To Do Basically. Find the Vertex-edge over lap of Graphs

How → By Using Multisets

↓

How

Can you please tell an example of Input graph → How we are giving graph Input.

We are No more Using ~~Graphs~~ Vertex-id representation of Graphs here.

Acc to me Input Graph ~~dataset~~ is. Like.

V → ~~Set of Vertices~~.

E → ~~Set of Edges~~.

tells us the adjacency relation between atom in a molecule.

Ex Input for a single Graph

5 → Total no. of graphs in dataset

9 No. of V No. of Edges Graph No.

v 6 C

v 1 O.

v 8 C

v 2 H.

e 6 1

e 6 2

e 1 2

Now Suppose this is the Representation of Graphs we have two things vertex multiset & edges multiset.

Vertex multiset for above graph. example

→ {C, C, O, H}

Edge Multiset for above graph. example

→ { [C, O] , [C, H] , [O, H] }.

one pair. one pair one pair.

Similarity →

we have

g 4 3 2.

v 5 C

v 1 O.

v 7 C

v 2 O.

e 7 2

e 5 1

e 1 2.

V - multiset - 2.

{ C, C, O, O }.

→ E - multiset - 2.

{ [C, O], [C, O], [O, O] }

g 3 2 3 v-multiset-3.

v 3 C → [C, H, O].

v 8 H

v 2 O e-multiset-3

e 3 2 → [{C, O}, {C, H}]

e 3 8

g 5 4 4. v-multiset-4.

v 7 C → ~~[C, O, O, H, H]~~

v 2 H

v 6 O [C, H, H, O, O].

v 1 O

v 5 H. e-multiset of 4.

e 2 6. {[O, H], [C, H],

e 7, 2

e 6, 1 , [O, O], [O, H]}

e 6 5

If we now use the Naive way ie checking all nC_2 pairs. $4C_2 = 6$

~~Step~~ Let us take 1 pair for example.

1, 2

V- multiset-1 $\rightarrow$ $\{2 \cdot C, 1 \cdot O, 1 \cdot H\}$.

V- multiset-2 $\rightarrow$ $\{2 \cdot C, 2 \cdot O\}$.

$V_1 \cap V_2 = \{2 \cdot C, 1 \cdot O\}$ $V_1 \cup V_2 = \{2, C, 2, O, 1, H\}$

$|V_1 \cap V_2| = 3$, $\min(|V_1|, |V_2|) = 4$.

V- multiset-3 $\rightarrow$ $\{1 \cdot C, 1 \cdot H, 1 \cdot O\}$.

V- multiset-4 $\rightarrow$ $\{1 \cdot C, 2 \cdot H, 2 \cdot O\}$.

$V_1 \cap V_2 = \{1 \cdot C, 1 \cdot H, 1 \cdot O\}$.

$|V_1 \cap V_2| = 3$, $\min(|V_1|, |V_2|) = 3$.

Similarly

$|V_1 \cup V_2| = |V_1| + |V_2| - \cancel{2 \max(V_1, V_2)}$

Thus we can represent it as.

$|V_1 \cap V_2| \leq \min(V_1, V_2)$

Now Lets go to edges.

E-mulbiset-1

$\hookrightarrow \{[C,O],[C,H],[O,H]\}$

Emulbiset-2

$\hookrightarrow \{[C,O]\cdot 2,[O,O]\cdot 1\}$

$G_1 \cap G_2 = \{[C,O]\cdot 1\}$

Smilaritity Here are well it will be.

$(G_1 \cap G_2) \leq \min(G_1, G_2)$

$(G_1 \cup G_2) \geq \max(G_1, G_2)$

$\therefore$ By

Intersection

$Sim_{(VEO)}(G,G') = \frac{|V \cap V'| + |E \cap E'|}{\text{Union}}$

$= \frac{(V \cap V') + (E \cap E')}{(V \cup V') + (E \cup E')}$

$= \frac{\min(|V|,|V'|) + \min(|E|,|E'|)}{\max(|V|,|V'|) + \max(\ldots)}$

similar Modifications will be made in the code aswell.

$$\leq \frac{\min(|V|,|V'|) + \max(|E|,|E'|)}{|V| + |V'| + |E| + |E'|}$$

for intersection we can also use set intersection in CPP.

multi