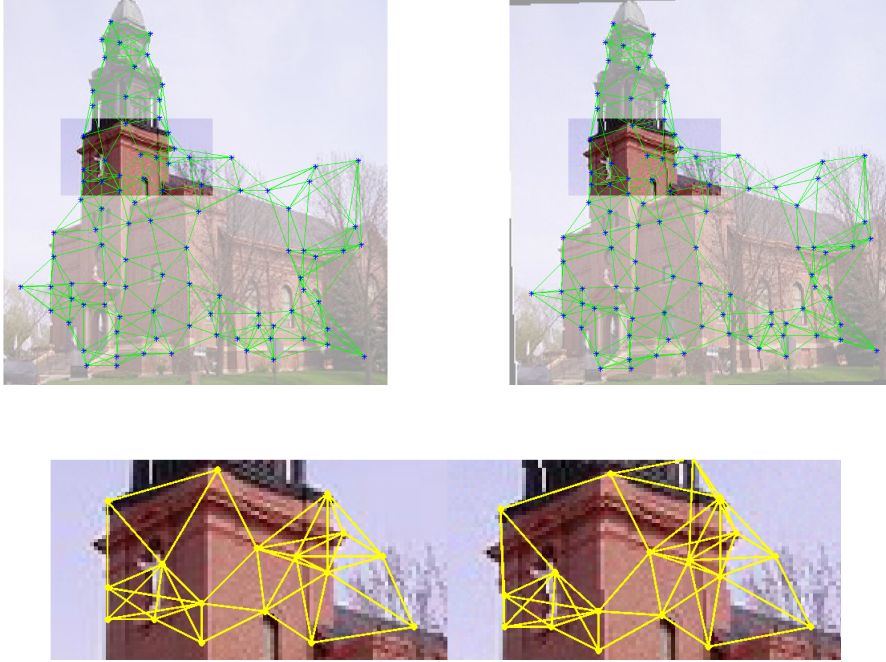


Figure 1: Graphs  $G_1$  and  $G_2$

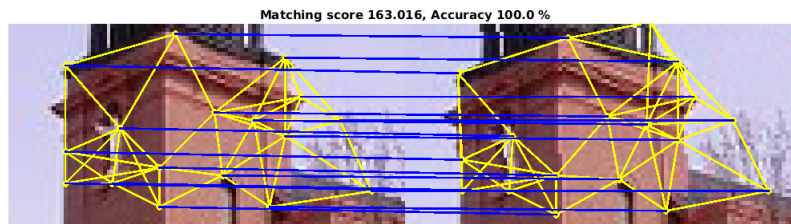


Figure 2: Matching result

**Case 2:**  $V(G_1) \cap V(G_2) = V(G_1)$ ,  $n_1 = 17$ ,  $n_2 = 21$

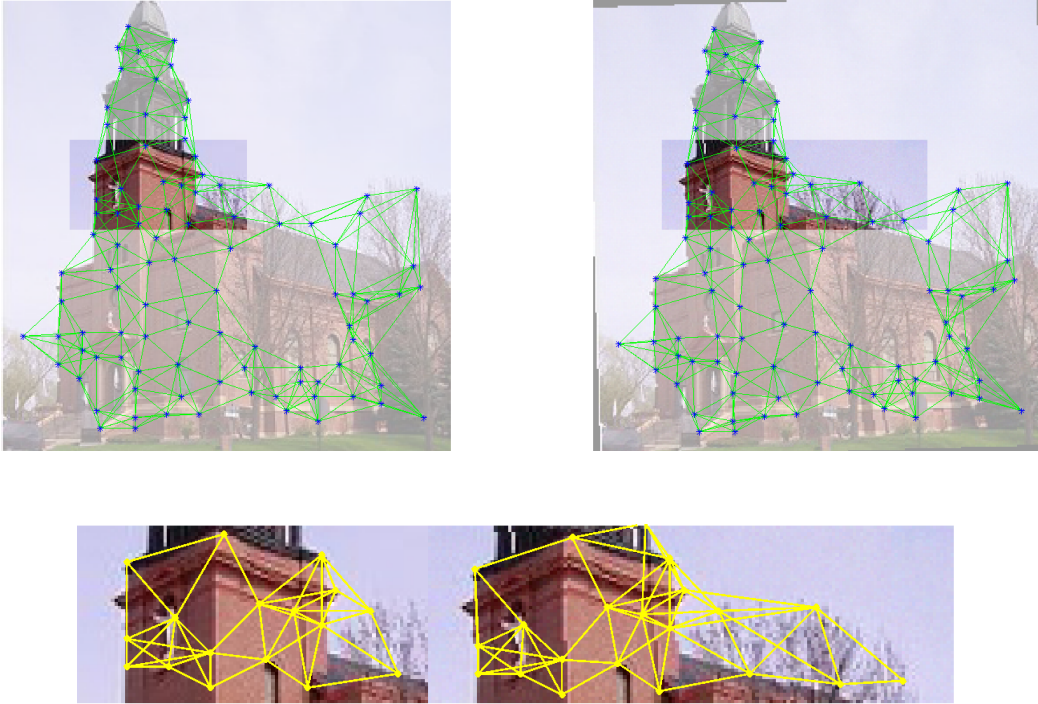


Figure 3: Graphs  $G_1$  and  $G_2$

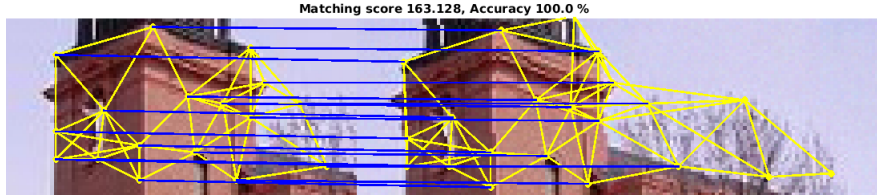


Figure 4: Matching result

**Case 3:**  $V(G_1) \cap V(G_2) = V(G_2) \setminus \{v\}$ ,  $n_1 = 23$ ,  $n_2 = 18$

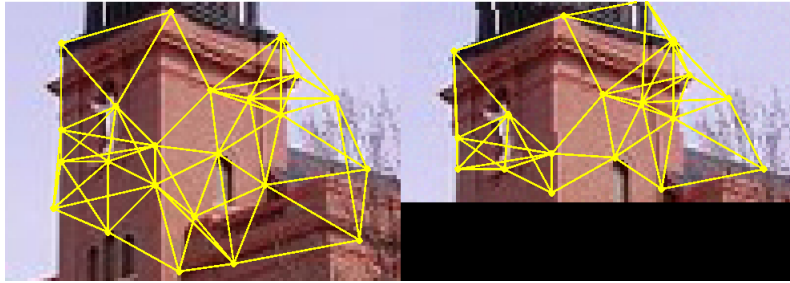
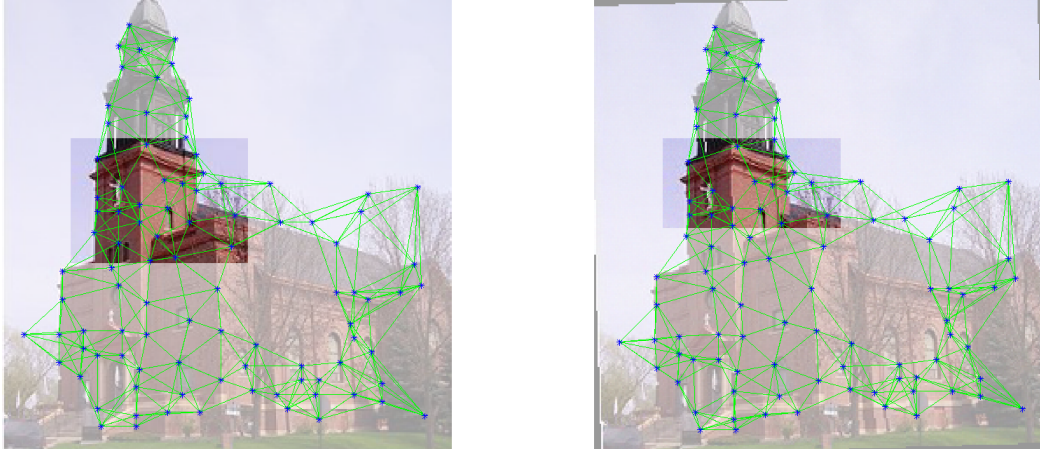


Figure 5: Graphs  $G_1$  and  $G_2$

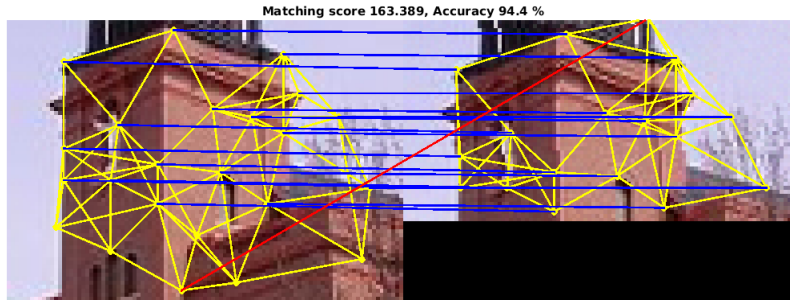


Figure 6: Matching result

**Case 4:**  $V(G_1) \cap V(G_2) = V(H)$ ,  $H \subset G_1$ ,  $H \subset G_2$

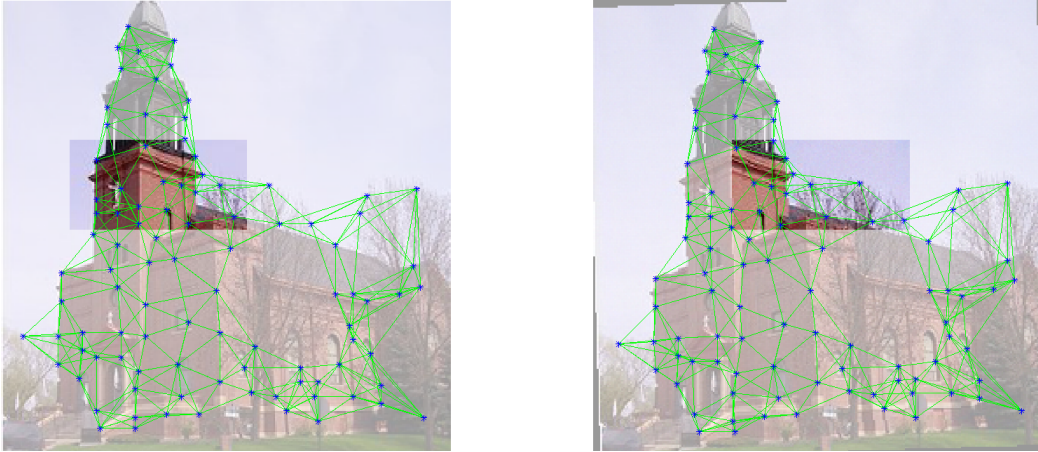


Figure 7: Graphs  $G_1$  and  $G_2$

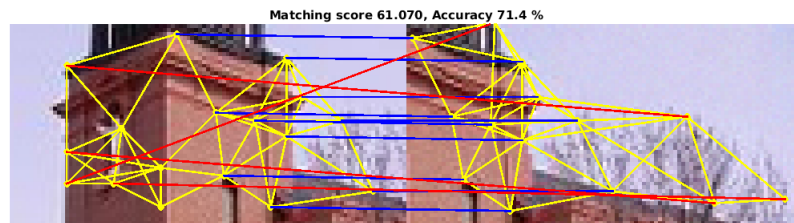


Figure 8: Matching result



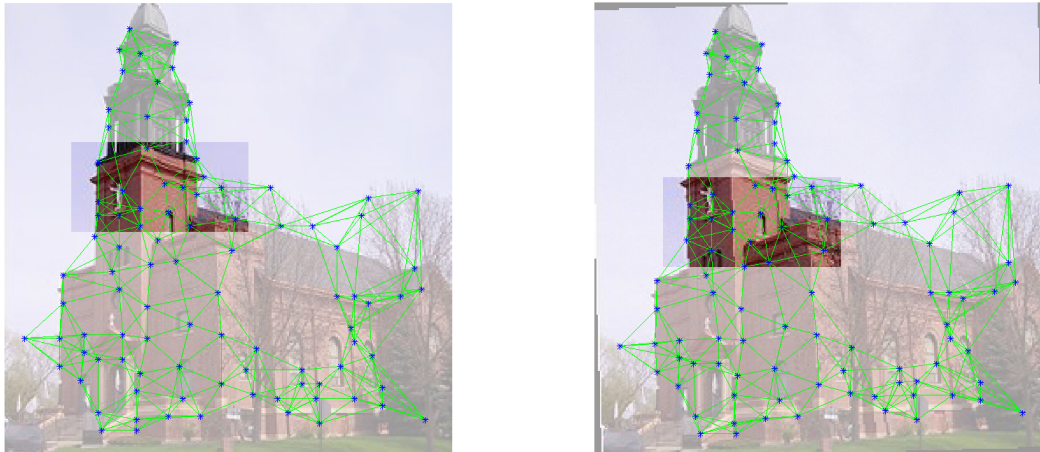


Figure 9: Graphs  $G_1$  and  $G_2$



Figure 10: Matching result

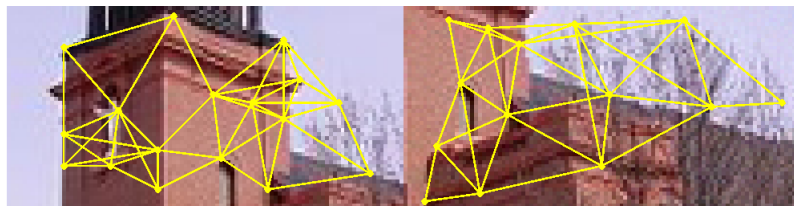
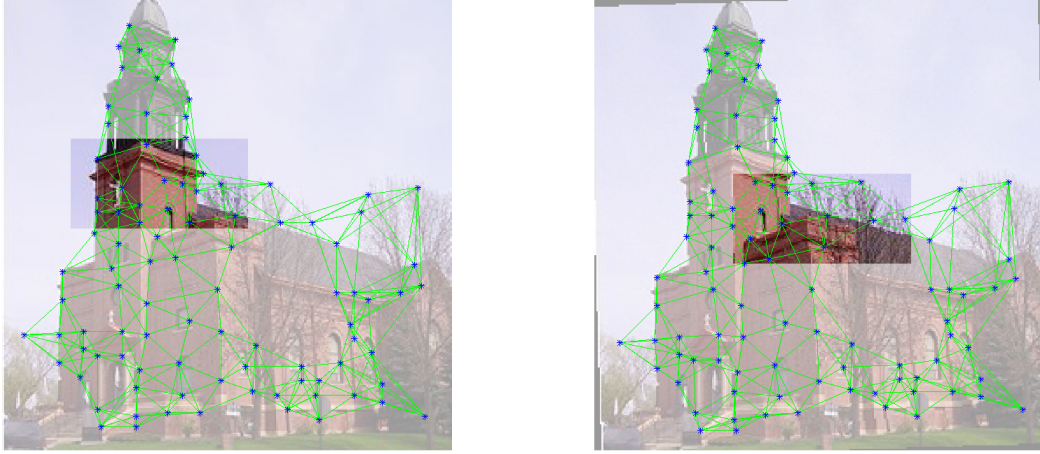


Figure 11: Graphs  $G_1$  and  $G_2$

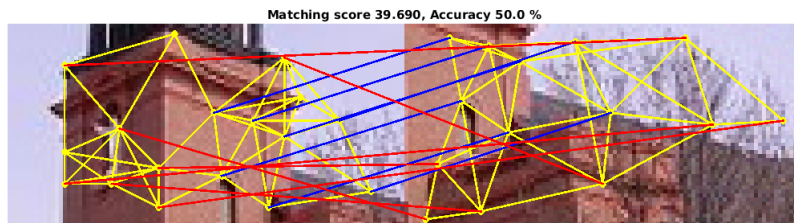


Figure 12: Matching result