SHAKTI TIEL

151

DATE 91013

PUSH DOWN AUTOMATA

(PDA) & Gontext free Language

- (CEL)

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W-

*5-0*

Que. Define Push Down Automata with its black diagiam

A push down automata is defined b*y 7 tuple*. M = (Q, E, sr, ao, zo, F) where,

Q = finite set of intes nal states. = = Finite set of input alphabet. 6 = Mapping Function

S: (QxE) x Q XNt. in = It is alphabet known as stack, alphabet. Zo = stack symbol called as start symbol.

E = finite set of final state. 90 = initial state.

A

l les

Finite tente control seads input string one symbol at a time. A PDA allow to observe the symbol at top of the stock { based on

its current state went input symbol { top of the stack transition is done.

A PDA consume input symbol used in transition then it goes to new state, which may or may not be the same a*s w*ent state

seplace the symbol at the top of the stack by some stsing. A PDA is non-deterministic if it contain some finite no. of choices of move in each substitution. The expectance of language is proved by

using empty stack & final state.

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Read

head

stutt

finite

fig

Block Didpiam of PDA

ue. Design a *PDR for L* = 396"/a.17.

1) *Logic Us*e >

Here for *input symbol ce we push* x into *th*e stack & state will same. at

As *be appears pop operation stast* f we *pop* **b Post** *\* A corresponding x and state will changed.*

As E l zo aco*mbination appeas w*e *jump o*n to the *final state.*

> Tsans*ition Funtion :*

aaaabbbb 8*(90,01,20) = (90, <zo*)

(9o, a, x) = (90, xx) & (9o, b, x) = (9, E)

tos pop

opernition

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s (1.b, ) = (91,) 8 (91, E, 20) = (af, E)

.

tinal state

>> Diagram

→

4) S*timulation*

w = ddabbb S (90, daabbb,20) (90, dabble, xz) (90, abbb, xxz)

(an, bb, x170) E (21b, *xz*o) (21€,zo)

(90;bbb,X7120) (qf, e)

**Hence lan**guage is acce*pted by empt*y stack.

2.L=10201

*1) Logic Use*

Here fas *input symbol o we push x int*o the stack

A state w*ill same*

*As 1 appeds pop operation stast 4 we pop t' f*ou **cosesponding** o a*nd state will ch*anged

AS E &zo co*mbination appeds, we jum*p onto *th*e final

state.

2) Dansitio*n Function +*

oooo 1 1 1 1

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& *(9*0, 0, ze) = (9*0, xzo)* $(90,0,2) = *(40, xx)* 8 *(90,1, x) = (91., c)* $(91,1x) = (21,6) 8 (942€*, zo) = (2*+,e) *5 (*90; €, Zo) - *(94,) This sule is used i#nao*

3*) Diag*ram →

Ozo 20

420)

Ezole

Ezote

Ls) s*timulation*

W= 000111 8(90,000m, zo) E (20,00111, *X2*0) (90,0!11, XXZ) (90, 141, XXlZo.

+(91, 11, xazo) (91, 4, XZo) (999€, ZO) E (98,€)

*Hense langudge is accepted by empty stuck*

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Conversion of contex*t fr*ee grammes to push

(FC) to (PDA) - d*own Automat*a \*

*Gue*

*Constructa PDR equivalent to following CEC*

S *OBB*

B → 05/15/0 C*heck whethes 0104 is accepted or no*t.

6BB جی

B → 05/15/0

A CFG is define by 4 tieple.

G=(x, I, P,S)

A PDA is *define by* 7 *tuple,*

G= (@, E,S, 9o, r , 30, F)

Transi*tion Tabl*e fos PDA - aslo 6(90,0 s) = ( 99BB)

s(a,0,B) = (9,5) 8(9, 1, B) = (9,5) 8(9,0, B) = (2,6) S (9, E, zo) = (ap, E)

W = 0104

=\_010000

SOBB

S-01SB S-010BBB S-> 0100 BB s-> 01000 B s --> 010000

(SEOBB). (B=D) (B=0)

(BOD)

WEDLOOD is accepted by PD*R*

S-09

#W-08

$ → *ORA*

À → as/bs/a

هموطه= لم

5- C*AA*

as/bs/a

A CFG is define by 4 trople

6=(,TP,S).

A PDA is define by 7 tuple

6 = (QLS, Loy M30, E)

Transition Table for PDA

8(90,,s) = ( AR) 6(460,)=(4,5) s(a, b, A) = (9,5) s(a, a, A) = (9,6)

(90,3,20) = (116)

Dare: 14/10/13

we aabaaa

S->QAA $ *USA (*Aa) s aabs (A-bs)

s →qabaas (S=qAA) S aabada (A= a) S aabada (A=a)

.. waaabada is accepted by PDA.

s*-> ABBA*

AA ط ل ععله ج- م

*Bb/bs/ ABB*

we cabbabab

s

aBlbA À → alas IBAA B-blbSLABB

A CFG is define by 4 tuple

G= (1, I, P,s)

A PDA is define by 7 tuple G=( Q, Z,d, 9o, r, To,F)

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*Transition Function t*os PDA

8(90.0,s) = (2,B) s (9, bxs) = (0,4) 6(a, a, A) = (9,6) S ( A) = (9*,*5)

&(q, b, A) = (9, AA) is (a, b, B) = (9,6) is (a, b, B) = (9,5)

S (9, d, B) = (Q,BB) s (90, E, zo) = (at, E)

w=aabbababa $ aB

S > CQBBB =OBB) s aabse (B=bs) s a abbaB (caba) s aabbaso (A-as)

s cabbabAB S=bA) s aabbabab

wedabbabab is accepted by PDA

DATE: 15/10/13

(PDA) Conversion of Push Down Automate to contey

free baammes. \*

W-10 05-04

C*onstruct a CEO fos following PDA*

*generating language* for

M = (5909, 3, 30, 13, 32, 107, s. 9, 20, 0) where

S is a*s below -* s(90, 0, zo) = (90, xzo) s(ao, 0,x) = ( 9o, xx) - 6 (90, 1, x) = (91, E) Sat, 1x) = (a), E) s (que, x) = (91, E) s. (91, 6, Zo) = (af, E).

A CFG is define by 4

tuple.

(Ps ركا) = ه

A P*DA is define by 7 tuple*.

G=( Q, Z, S, N, 9, 30,F)

s*(9.20, 2) = (90,1*70)

30-0*1*

@

8(90, a, x) = (90, a

10xx

E11 لایا

شان

(عربه) تعليمه) که

نفتکل چلا

شلمچه

عدية) = (حمليوکه

=> 1

كيرو) = (ارگري) ك (5)

*Requised context free gramme*s -

oothole

ozx/1/6 x

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\*

Co*rtext Free Language (CFL) \**

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*$*-09

W-Q8

$-08 S-06

y.V.imp

*Pumping Lemme For CEL →* Quee S*tate and prove pumping lemma fo. CEL*.

→ S*tatement z let, bv.bo the any CEL then their* ex*ists a constant n depending on L such that is i*n L and 12) = n then we may write a= uvway such that /vx!21 wwel<n and **zu uvwx'y izo** is in L for i=o.

Proof is let,

6 be *the CNE gramm*es *generatin*g *language lit gis in L(6) and z is long than* any o*ther desivation tree f*os *z then it contains* long *path. It the desivation tree of a wo*rd generated *by chomsky nos mal form grammes & hos no path* of leng*th g*rea*ter than then the string* is not greater than 2 2 - 1 it there are no path of length greater than i 1 in trees I & Tg then the tree *generate the word of few symbol & appeds twi*ce near the *bottom of the path*

ONE 17/10/13

Ap*plication of pu*mping temme

We used pumping le*mma* to show that language Lis not ine in the f*oll*owing ways -

step 1- Assume 1 is a CFL. let, to be the natwal

*numbes obtain by using pumping lemma.*

Step 2 & Choose EL so that Izzn write

uvwxy using pumping lemma.

Step 3 - *Find suitable é so that xu*v'we*'y&L*

this is *the contradiction to ous assumption that* is a CFL so we conclude that t is not CFL.

Problems On C*ont*ext Free Language \*

S-99

w-of *S-05*

5-04

**Dawe, show** that *following languag*e is not CL

=anon omncm ran 3

L = { am 6m cn mencom} put n=2m. *Assume is a cont*ex*t free language*. Yet 'n be the natural member

*obtained by using pumping lemma*. such that

/z/an

171 10/13

put m=an

12 anunten

Condition is satisfied.

Split

show that

the string z

in u, v, w, x ly

such

acb

Z = aq

vwa

VW x = 6k

y=ch

let,

v=6m

kem

let

w=bn

Consides,

z = uwy

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z

-

a

n

=

J

b

l c

Intl & un

one

*Hence* ou ass*umption that L*i OCEL is i We conc*lude that li*s nat. CE*L*

*y.*y.w.w.i*mg* \* \* S-08

L = 3 atliis prime } is not cEL.

Ass*ume l'is a CE*L

let 'n be the natural numbes.

Obta*ined b*y us*ing pumpi*ng lemma such that 12/2n.

C*ondition is satisfied.*

Split the string z in u, w, v, z ly such that

22.

oddáadá

vwx

Date: 21/10 113

Closwe Proper*ties of Cont*ext. Free lang

tade

y. *V.mp*

*Prove that CEL are close sendes union,concatenati*on *& kleen closu*se.

Co*nsides, AL CELL* I *Lg generated b*y CEC G, 8GGq -

- 9 = (V1, TPI.S) 8 42 = *(V2*T2, P2,52)

S-10

Union

Construct a quammes. 63 = (VIU V U13 s3}, T, U TOP

S3) whese, Pis Rule with paoduction

So Sils since eves y production in 4 is in Gs

similasly, every production in Lg is in G3

Thus,

Hence, CFL is closed under union.

Concatenation

Construct a grammer GG = (v1 u V2 U { Sy}, T, UTz, P4

where, Pl is P, Upg with production

Sysilsa since, every production of Gy is the production of 44 simil.nesly, every production of 42 is the production of 44

PANENO 43

D*IE* 21 | 1013

(94) = L(41) L (42) Hence, CEL is closed under concatenation.

. Kleen closuse it

Gonstruct. d guammer 45=*(* VHS

Mu{ss}, T5, Ps, S-) whese Pi is production

علوکوک دیگ

since, closuse means any no. of sepetation of itself so, as far a*s ze*ro is concern no. of sepetation of ss ne sequired so, we have the peoduction s e

because of the vasiable on sight hand side can be repeted no. of times hence CFL is closed under

kleen close

Hence, from 0.0 & . CEL is closed undes union, concatenation 4 kleen closure

*eu show that th*e CFL are c*losed under substitu*tion

→ let,

- L be a CFL L E \* & for each

let, La be a CFL

let, the geammes generated by language Lis (9) the gaammer genercled by La is L(Ga)

Assume that variable that G & Go we disjoint Construct a gaammes as follows -

the vas iable of Gase all the vasiable of a & Ga the terminals of case the terminals of ga

The stast symbol of G is the start symbol of a The production of a me all the produc**tion of ga!**

The production form by taking a production Anx of a substituting sa the stust symbol of Ge for

each production.

Hence, we conclude that El me closed under substitution.

To

NO. 45 *Turning Machi*ne

DATE 23/10/13

Define Turning Machine

*The tuning machine is a simpl*e ma*thematical model of our computer. This machin*e w*as* introduced by Allan tuuning in 1936 A IM has a finite alphabet set of symbol & a tinite set of states & input tape is divided into cells. A tape head *scan* one cell of the tape each time. Each cell can hold one symbol from the alphabet. It the cell has no symbol then it is considesed as blank symbol

A Tuning machine is define by 7 tuple -

- M = (0,5, rys, 90, B,F) where,

Q : finite set of internal states: 5 = finite set of input alphabet

finite set of allowable tape symbol 90 = initial state.

S = Mapping function

B = A tape symbol known as blank symbol F = finite set of final state,

Ilp habet cells

Ilp string

o

blank

Read & write head

tinite

+19.@ Block Diagram of Tuning machine

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Tusning

Machine

OMRO2102

1) Heads

A head which *can sead ar w*aite symbol { move *let*t a sight as stay *in position* coresp*ondi*ng to squa*se* cell mask on a tape.

2x Tape

An infinite tape extend*ing on* eithe side of head mask into the square cell on w*hich* the symbol fro*man* alphabet set can be wsitten

3) Input Tape

Finite set of symbol called as an extended alphabet set consist of letters, digits, blank etae

47 Final state i n

There is a finite set of final state denoted be l.f'on which machine con reside or stop.