

Árvores geradoras mínimas

1. Objetivo

- Encontrar a árvore geradora menos custosa de um grafo conexo.

2. Teoria

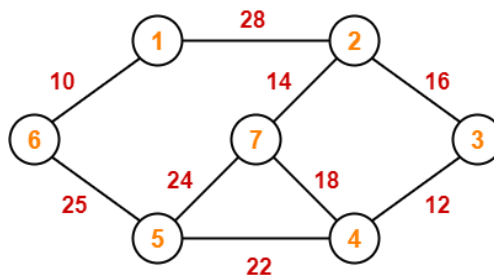
a. Union-find

- Estrutura usada para gerar um sistema de classificação, utilizando o conceito de representatividade.
- Em grafos, tal estrutura é utilizada para identificar em qual componente conexa um vértice se encontra.

3. Algoritmos

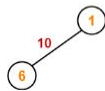
a. Algoritmo de Prim

- Escolher, entre os vértices já visitados, a aresta de menor custo para um vértice não visitado até que o grafo se torne conexo.

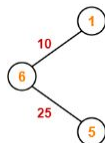


Simulação começando do vértice 1.

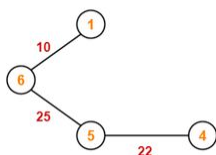
Step-01:



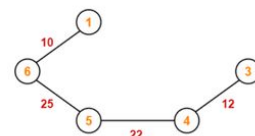
Step-02:



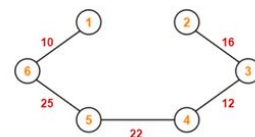
Step-03:



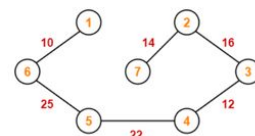
Step-04:



Step-05:

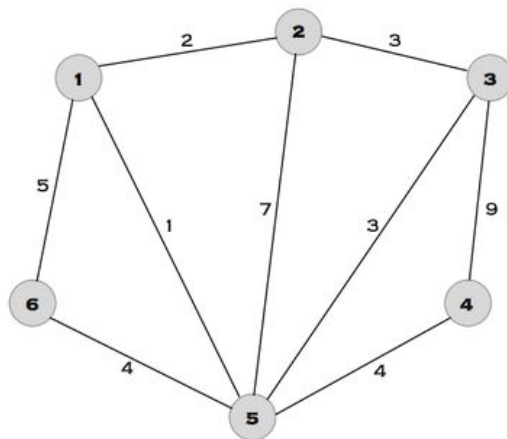


Step-06:



b. Algoritmo de kruskal

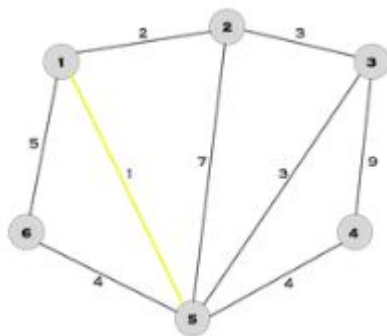
- i. Ordenar as arestas em ordem crescente.
- ii. Escolher das arestas em sequência, aquelas no qual seus extremos pertencem a componentes conexas distintas.
 1. Utilização do Union-find.
 2. Inicialmente todos os vértices se encontram em componentes conexas diferentes.



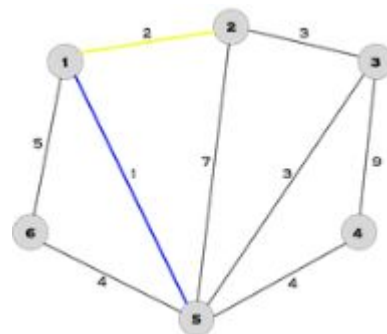
Arestas em ordem crescente de peso

(1, 5), (1, 2), (2, 3), (3, 5), (4, 5), (5, 6), (1, 6), (2, 5), (3, 4)

1)

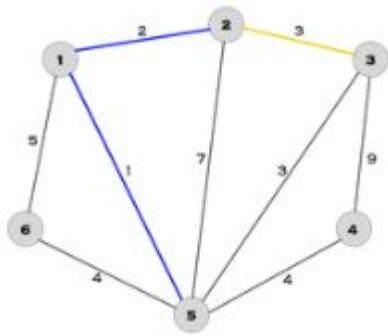


2)

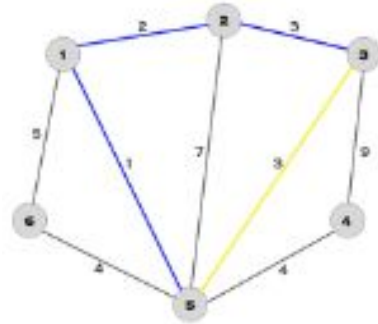


3)

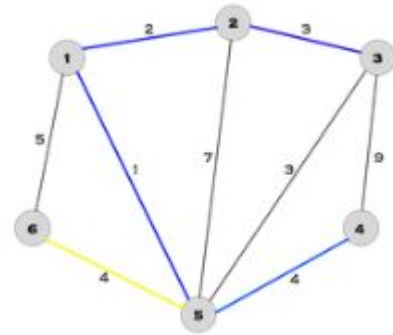
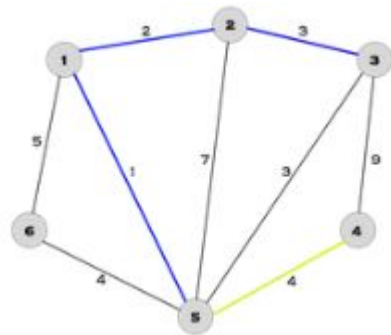
4)



5)



6)



Referências:

1. <https://www.ime.usp.br/~maratona/aulas/union-find-e-kruskal>
2. <https://neps.academy/lesson/196>
3. <https://www.gatevidyalay.com/prims-algorithm-prim-algorithm-example/>