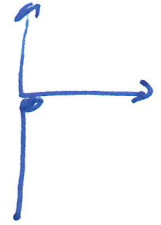


Reminders

- Homework 1 due Friday (10/02)
- Student information and resume upload due Monday (10/05)

Previous class

- Point Algebra
- Simple temporal networks (STNs)



Today

- STNs - TCSPs (general case of STNs)

constraint graph

distance graph

↓ minimize
 algorithm
 Floyd-Warshall's

$$0 \rightarrow L$$

10

$$0 \rightarrow H$$

30

$$H \rightarrow B$$

-5

$$B \rightarrow L$$

-20

$$0 \rightarrow L$$

new
5

$$B \rightarrow H$$

10

$$B \rightarrow L$$

-20

$$L \rightarrow O$$

-5

$$O \rightarrow H$$

30

$$B \rightarrow H$$

new
5

$$0 \rightarrow B$$

99

$$0 \rightarrow \boxed{L} \rightarrow B$$

10 20

$$\text{new } 0 \rightarrow B$$

30

$$0 \rightarrow \boxed{H} \rightarrow B$$

30 -5

new 25
 $0 \rightarrow B$

pair 0, B

through L ; through H

(2)

1 • John to work: car: $[30, 40]$

bus: $[60, \infty]$

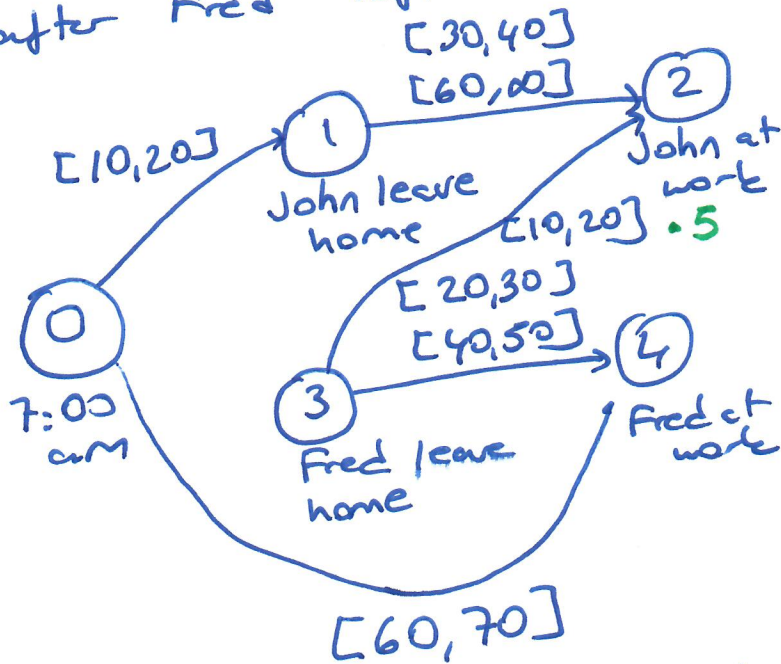
2 • Fred to work car: $[20, 30]$

carpool: $[40, 50]$

3 • John: left home $7:10 - 7:20$

4 • Fred arrived at work $8:00 - 8:10$

5 • John arrived at work $[0, 20]$ minutes after Fred left home



Solution: an assignment of values to the nodes that do not violate any constraints.

We will solve using an SAT solver (minimizer) by feeding all possible constraints.

e 2

2^e ↓
not polynomial anymore

multiple constraints on an edge are OR'ed

(3)

$$T \quad [-1.25, 0.25] \quad [2.75, 4.25]$$

$$S \quad [-0.25, 1.25] \quad [3.75, 4.25]$$

$T \otimes S$ composition

$$[-1.25, 0.25] \quad [-0.25, 1.25]$$

$$[-1.50, 1.50]$$

$$[-1.25, 0.25] \quad [2.75, 4.25]$$

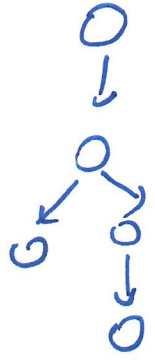
$$[2.50, 4.50]$$

$$[2.75, 4.25] \quad [-0.25, 1.25]$$

$$[2.50, 5.50]$$

$$[2.75, 4.25] \quad [3.75, 4.25]$$

$$[6.50, 8.50]$$



$T \oplus S$ intersection

$$T: \quad [-1.25, 0.25]$$

$$S: \quad [-0.25, 1.25]$$

$$[-0.25, 0.25]$$

larger smaller

$$[2.75, 4.25]$$

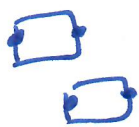
$$[3.75, 4.25]$$

$$[3.75, 4.25]$$

For STNs

Floyd-Warshall's Algorithm $O(n^3)$
 + Assignment is backtracking free $O(n^2)$

$$O(n^3)$$



IAAI AAI