Assignment 3

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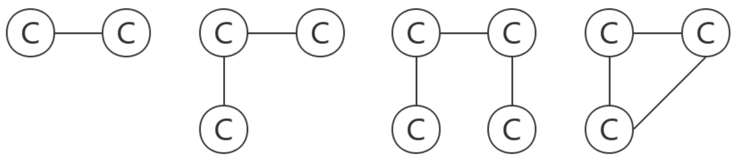
Question 1



Question 2

1) Draw a NEC Tree of query q.

   Root node selection

   First, ranking every node:

   Rank(u_0) = 1/3

   Rank(u_1) = 2/4

   Rank(u_2) = 1/4

   Rank(u_3) = 2/2

   Rank(u_4) = 2/2

   Rank(u_5) = 1/2

   Rank(u_6) = 2/1

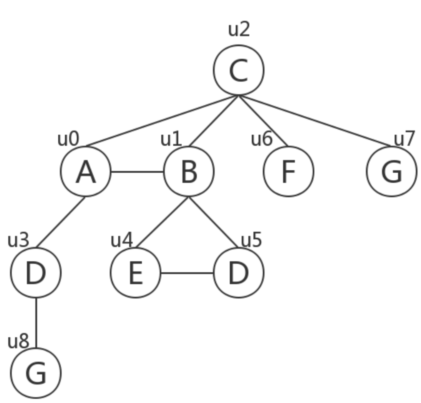
   Rank(u_7) = 3/1

   Rank(u_8) = 3/1

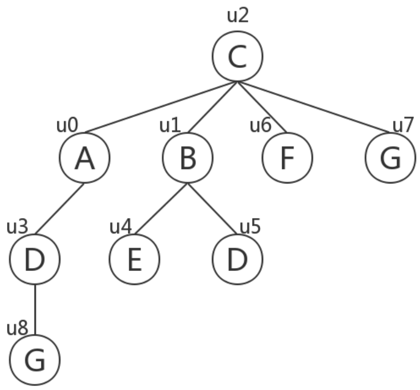
   Hence, u_2 is selected as the root node.

   Rewrite to NEC Tree

   Performing BFS from the root node:

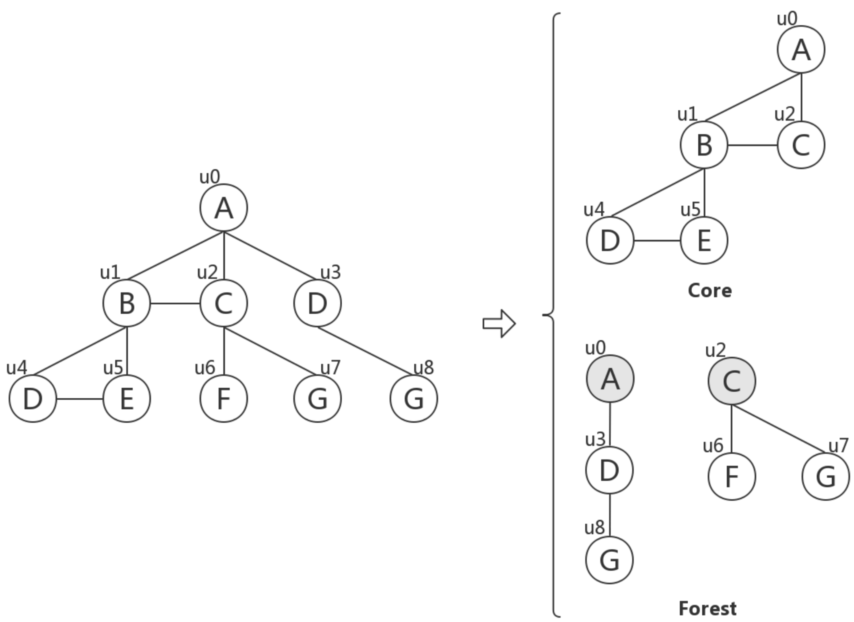


Merging vertices from same NEC into a single vertex:

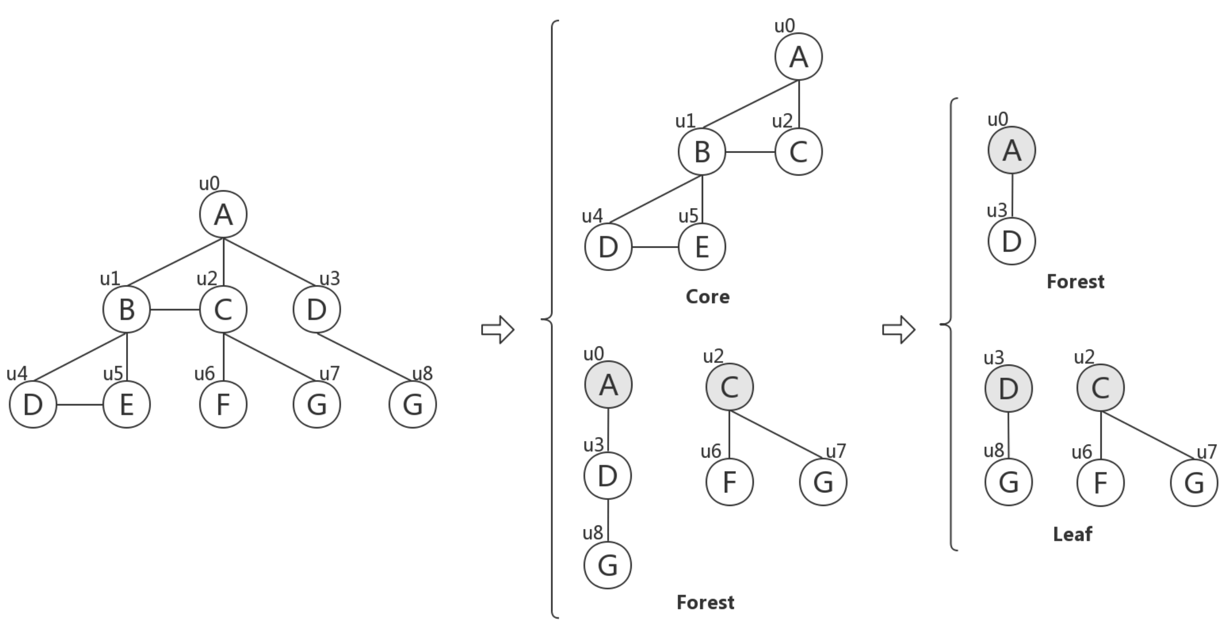


2) Decompose the vertex set of set of query q according to Core-Forest-Leaf decomposition.

Core-Forest Decomposition



Forest-Leaf Decomposition



Core-set: $\{u_0,\ u_1,\ u_2,\ u_4,\ u_5\}$

Forest-set: $\{u_3\}$

Leaf-set: $\{u_6,\ u_7,\ u_8\}$

Question 3

1) From $v_0 \sim v_9$, v_2, v_3 and v_9 have the largest edges. So they are more likely to generate the largest influence spreads.

   If we choose v_2 as the activated seed,

   $$\sum_{i=0}^{9} w(v_i)$$

   $= 0.3 + 0.1\times0.3\times0.2 + 1 + 0.1 + 0.5\times0.6 + 0.2\times0.3 + 0.2 + 0.1\times0.3 + 0.1\times0.5\times0.1 + 0.1\times0.5$

   $= 1.781$

   If we choose v_3 as the activated seed,

   $$\sum_{i=0}^{9} w(v_i)$$

   $= 0.4\times0.3 + 0.3\times0.2 + 0.4 + 1 + 0.5\times0.6 + 0.4\times0.2\times0.3 + 0.4\times0.2 + 0.3 + 0.5\times0.1 + 0.5$

   $= 2.834$

   If we choose v_9 as the activated seed,

   $$\sum_{i=0}^{9} w(v_i)$$

   $= 0.1\times0.4\times0.3 + 0.1\times0.3\times0.2 + 0.1\times0.4 + 0.1 + 0.6 + 0.1\times0.4\times0.2\times0.3 + 0.1\times0.4\times0.2 + 0.1\times0.3 + 0.1 + 1$

   $= 1.8984$

   When choose v_3 as a activated seed, $\sum_{i=0}^{9} w(v_i)$ is maximum.

   So v_3 can generate the largest influence spreads.