CS-208:Artificial Intelligence

Topic-16: Resolution in Propositional Logic

Resolution in Propositional Logic

Input: Procedure for producing proof by resolution of proposition ***S*** with respect to given set of axioms ***F***

Step1: Convert all the propositions of F in to Clause Form

Step2: Negate S and convert the result in to clause form. Add it to the set of clauses obtained in step1.

Step3: Repeat Until either a contradiction is found or no progress can be made

a) Select two clauses. call them as the parent clause.

b) Resolve the parent clauses. The resulting clause is called resolvent will be the disjunction of all the literals from both the parent clauses with following exception: If there are any pairs of literals L and $\neg$L such that one of the parent clauses contains L and the other contains $\neg$L then eliminate both L and $\neg$L from the resolvent.

c) if the resolvent is an empty clause then a contradiction has been found . If it is not, then add the resolvent to the set clauses available to the procedure.

An Illustrative Example for Resolution in Propositional Logic

<u>Given set of Axioms</u>

1. p
2. $(p \wedge q) \rightarrow r$
3. $(s \vee t) \rightarrow q$
4. t

<u>Prove:</u> r

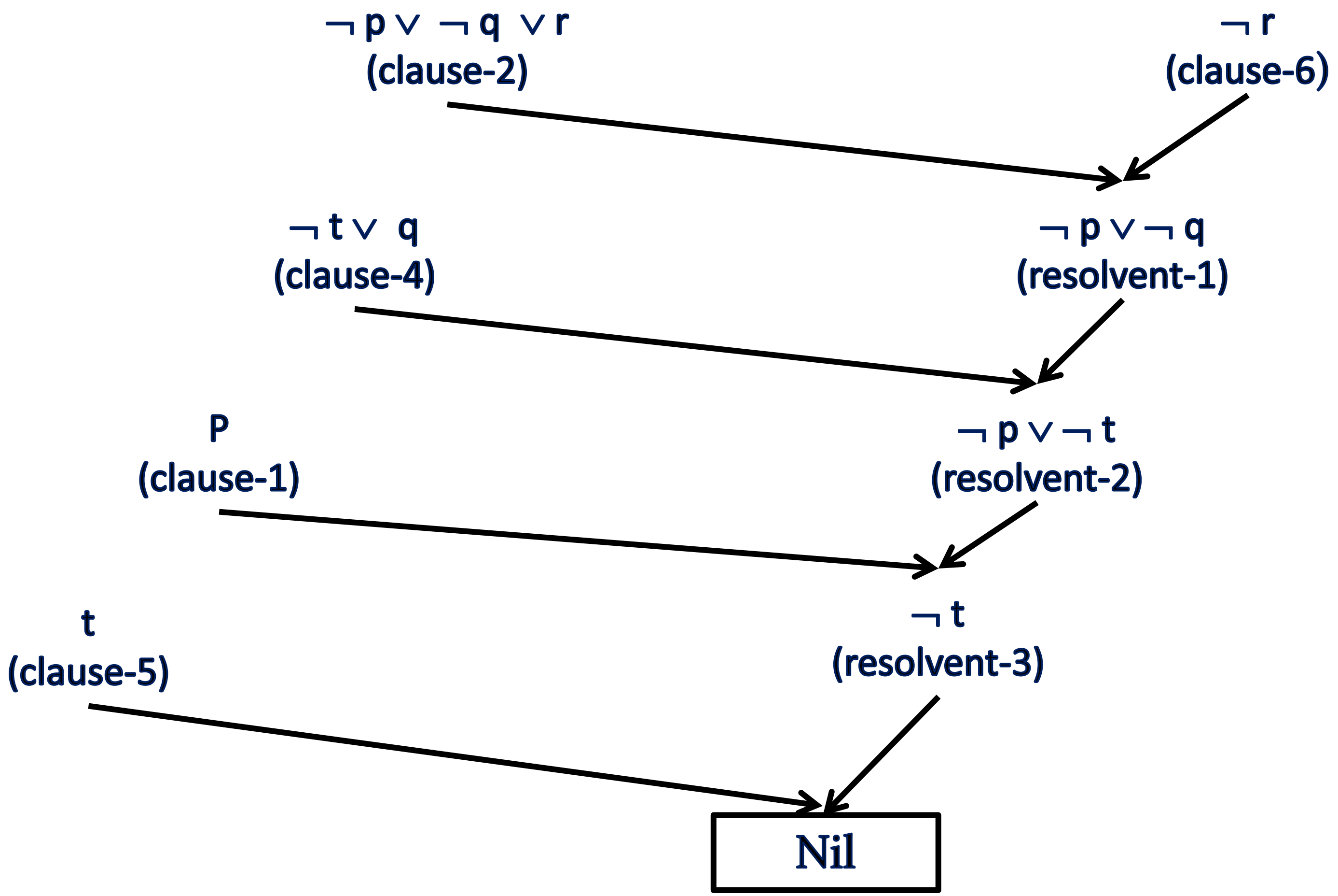
Resolution Step1: convert given set of axioms in to clause form

	Conversion steps	Description	Clauses
1	p	Already in the clause form	Clause-1
2	$(p \wedge q) \rightarrow r$		
	$\neg(p \wedge q) \vee r$	By conversion step-1	
	$(\neg p \vee \neg q) \vee r$	By conversion step-2	Clause-2
3	$(s \vee t) \rightarrow q$		
	$\neg(s \vee t) \vee q$	By conversion step-1	
	$(\neg s \wedge \neg t) \vee q$	By conversion step-2	
	$(\neg s \vee q) \wedge (\neg t \vee q)$	By conversion step-7	
	$\neg s \vee q$	By conversion step-8	Clause-3
	$\neg t \vee q$	By conversion step-8	Clause-4
4	t	Already in the clause form	Clause-5

Resolution Step2: Negate r and convert ¬ r into clause form

	Conversion steps	Description	Clauses
1	¬r	Already in the clause form	Clause-6

Resolution Step3:



An empty clause indicates ¬*r* can not be true as it was concluded with full of contradictions. So *r* must be true.