Exercise Sensor Networks

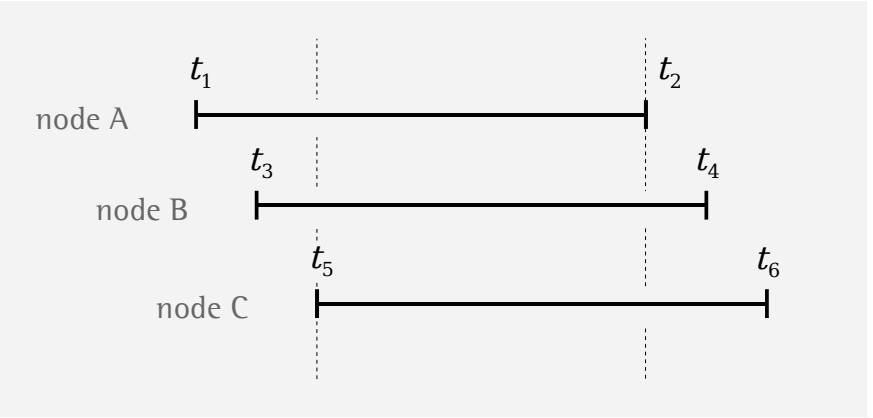
Lecture 11: Synchronization in sensor networks

Exercise 11.1: Comparison of fuzzily determined events

An event A takes place in the time interval [t1, t2], another event B in [t3, t4] and the event C in [t5, t6]. The following holds true: t1 < t3 < t5 < t2 < t4 < t6. What is the probability that C happens first, than B and A at last.

Solution:

Let's obtain the probability that every event takes place in the interval [t5,t2]. This is a precondition that the events can take place in the order C, B, and A.



Node A $\frac{t_2 - t_5}{t_2 - t_1}$

Node B $\frac{t_2 - t_5}{t_4 - t_3}$

Node C $\frac{t_2 - t_5}{t_6 - t_5}$

Probability that all events happen in [t5,t2].

$$\left(t_2 - t_5\right)^3 \times \left[(t_2 - t_1)(t_4 - t_3)(t_6 - t_5)\right]^{-1}$$

The events can be ordered in 6 configurations but only one is valid in this context:

$$\frac{\left(t_2 - t_5\right)^3 \times \left[(t_2 - t_1)(t_4 - t_3)(t_6 - t_5)\right]^{-1}}{6}$$