

Ranking of Translator result graphs: ARAX's approach

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ARAX result-graph ranking method

A result g is a weighted multi-digraph $g = (\mathcal{V}, \mathcal{P}, \mathcal{E}, \mathcal{W})$, where \mathcal{V} is the vertex-set, \mathcal{P} is a predicate set, $\mathcal{E} \subset \mathcal{V} \times \mathcal{V} \times \mathcal{P}$ is the set of directed edges, and $\mathcal{W} : \mathcal{E} \rightarrow [0, 1]$ contains edge weights. Let \mathbf{A}_g be the induced weight matrix with components $(\mathbf{A}_g)_{v,v'} = \sum_{p \text{ sth. } (v,v',p) \in \mathcal{E}} (W(v, v', p))$. Let G be the set of result-graphs. For each g , ARAX computes three \mathbb{R} -scalar scores:

1. $S_1(g) = \|\mathbf{A}_g\|_F$, the Frobenius norm
2. $S_2(g) = \max(\max\text{-flow}(\mathbf{A}_g))$
3. $S_3(g) = \langle ((\mathbf{A}_g)^{L(g)})_{i,j} \rangle_{(i,j) \in P_g(L(g))} / L(g)!$

where $\max\text{-flow}(\mathbf{A}_g)$ denotes the maximum-flow matrix computed for the weighted digraph via the Push-relabel algorithm; and $L(g)$ denotes the maximum unweighted geodesic path length of g ; and $P_g(l)$ denotes the set of node pairs with geodesic path length l .

The scores are combined by $\sum_{k \in \{1,2,3\}} \text{rank}_{S_k(G)}(S_k(g)) / 3$.