Tutorial 4 : LTL AND CTL

CS60030 Formal Systems

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FMSAFE

FORMAL METHODS FOR SAFETY CRITICAL SYSTEMS

LTL Properties

Write the LTL formulations for the following sentences:

1. A and B always alternate starting with A. This means only A is true in the first step, then only B is true in the next step, and this alternation between A and B is always repeated.

2. Between two neighboring A's there is at least one B.

3. Never is it that an A is followed by a B unless the A is preceded by a C

4. If at some point C holds and at all points before it A did not hold and B held, then at some point after C, A and B both hold.

CTL Properties

Write the CTL formulations for the following sentences:

S : I follow Social distancing

V : I got Vaccinated

1. I will follow social distancing, no matter what happens.
2. It's possible I may be follow social distancing some day, at least for one day.
3. It's always possible that I will suddenly be following social distancing for the rest of time.
4. Depending on what happens in the future, it's possible that for the rest of time, I'll be guaranteed at least one day of following social distancing still ahead of me.
5. There will surely be a time in future when I get vaccinated. Until then I have to follow social distancing.
6. From now on until I get vaccinated, I will follow social distancing. Once I get vaccinated, I may not follow social distancing.

LTL Properties

c : Class

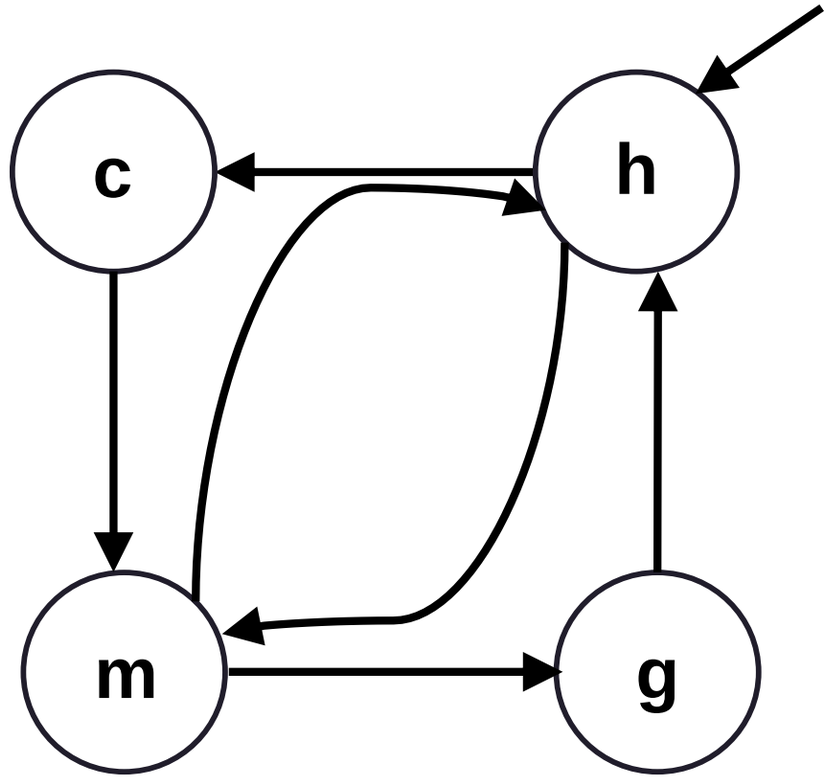
h : Hostel

m : Mess

g : Gymkhana

Write the LTL formulations for the following sentences:

1. The Mess is visited infinitely often
2. Eventually the class is always visited.
3. Once in class a student eventually goes to Mess after spending some time is Gymkhana



CTL Properties

a : attention is high

t : tempo is high

Write the CTL formulations for the following sentences and check on the given model:

1. There exists a path where in future on all paths always ¬a
2. There exists a path where always ¬t
3. There exists a path where a does not hold till t
4. On all paths always a holds or there exists a path where always ¬t holds
5. EG (a ∨ EG ¬t)
6. AGAF (a ∨ ¬t)