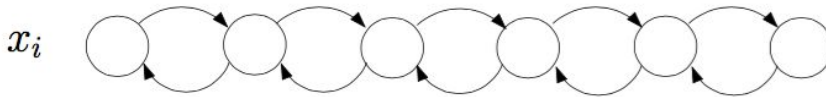


CS 133 Exam 4

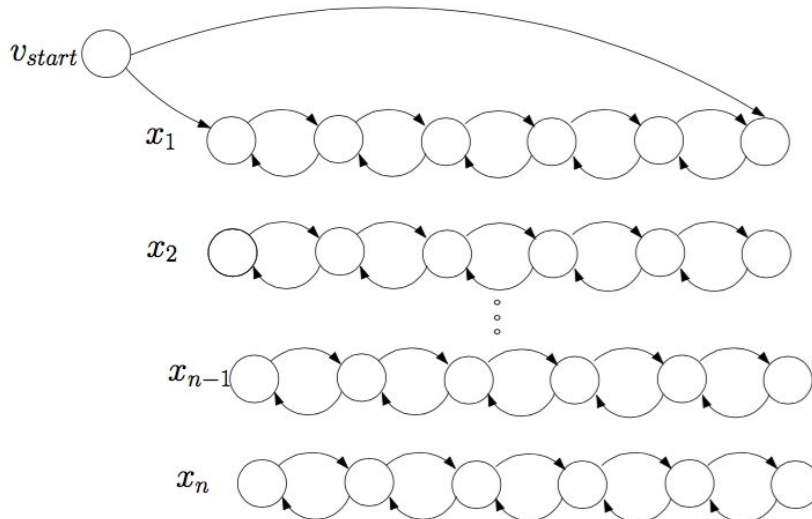
Yee, Christiane Joy Angelyn

November 15, 2015

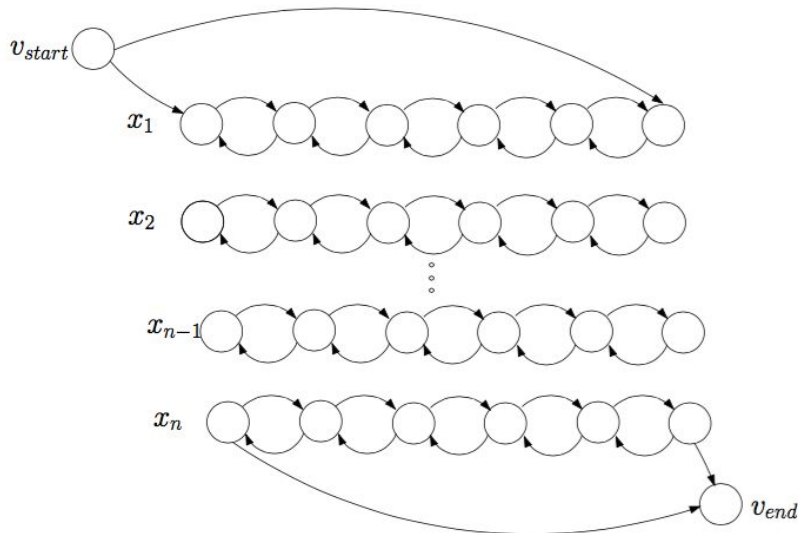
1. _____
2. ALL_{TM} is undecidable.
 - a. Assume it is decidable and obtain a contradiction.
 - b. Suppose that R is a decider for ALL_{TM} .
 We construct TM S to decide E_{TM} as follows:
 S = "On input $\langle M \rangle$ where M is a TM:
 - Run R on input $\langle M \rangle$.
 - If R accepts, reject.
 - If R rejects, accept.
 - c. If R decides ALL_{TM} then S decides E_{TM} .
 - d. But E_{TM} is undecidable. Hence, ALL_{TM} must be undecidable.
3. Given $\rho = c_1 \wedge c_2 \wedge \dots \wedge c_m$ where $c_m = (x_{i,1} \vee x_{i,2} \vee x_{i,3})$, the following steps convert this 3SAT problem to the Hamiltonian path problem:
 - a. For each x_i , we create a chain of vertices.



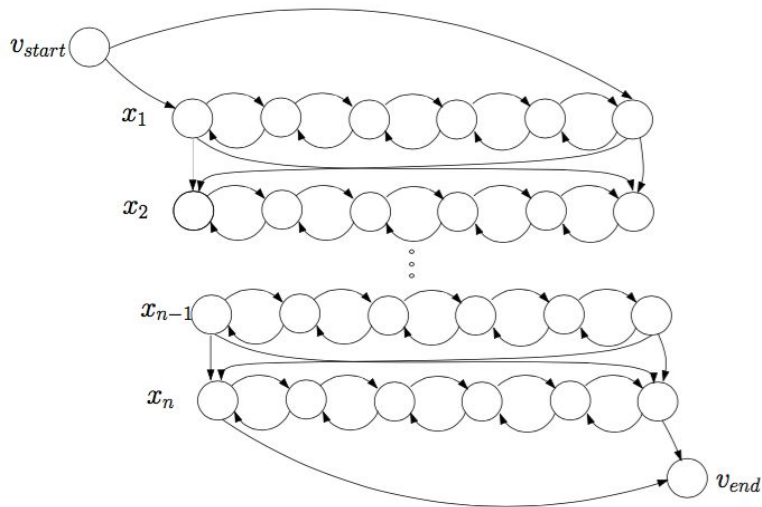
- b. We then add a start vertex as follows.



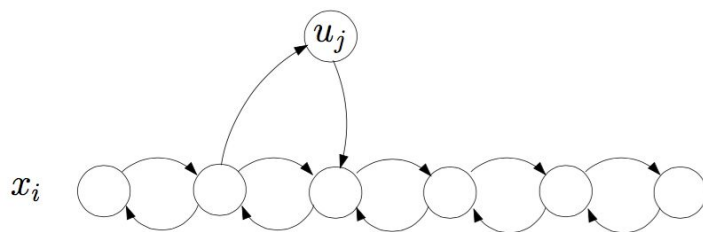
c. Similarly, we add an end vertex.



d. We interconnect the chains by adding 2 edges from the first and last vertices of each chain (except the last), to the first and last vertices of the next chain.



e. Then for each clause c_j , we add a vertex u_j as follows:



If the clause c_j contains a negated x_i , we reverse the directions of the edges.

source: <http://sma.epfl.ch/~moustafa/Other/Complexityslides/lec7.pdf>

4. (a) No, since the 8 clauses represent all possible combinations of the values of x , y , and z . Hence, one of them is where all are false so that one of the clauses is false and so the whole statement is false.

[illegible]