Application of finding maximal cliques

(not – not the maximum)

Reasoning about graph problems – wins awards!

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- By common metrics, it is also typically the highest ranking conference across disciplines – that doesn't mean it is THE BEST (rankings/metrics have their imperfections – but it is certainly one of the best…)

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Best Paper
Award

3D Registration with Maximal Cliques

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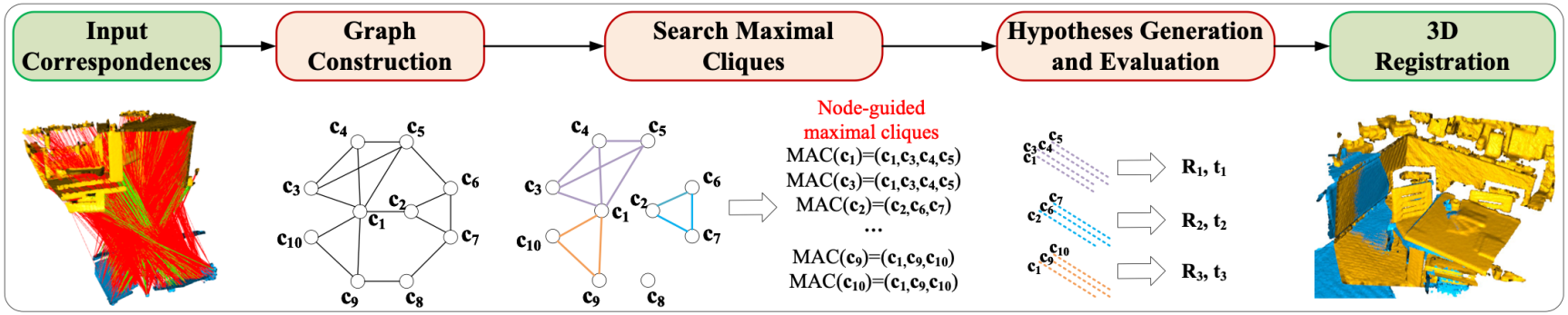

Figure 2. **Pipeline of MAC**. **1.** Construct a graph for the initial correspondence set. **2.** Select a set of maximal cliques from the graph as the consistent sets. **3.** Generate and evaluate the hypotheses according to the consistent sets. **4.** Select the best hypothesis to perform 3D registration.

- For every pair of "potential correspondences" (->vertex in graph) place an edge if these correspondences are "compatible" (can both arise from 3D rigid transformation).
- Find maximal (not only the maximum but other large ones) cliques (of some size or quality thresholded)
- Evaluate the maximal cliques by the quality of registration yielded by the rigid motion they "vote for". Select the best one.

- Simple (in principle) – but because finding all cliques (above a certain size/quality is likely hard – need a lot of approximations and hacks to make it work well…. BUT the motivation comes from simple graph theory.

THIS IS CONNECTED TO (maximal) independent sets!

- A clique is a set of totally connected vertices…
- What can you say about these vertices in the complement graph?
  - They have no edges between then in the complement graph -> they are an independent set in the complement graph.
  - Thus….finding a maximal clique in the graph G is the same as finding a maximal independent set in the graph G_complemement.
  - G is the graph of compatible pairs of potential matches
  - So G_complement is the the graph of incompatible pairs of potential matches
  - So…the paper COULD have been written as finding maximal independent sets….
  - But G might be (for the data setting) simpler/smaller to deal with then G_complement…..so there might be computational/practical reasons for preferring one of the two (theoretically equivalent) characterisations…