1

FSM

States — initial
       — accept
S

Alphabet eg. {0,1} A

Transitions/Rules

$\delta : S \times A \rightarrow S$

+

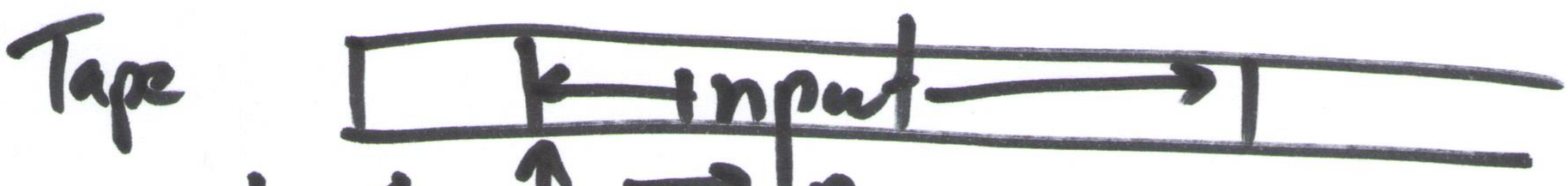
Turing

Tape / SAM / Array (infinite)

R/W Head

electro-mechanical

Input A_i eg. {a,b}, {0,1}



FSM one at a time

Processes input on tape

unrestricted access to input/tape

$A_i = \{0,1\}$

Tape $A_T =$

Working Paper

Do Working

- mark on tape R/W

~~right~~ write any Symbol

② Mark on tape

$$A_i = \{0, 1\}$$

Tape Alphabet

$$A_T = \{0, 1, x\}$$

← Symbol for checking / working

FSM

Set of Accepts states S^{yes}

To accept, • finish in

$S \in S^{yes}$

Turing

Single accept state S_a

because of ^ infinite tape ↙

accept instantly

when in this state.

Likewise for reject state

Example

Decide if input is has a 1 in it.

R

→ 0010 t

(3) Turing Machine

S set of states

A_i input Alphabet

A_T #Tape Alphabet

δ Transitions

s_0 initial State

s_a accept... state

s_r reject state

FSM

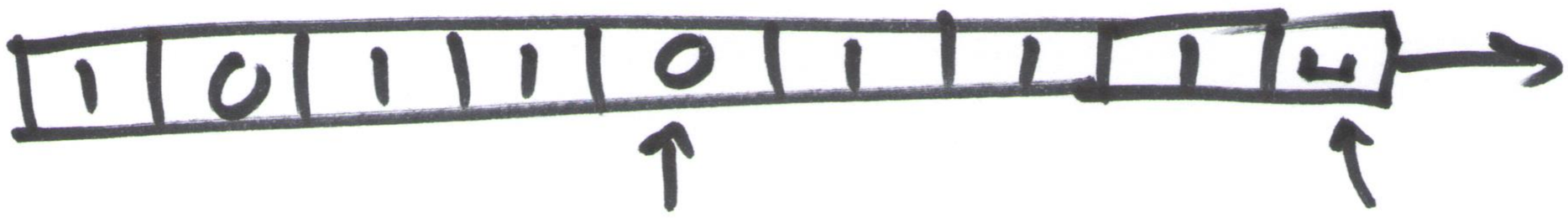
$$S \times A \longrightarrow S$$

Turing

$$S \times A_T \longrightarrow S \times A_T \times \{L, R\}$$

Code → δ Program

(4) Configuration → how to keep track of Computation of Turing Machine



Notation

$t\,0\,1\,1\,s_7\,0\,1\,1\,1$

Example

TM is to determine if the left side of an input is the same as the output.

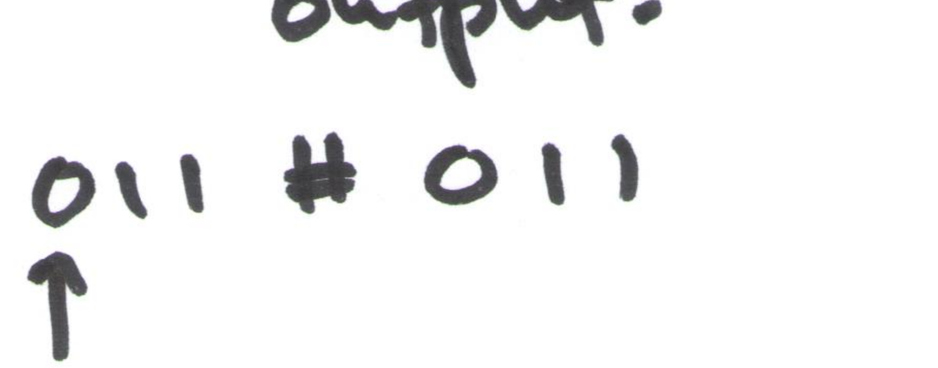
011 # 011

Algorithm

s_0 - initial

s_0 011 # 011

check, R until #, check if same state continue



X 11 # # s_{00} X 11