subject area *and application*	*vertex attributes and meaning* *edge/arc attributes and meaning*	*reference*
cartography map-coloring	regions are countries edges are borders	§8.6.4
highway construction avoiding overcrossings	vertices are road intersections edges are roads	§8.7.1
electrical network boards avoiding insulation	vertices are circuit components edges are wires	§8.7.1
VLSI computer chips minimizing layering	vertices are circuit components edges are wires	§8.7.4
information management binary search trees	vertices are data records edges are decisions	§17.1.4
computer operating systems priority trees	vertices are prioritized jobs edges are priority relations	§17.1.5
physical chemistry counting isomers	vertices are atoms edges are molecular bonds	§9.3.2
network optimization min-cost spanning trees	edges are connections edge-labels are costs	§10.1.1
bipartite matching personnel assignment	parts are people and jobs edges are job-capabilities	§10.2.2
network optimization shortest path	vertices are locations edge-labels are distances	§10.3.1
traveling salesman routing shortest complete tour	vertices are locations edge-labels are distances	§10.7.1

The ***out-degree*** of vertex v, denoted $\delta^+(v)$, is the number of arcs with tail at v.

The ***in-degree*** of vertex v, denoted $\delta^-(v)$, is the number of arcs with head at v.

A digraph D is ***transitive*** if whenever it contains an arc from u to v and an arc from v to w, it also contains an arc from u to w.

The ***adjacency matrix*** A_D of a digraph D is

$$A_D = [a_{ij}], \text{ where } a_{ij} = \text{number of arcs from } v_i \text{ to } v_j.$$

The ***incidence matrix*** M_D of a digraph D with no self-loops is $M_D = [b_{ij}]$, where

$$b_{ij} = \begin{cases} +1, & \text{if } v_i \text{ is the tail of } e_j \text{ but not the head} \\ -1, & \text{if } v_i \text{ is the head of } e_j \text{ but not the tail} \\ 0, & \text{otherwise.} \end{cases}$$

There is no standard convention for self-loops.

Facts:

1. *Strict-digraph terminology*: In a context focusing primarily on strict digraphs, there is often a different terminological convention:

- "digraph" refers to a strict digraph;
- a directed graph with multi-arcs is called a *multidigraph*;
- a directed graph with self-loops is called a *pseudodigraph*;
- an arc with tail u and head v is designated uv.