Why

1

Definition

Suppose we want to find the shortest path on a weighted graph from a given starting vertex to a given terminal vertex.

Let $((V, E), w : E \to \mathbf{R})$ be a weighted directed graph. Let v be a source and w be a sink. Let $\mathcal{X}$ denote the set of (directed) paths from v to w. Let $f : \mathcal{X} \to \mathbf{R}$ be so that if $x \in X$ is a path from v to w, then $f(x)$ is the weight of the path. In other words, $f(x)$ is the sum of weights on the edges. Then we call the problem $(\mathcal{X}, f)$ a *directed shortest path problem.*

Examples

2

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[1]Future editions will include. For now this is an example of a discrete optimization problem.

[2]Future editions will include the numerous examples.

Directed Shortest Path Problems

Optimization Problems

Weighted Graphs

Directed Paths

N-Dimensional Space

Directed Graphs

Extended Real Numbers

Distance

Optimizers

Real Limits

Space Distance

Undirected Graphs

Absolute Value

Plane Distance

Real Functions

Interval Length

Intervals

Real Space

Greatest Lower Bounds

Real Sequences

Real Line

Real Plane

Real Order

Sequences

Integral Line

Lists

Geometry

Rational Order

Real Numbers

Direct Products

Set Numbers

Rational Numbers

Comparisons

Integer Order

Integer Arithmetic

Finite Sets

Orders

Integer Products

Integer Sums

Natural Multiplicative Identity

Natural Additive Identity

Equivalent Sets

Family Unions and Intersections

Natural Order

Integer Numbers

Arithmetic

Identity Elements

Function Inverses

Families

Converse Relations

Equivalence Relations

Natural Powers

Operations

Function Images

Function Composites

Functions

Relations

Natural Products

Natural Sums

Recursion Theorem

Peano Axioms

Set Products

Natural Induction

Set Powers

Natural Numbers

Generalized Set Dualities

Ordered Pairs

Partitions

Unordered Triples

Intersection of Empty Set

Successor Sets

Set Symmetric Differences

Set Dualities

Set Unions and Intersections

Set Intersections

Pair Unions

Set Complements

Unordered Pairs

Set Unions

Set Differences

Pair Intersections

Empty Set

Set Specification

Set Inclusion

Standardized Accounts

Accounts

Deductions

Quantified Statements

Logical Statements

Statements

Identities

Sets

Names

Letters

Objects