12.2 - Choosing Better Augmenting Paths

对于 F-F 算法

```
Max-Flow

        Initially set f(e) = 0 for all e in E.

        While there exists an s-t path in the residual graph G_f:
            Choose such a path P
            f' = augment(f, P)
            Update f to be f'
            Update the residual graph to be G_{f'}

        Endwhile

        Return (f)
```

在选择路径的时候可以通过选择最短路径来优化这个算法
选择最短路径可以使用如 BFS 的算法

Edmonds-Karp 算法：

```
Max-Flow

        Initially set f(e) = 0 for all e in E.

        While there exists an s-t path in the residual graph G_f:
            Choose 最短的 such path P
            f' = augment(f, P)
            Update f to be f'
            Update the residual graph to be G_{f'}

        Endwhile

        Return (f)
```

运行时间 $O(nm^2)$

- BFS：$O(m)$
- 每次增广路径：$O(m)$
- $O(n)$ 次增广路径操作