Problem

In Theorem 3.21, we showed that a language is Turing-recognizable iff some enumerator enumerates it. Why didn't we use the following simpler algorithm for the forward direction of the proof? As before, $s_1, s_2, \ldots$ is a list of all strings in Σ^*.

E = "Ignore the input.

1. Repeat the following for i = 1, 2, 3, ...

2. RunM on s_i.

3. If it accepts, print out s_i."

THEOREM **3.21**

A language is Turing-recognizable if and only if some enumerator enumerates it.

Step-by-step solution

Step 1 of 1

Theorem: - A language is Turing – recognizable if and only if some enumerator enumerates it.

The given simpler algorithm for the forward direction of the proof of this theorem is

Say that $s_1, s_2 \cdots$ is a list of all strings in Σ^*

If Turing Machine M recognizes a language L, then we can construct following enumerator E for L.

The Enumerator E works as follows:

$E = "\text{Ignore the input}$

1. Repeat the following for $i = 1, 2, 3, \ldots$

2. Run M on S_i;

3. If it accepts, print out S_i"

Defects in this proof:

In stage 2 of this algorithm (Run M on S_i)

If M loops on a certain input S_i runs forever, E could not check any input after S_i.

If it occurs, then E might fail to enumerate its language L as required.

Thus this procedure does not give the effect of running M in parallel on all possible input strings.

So, this proof is not suited for forward direction of above theorem.

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