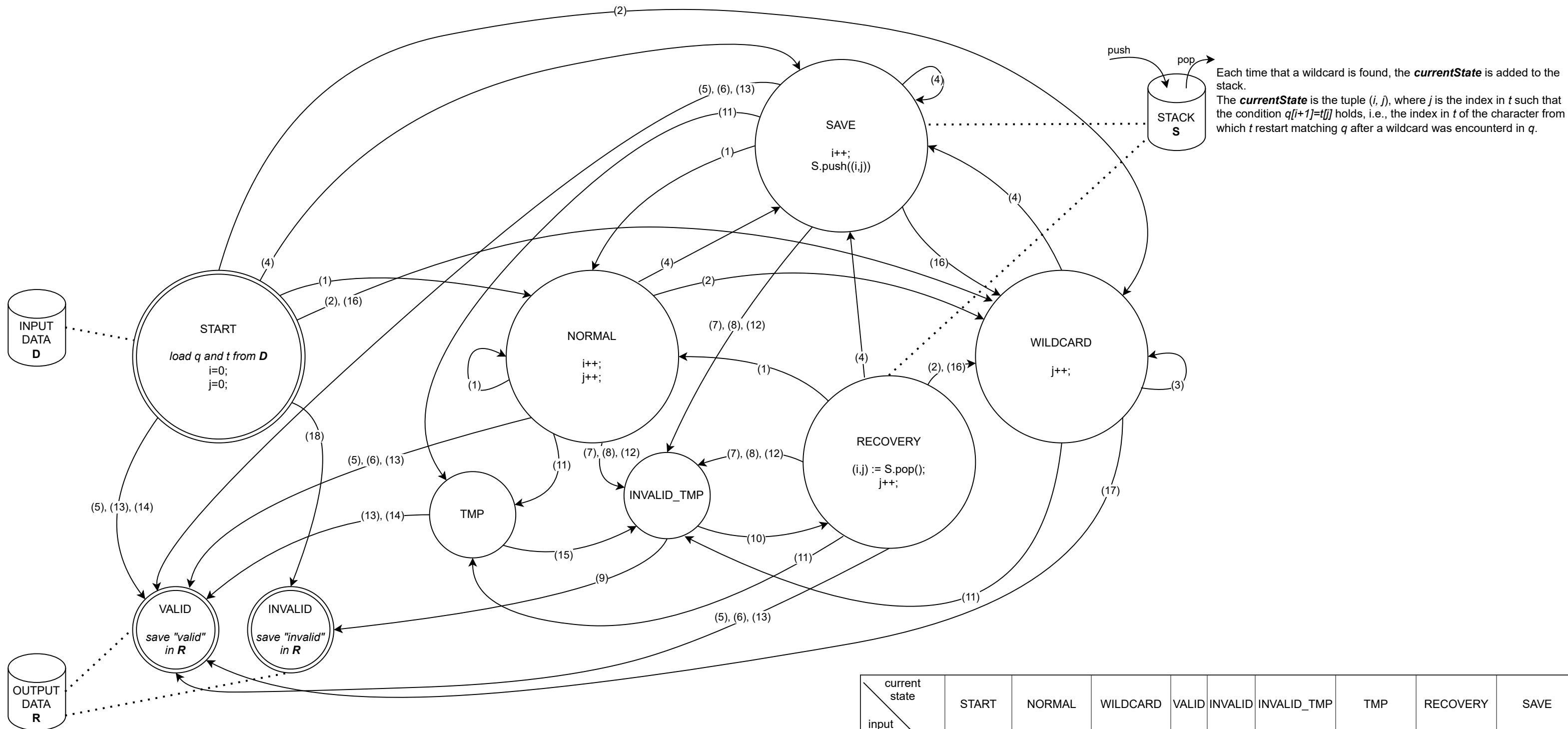


**GOAL:** Given an un-stemmed wildcard query  $q$  and a stemmed token  $t$ , return true if the stemmed version of the wildcard query is compatible with the given stemmed token, false otherwise.

This problem is solved using an implementation of a modified finite-state machine, where each state can take some input parameter and its state evolves dynamically according to its current state and the input parameters.



- (1)  $i < q.length$  AND  $j < t.length$  AND ( $q[i] = t[j]$  OR  $stem(t.substring(0,j) + q.substring(i).replaceAll("?", "")) = t$ )
- (2)  $i < q.length-1$  AND  $j < t.length$  AND  $q[i] \neq t[j]$  AND  $q[i] = '*'$
- (3)  $i < q.length-1$  AND  $j < t.length$  AND  $q[i+1] \neq t[j]$
- (4) ( $i < q.length-1$  AND  $j < t.length$  AND  $q[i+1] = t[j]$ ) OR ( $i = q.length-2$  AND  $j = t.length-1$  AND  $q[i] = '*'$  AND  $q[i+1] = t[j]$ )
- (5) ( $i = q.length$  OR  $i = q.length - 1$ ) AND  $j = t.length$
- (6)  $i = q.length-1$  AND  $j < t.length$  AND  $q[i] \neq t[j]$  AND  $q[i] = '*'$
- (7)  $i = q.length-1$  AND  $j < t.length$  AND  $q[i] \neq t[j]$  AND  $q[i] \neq '*'$
- (8)  $i < q.length-1$  AND  $j < t.length$  AND  $q[i] \neq t[j]$  AND  $q[i] \neq '*'$
- (9)  $S.isEmpty()$
- (10)  $\neg S.isEmpty()$
- (11)  $i < q.length$  AND  $j = t.length$
- (12)  $i = q.length$  AND  $j < t.length$
- (13)  $i < q.length$  AND  $j = t.length$  AND  $i < q.length$  AND  $stem(t + q.substring(i).replaceAll("?", "")) = t$
- (14)  $q[i] = '*'$  AND  $i = q.length-1$
- (15)  $q[i] \neq '*'$  OR  $i < q.length-1$
- (16)  $i < q.length-1$  AND  $j < t.length$  AND  $q[i] \neq t[j]$  AND  $q[i+1] = '*'$  AND  $q[i] \neq '*'$
- (17)  $j = t.length$  AND  $i < q.length$  AND  $stem(t + q.substring(i+1).replaceAll("?", "")) = t$
- (18)  $i < q.length$  AND  $j < t.length$  AND  $q[i] \neq t[j]$  AND  $q[i] \neq '*'$

current state \ input	START	NORMAL	WILDCARD	VALID	INVALID	INVALID_TMP	TMP	RECOVERY	SAVE
no input (unstable state)	-	-	-	end	end	-	-	-	-
(1)	NORMAL	NORMAL	-	-	-	-	-	NORMAL	NORMAL
(2)	WILDCARD	WILDCARD	-	-	-	-	-	WILDCARD	-
(3)	-	-	WILDCARD	-	-	-	-	-	-
(4)	-	SAVE	SAVE	-	-	-	-	SAVE	SAVE
(5)	VALID	VALID	-	-	-	-	-	VALID	VALID
(6)	-	VALID	-	-	-	-	-	VALID	VALID
(7)	-	INVALID_TMP	-	-	-	-	-	INVALID_TMP	INVALID_TMP
(8)	-	INVALID_TMP	-	-	-	-	-	INVALID_TMP	INVALID_TMP
(9)	-	-	-	-	-	INVALID	-	-	-
(10)	-	-	-	-	-	RECOVERY	-	-	-
(11)	-	TMP	INVALID_TMP	-	-	-	-	TMP	TMP
(12)	-	INVALID_TMP	-	-	-	-	-	INVALID_TMP	INVALID_TMP
(13)	VALID	VALID	-	-	-	-	VALID	VALID	VALID
(14)	-	-	-	-	-	-	VALID	-	-
(15)	-	-	-	-	-	-	INVALID_TMP	-	-
(16)	WILDCARD	WILDCARD	-	-	-	-	-	WILDCARD	WILDCARD
(17)	-	-	VALID	-	-	-	-	-	-
(18)	INVALID	-	-	-	-	-	-	-	-