

CS4335 Algorithm Design & Analysis

Tutorial Week 1

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September 11, 2020

Information

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Overview for each Tutorial

- ▶ Recall the important knowledge of last lecture.
- ▶ Teach some excises.
- ▶ Ask questions.

Euler circuit

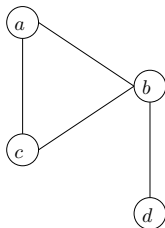
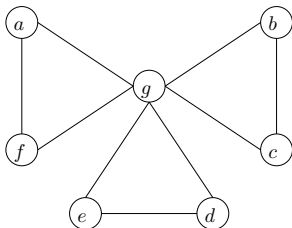
Definition

A circuit in graph $G(V, E)$ that uses each edge exactly once.

- ▶ You can use a vertex more than once.
- ▶ A graph may have many different Euler circuits.

Euler's theorem

An un-directed connected graph has an Euler circuit **if and only if** all the vertices in the graph have even degrees.



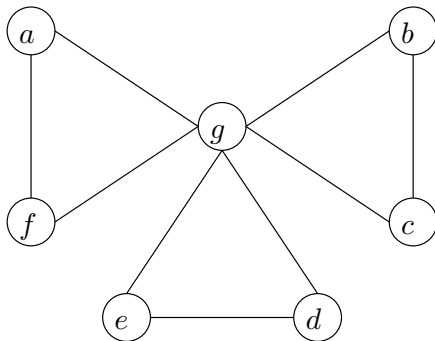
Euler circuit

The algorithm to find the Euler circuit.

1. Starting with any vertex u in G , take an unused edge (u,v) (if there is any) incident to u
2. Do Step 1 for v and continue the process until v has no unused edge. (a circuit C is obtained)
3. If every node in C has no unused edge, stop.
4. Otherwise, select a vertex, say, u in C , with some unused edge incident to u and do Steps 1 and 2 until another circuit is obtained.
5. Merge the two circuits obtained to form one circuit
6. Goto Step 3.

Euler circuit

Example for algorithm



Hamilton circuit

Definition

A circuit in graph $G(V, E)$ that visits each vertex exactly once.

- ▶ Given an arbitrary undirected connected graph, determine whether there is a Hamilton circuit or not is a NP-hard problem.

