

distance between vertices is $OV+S$. OV be amount of vertical overlap with its lower vertex. Here $OV=H$. After adding $(n-2)$ vertices, Distance between lowest and topmost vertex becomes,

$$(n-2)(H+S)$$

And height of graph becomes,

$$(n-2)(H+S) + H \quad \dots(4)$$

Thus, the resulting laid out graph is bounded by area,

$$((n-1)(W+S) + W) \times ((n-2)(H+S) + H) \quad \dots(5)$$

If you are using *Word*, use either the Microsoft Equation Editor or the *MathType* add-on (<http://www.mathtype.com>) for equations in your paper (Insert | Object | Create New | Microsoft Equation *or* MathType Equation). “Float over text” should not be selected.

5. Results and Conclusions

We perform the tests on a data set consisting of biological pathways. The graphs are clustered in nature with multiple clusters at a level and multiple levels of nested clusters. We

analyze the laid out graphs for number of edge crossings and area of graph.

The experimental results show average reduction in number of edge crossings to 42% of original (Fig 5). Also the nodes in the laid out graphs maintain correspondence with their parent compartments. The proposed algorithm plots the graph in area bounded by $((n-1)(W+S) + W) \times ((n-2)(H+S) + H)$. The algorithm finds the layout in the time in $O(E^2+EV^2 \log V)$.

5.1 Future Scope

In implementation of Wolf’s thesis, we consider the problem as VIP-FIX. Also we use basic heuristics approach for sake of simplicity. The number of crossings can be reduced by considering the problem as VIP-VAR and using permutation heuristics. Also we observe that there is scope to reduce the edge crossings among edges between vertices in different clusters by rearranging the internal layout of that cluster. This can be achieved by rotating the layout of cluster or choosing different canonical order.

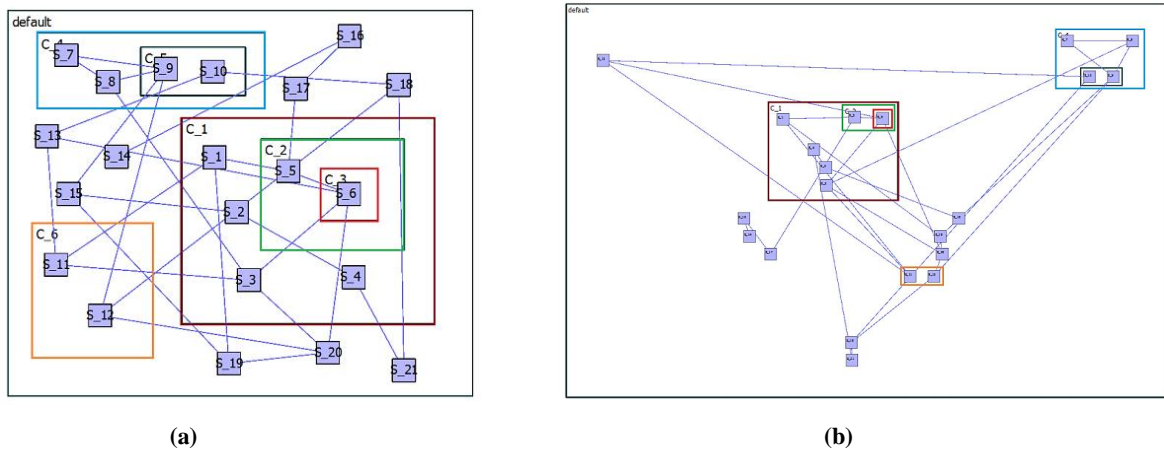


Figure 4: (a) A clustered input graph, (b) Grid Based Straight-Line Layout of graph in (a)

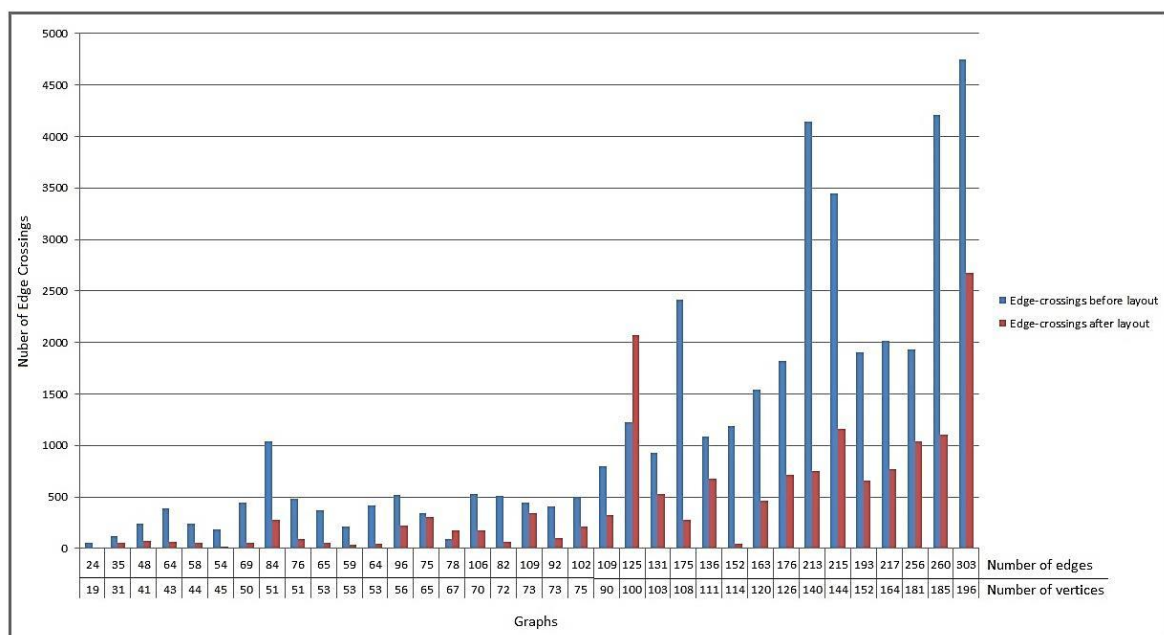


Figure 5: Edge-crossings in graphs before and after applying Grid Based Straight-Line Layout

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