

How about Recall 192.1

$0^n 1^n 2^n$ NIT CFL

$\begin{matrix} \text{p} \\ \text{q} \\ \text{r} \\ \text{s} \end{matrix}$
 $\begin{matrix} \text{A-} \\ \text{B-} \\ \text{C-} \\ \text{D-} \end{matrix}$
 $\begin{matrix} \text{get } 0 \\ \text{find } 1 \\ \text{find } 2 \\ \text{find next } 0 \end{matrix}$
 $\begin{matrix} + \\ \text{u} \end{matrix}$
 $\begin{matrix} \text{E-} \\ \text{F} \end{matrix}$
 $\begin{matrix} \text{out of } 0's \\ \text{ACCEPT} \end{matrix}$

		0	1	2	X	Y	Z	b
p	A	BX →				EY →		
q	B	B0 →	CY →					
r	C		C1 →	DZ ←				
s	D	D0 ←	D1 ←		AX →	DX ←	DZ ←	
t	E					EY →	EZ →	Fb →
u	F							

Depth of $z's$, Bq blocks
 $z's$, Cr blocks

So, TM clearly more powerful than PDA

Example: TM (my note, p. 202)

for $0^n 1^n 2^n$

$$A_1 \rightarrow A A_2$$

$$A_2 \rightarrow \begin{array}{l} [00] A_2 \\ | [11] A_2 \\ | [22] A_2 \\ | A_3 \end{array}$$

$$A_3 \rightarrow \begin{array}{l} [\lambda \Delta] A_3 \\ | \lambda \end{array}$$

which generates representation of $\{0,1,2\}^*$

such as

$$[11] [00] [00] [\lambda \Delta] [\lambda \Delta]$$

(not in L)

and

$$[00] [11] [22] [\lambda \Delta]$$

(in L)

Rest of grammar ...

$$A[a 0] \rightarrow [a X] B$$

$$A[a Y] \rightarrow [a Y] E$$

$$B[a 0] \rightarrow [a 0] B$$

$$B[a 1] \rightarrow [a Y] C$$

$$C[a 1] \rightarrow [a 1] C$$

$$[b \beta] C[a 2] \rightarrow D[b \beta] [a Z]$$

$$[b \beta] D[a 0] \rightarrow D[b \beta] [a 0]$$

$$[b \beta] D[a 1] \rightarrow D[b \beta] [a 1]$$

$$D[a X] \rightarrow [a X] A$$

$$[b \beta] D[a Y] \rightarrow D[b \beta] [a Y]$$

$$[b \beta] D[a Z] \rightarrow D[b \beta] [a Z]$$

$$E[a Y] \rightarrow [a Y] E$$

$$E[a Z] \rightarrow [a Z] E$$

$$E[a \Delta] \rightarrow [a \Delta] F$$

$$[b \beta] F \rightarrow F b F$$

$$F[b \beta] \rightarrow F b F$$

$$F \rightarrow \lambda$$

S

A, => A [00][11][22] Δ Δ Δ

[0x] B [11] [22] --

[0x] [1y] C [22]

[0x] b [1y] [2z]

b [0x] [1y] [2z]

[0x] A [1y] [2z]

[0x] [1y] E [2z]

[0x] [1y] [2z] E [1Δ]

[0x] [1y] [2z] [1Δ] F

[0x] [1y] [2z] F 1 F

F 2 F 1 F

F 1 F 2 F 1 F

F 0 F 1 F 2 F 1 F

0 1 2