

In this section, we present details for the proposed New Network algorithm and related algorithms. There are two main contributions: a new faster search strategy and extension to processing of subgraph queries. Further, we also describe in detail the improved algorithms for processing of induced subgraph query.

As an overview, the algorithms solve two problems, database creation and query processing. Accordingly we divide the discussion into them into two corresponding parts. The first part is concerned with the construction of a dynamic acyclic graph *DAG* to store the model graphs. The model graphs are stored in a network with their decomposed subgraphs and the related links and state information. Specifically, we construct a *DAG* consisting of a set of 5-Tuples, each of which stores information about a graph, its state, its parents, its children and the Edges connecting the pair of child graphs. Creation of the *DAG* is performed by recursively decomposing the Model graphs and creating a 5-tuple for each resulting graph to store the information. The 5-tuples can be considered as nodes in the *DAG* as they are connected by a directed edge from parent to child.

The second group of Algorithms concerns the process of detecting subgraph isomorphisms using *DAG* constructed in previous part. The *DAG* is the central data structure for this work and is considered a global variant in all the algorithms.

DAG definition First we make a formal definition to help us write the algorithms for the *DAG* more concisely.

Let $G = \{g_1, \dots, g_n\}$ be a set of model graph. definition A *DAG* $D(G)$ is a finite set of 5-tuple (g, s, P, C, E) constructed by decomposition of a set of model graphs G where g is a graph, s is one of $\{unsolved, dead, alive\}$, P is a set of one or more parent graphs $\{p, p'' \dots\}$, C is a set of two child graphs $\{c', c''\}$ of graph g , and E is a set of edges connecting the child graphs c' and c'' . The *DAG* has to satisfy the following conditions.

enumerate[(1)]

representing graph-tuple