Tutorial 5 : ω-Regular Languages & Büchi automata

CS60030 Formal Systems

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FMSAFE

FORMAL METHODS FOR SAFETY CRITICAL SYSTEMS

Equivalence checking

For each of the following pairs, determine if they are equivalent. If not, provide a counterexample

1. $G(A \rightarrow B) \equiv (GA \rightarrow GB)$
2. $(A^*B)^\omega$ and $A^*.B^\omega$
3. $GFp \rightarrow GFq \equiv G(p \rightarrow Fq)$
4. $(A + B).C^\omega \equiv A.C^\omega + B.C^\omega$
5. $FGp \wedge FGq \equiv FG(p \wedge q)$
6. $pU(qUr) \equiv r \vee ((p \vee q) \wedge (p\ U\ (q\ U\ r))$
7. $(A^* + B.C)+.(C.C^*)^\omega$ and $(A^* + B.C)+.(C)^\omega$

ω-Regular Languages

Write the ω-Regular Language 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.

NBA CONSTRUCTION

Construct NBA for the following properties/expressions

1. $(A^*C)^\omega$
2. $(AB + C)^* ((AA + B)C)^\omega$
3. Between two neighboring A's there are odd no. of B's
4. If A occurs, it occurs consecutively in multiples of three
5. $(A^*CA + BB)^*(A + CC)^\omega$

GNBA TO NBA

Draw the NBA for the following GNBA, where F={{q1},{q2}}.