A table of mathematical equations

Description automatically generatedStates: • Initial state: • Goal state(s): • Actions: • Transition model:

• CRUD

**Creating** : Creating new data using CREATE and/or MERGE clauses.

CREATE (p1:Person {name: "Siri"}), (p2:Person {name: "test user"}) CREATE (p)-[r:READ]->(b)

**Reading:** MATCH (p1:Person)-[r1:ACTED\_IN]->(m:Movie)<-

[r2:ACTED\_IN]-(p2:Person)

WHERE p1.name="Martin Sheen" AND p2.age<30

RETURN p1, p2

**Updating: SET clause**

Deleting: MATCH (p:Person {name: "Siri"})-[r:READ]-> (b:Book {name: "Harry Potter"}) DELETE r

**Count:** MATCH (p1:Person)-[:FRIENDS\_WITH]->(p2:Person)

RETURN p1.name, COUNT(p2)

**Path: (a)-[\*3..5]->(b) Paths from length 3 to 5 inclusive**

**Propositional logic syntax**

Precedence (from highest to lowest): -, ^, v, ->, <->

**Satisfiable =** A sentence is satisfiable iff it is true in, or satisfied by, some model.

**Unsatisfiable =** A sentence is unsatisfiable iff it is false in all models, e.g. P ∧ ¬P

**Valid** = A sentence is valid/a tautology iff it is true in all models, e.g. P ∨ ¬P

For any sentences 𝜶 and 𝜷, 𝜶 ⊨ 𝜷 iff the sentence 𝜶⋀¬𝜷 is unsatisfiable

to show that 𝐾𝐵 ⊨ 𝛼, we show that is 𝐾𝐵 ∧ ¬𝛼 unsatisfiable.

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• Action cost:

Complete, optimal, time complexity, space complexity

**Depth-first Search:** **Breath-first Seach:**Expand deepest unexpanded node expand shallowest unexpanded node

Implementation: implementation:

Frontier = LIFO queue frontier = FIFO queen

Put successors at front

**Uniform-Cost Search:**

Strategy: expand a cheapest node first

Frontier: a priority queen of cumulative cost

**Heuristics Function:**

A function that estimates how close a state is to a goal

**Evaluation function:**

F(n)=g(n) + h(n)

𝑔 𝑛 = cost so far to reach 𝑛

ℎ 𝑛 = estimated cost from 𝑛 to the closest goal (heuristic)

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𝑓 𝑛 = estimated total cost of path through 𝑛 to goal

**Uniform** cost search (uninformed): 𝑓 𝑛 = 𝑔 𝑛

• **Greedy** search (informed): 𝑓 𝑛 = ℎ 𝑛

**• A\*** **search** (informed): 𝑓 𝑛 = 𝑔 𝑛 + ℎ(𝑛)

**Admissible Heuristics:**

Admissible heuristic: ∀𝑛 0 ≤ ℎ 𝑛 ≤ ℎ∗ 𝑛 where ℎ∗ 𝑛 is the true cost from n.

E.g. ℎ𝑆𝐿𝐷(𝑛) never overestimates the actual road distance.

A heuristic h(n) is admissible if, at every node n, it does not overestimate

the cost h\* (n) of the shortestpath from n to the closest goal node,

A heuristic is consistent if between any node n and its successor n' the

heuristic doesn't decrease by morethan the cost: i.e. h(n) - h(n') ≤ c(n, n').

h S 1 - h(B) = 4 - 1 = 3 £ c( S B) = 2

**AC-3:**

1. Enqueue all the arcs.

Queue = {(A, B), (B, A), (B, C), (C,B)}

2. Dequeue (𝑋𝑖,𝑋𝑗)= (A, B), where A is the tail

Since A = 1, no value in B’s domain can satisfy the constraint A > B. Thus, 1 is

eliminated from A’s domain.Since A only shares a neighbour relationship with B,

no new arcs are added to the queue. Updated Queue: {(B, A),(B, C), (C, B)}

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Description automatically generated with medium confidence**Forward checking**:

Cross off values that violate a constraint when added to the existing assignment.

Enforce arc consistency on neighbours.

**Arc consistency (AC-3 algorithm):**

▪ Iteratively enforces arc consistency, ensuring that all domains are as

constrained as possible.

▪ Enforce arc consistency on neighbours and their neighbours.

**Graph vs relational:**

-excellent performance on queries involving highly connected data.

-We often need to modify an existing database, Graphs are naturally additive

A screenshot of a computer screen

Description automatically generatedadd new kinds of relationships without affecting existing queries.-Graph databases are schema-free, rapidly speeding up development

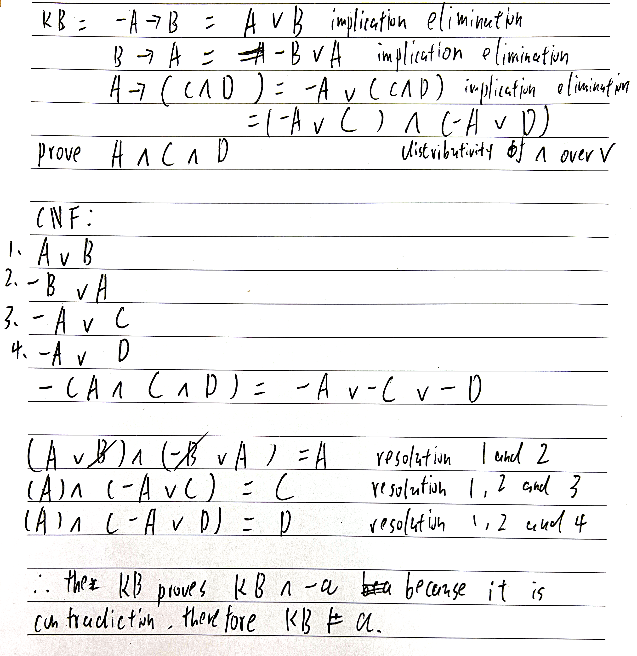
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A piece of paper with writing on it

Description automatically generatedA diagram of a complex structure

Description automatically generated with medium confidenceA math equations and formulas

Description automatically generated with medium confidenceA close-up of a notebook

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