Lazaron Shyta

Graph Edges Properties from DFS

After running a DFS traversal in a Graph, a spanning tree is created, or a spanning forest when the Graph is disconnected

When running DFS, let's name three type of vertices…

- Unvisited *still not explored*
- Explored *still nod done exploring all children*
- Visited *done exploring all children*

Finding types of Edges (C++)

```
void graphCheck(int u) {
     dfs_num[u] = EXPLORED; // color u as EXPLORED ]
     for (int j = 0; j < (int)AdjList[u].size(); j++) {
          ii v = AdjList[u][j];
          if (dfs_num[v.first] == UNVISITED) {
                    1. tree edge  ( u -> v.first )
               dfs_parent[v.first] = u;
               graphCheck(v.first);
          }
          else if (dfs_num[v.first] == EXPLORED) {
               if (v.first == dfs_parent[u])
                    2a. two-way edge  ( u <-> v.first )

               else
                    2b.  back edge  ( u -> v.first )

          }
          else if (dfs_num[v.first] == VISITED)
                    3.  forward/cross edge  ( u -> v.first )
     }
     dfs_num[u] = VISITED; // color u as VISITED
}
```

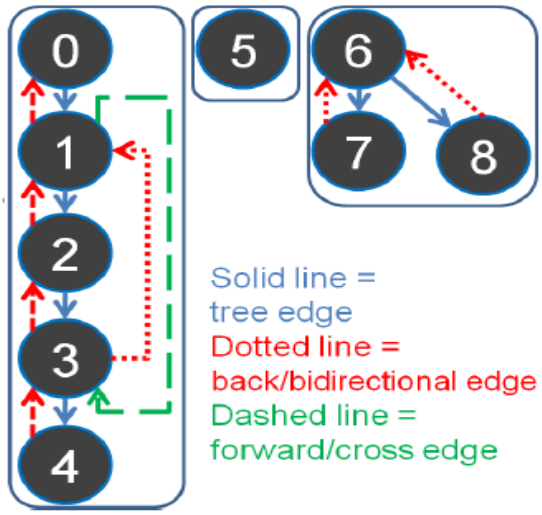

Figure 1 from ch4 CP3

Ref. CP3