Discrete Maths

6

Output symbols in FSM

over state

over transition edge

Upon entry

Upon exit

P.S. moore vs ~~mealy~~

Draw FSM for
1's ~~complement~~.

=>

Output
over
state
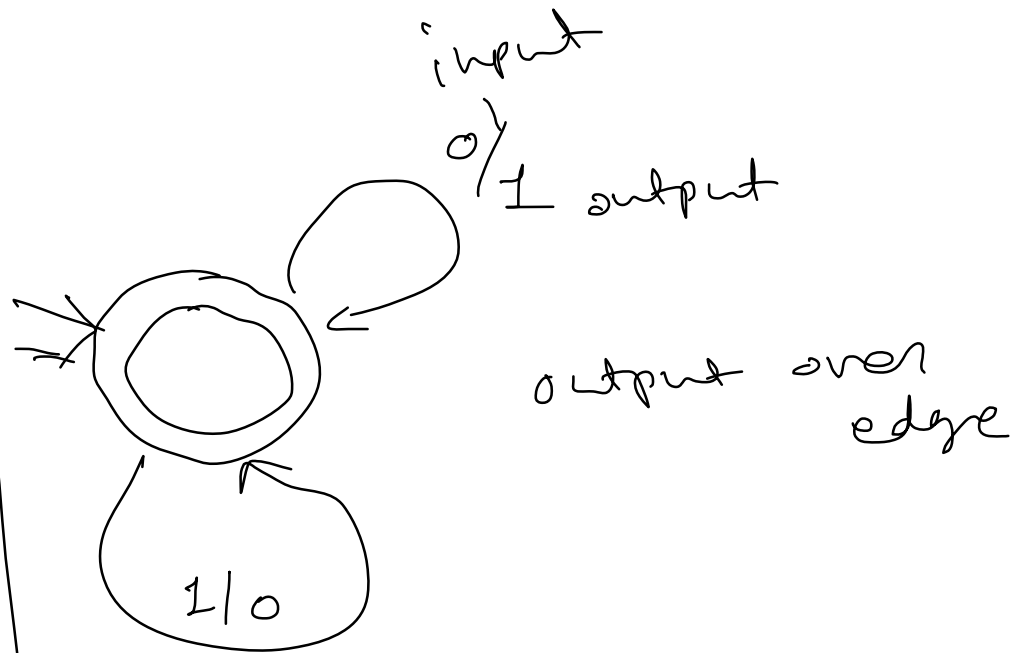
input
$0/1$ output

A/0

output over
edge

$1/0$

when do you
dispatch output.

On ~~mute~~ ~~minute~~
on entering
into?

On exiting out?

Start state output
as soon as we enter?

Example

For ~~language~~ $L = \{ a^i b^j \mid i \geq 1, j \geq 1 \}$ $i \neq j$

write grammar or FSM

Observations

①

i	j		i	j			
1	1	X	1	1	X		a b
1	2		2	1			
1	3		3	1			
...	...		...	...			
2	1	✓	2	2			
2	2	X	2	2	X		aabb
2	3		3	2			
...	...		...	...			

② All a's must precede all b's

③ $i \geq 1$, $j \geq 1$, $i \neq j$

aab   or   abb

first possible strings

Can we think "dead state"

If input starts from b

or after ~~got~~ ~~too~~ any a's 1st ~~b and then~~

a again

.

How will you solve ?

Think Simple

Devide task

$i \neq j$ into two

possible ?

How ?

$$L_1 \qquad i > j$$

$$L_2 \qquad i < j$$

$$L_1 \cup L_2$$

$$i \neq j$$

L1   i > j

S → A

A → aA

A → aB

$\}$ ⟶ Add one more a

all other a's then extra one

the extra one

B → aBb

B → ab

$\}$ ↳ Number of a's same as b's

↳ a's first b's later

S → C

C → cb

C → 𝒟b

𝒟 → a𝒟b
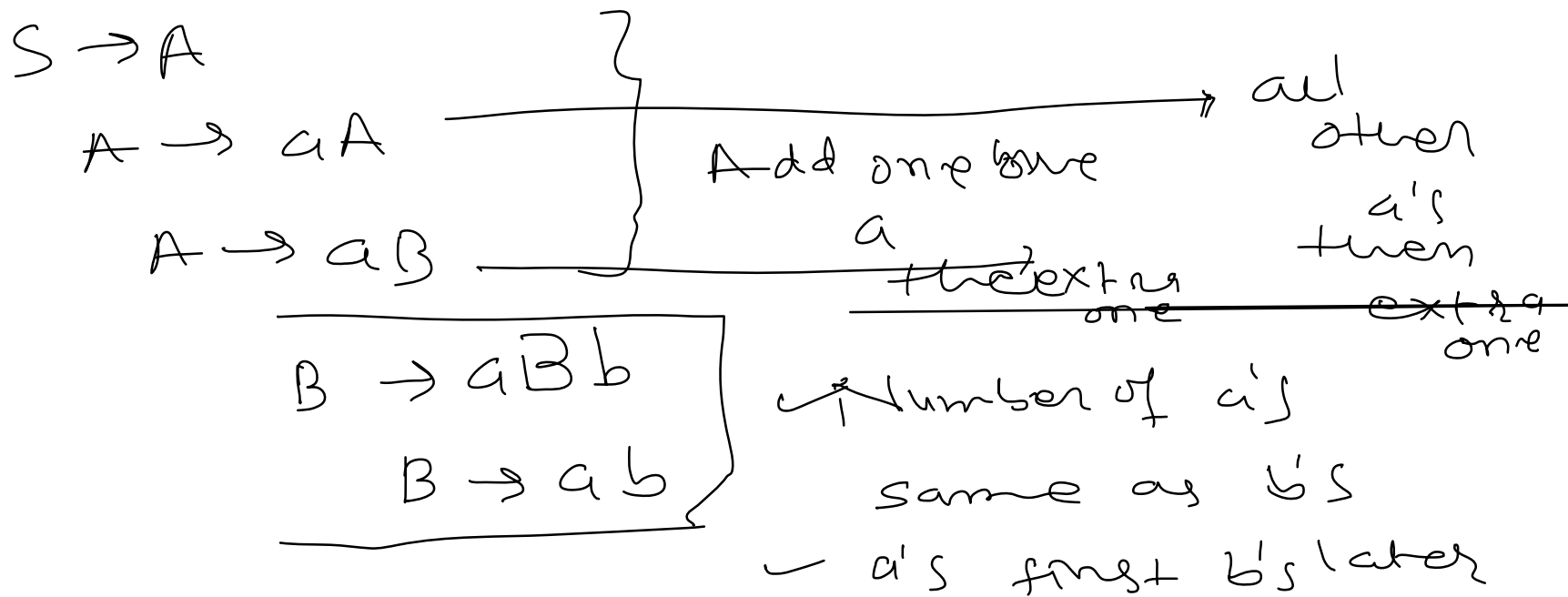
𝒟 → ab

L2

i < j

Total 10 rules

L₁ U L₂

i ≠ j

Simplified

$S \rightarrow A$

$S \rightarrow C$

$A \rightarrow aA$

$A \rightarrow aB$

$B \rightarrow aBb$

$B \rightarrow ab$

$C \rightarrow cb$

$C \rightarrow Bb$

Total
8 rules.

Behaviour of student
Input

Happy A ~~Happy A~~	Homework	Party	Poor Exam
	A	A	B
Angry B	C	A	B
Upset C	C	A	C

	output	
A	SING	✓ Psychologists
B	CURSE	✓ Sociologists
C	SLEEP	✓ economists
		✓ scientists
	to use	etc

FSM to model.

Exercise

Give a type-2 Grammar for

$$L = \{ a^i \ b^i \ c^j \mid i \geq 1, \ j \geq 1 \}$$

Also, validate strings

~~aaa~~

aaabc

aaabbbccc

etc.