

Maximum number of simple paths generable from a graph

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Abstract

I want to give an exact formula that represents the maximum number of simple paths generable from a graph

1 Formula

Let $G = \langle V, E \rangle$ be a directed graph. The maximum number of simple paths generable from G is

$$\sum_{i=0}^{|V|} \frac{|V|!}{(|V| - i)!}$$

1.1 Corollary

Let $G = \langle V, E \rangle$ be an undirected graph. The maximum number of simple paths generable from G is

$$\sum_{i=0}^{|V|} \frac{|V|!}{i! * (|V| - i)!}$$

2 Explanation

The formula is derived from the number of possible permutations from a set whose cardinality is $|V|$ into a set whose cardinality is i .

If S is a sequence $\langle s_1, s_2, \dots, s_i \rangle$ then we can generate $\frac{|V|!}{(|V| - i)!}$ different simple paths. Then we shall sum the number of possible simple paths for any sequence whose length is 0 to $|V|$.