Proving the decidability of the language

Given:

$E = \{\langle M \rangle \mid M\}$, is a DFA which is use for accepting a string *w* which contain more number of 1s and 0s.

Proof:

In order to prove that *E* is decidable, context free language should be use. As it is well known that if any string contain more number of 1's and 0's then it is context free language.

Now, consider a string *w* that contains more number of 1s than 0s that is accepted by DFA *M*. If a regular language is Context Free Language then it is decidable and it is decidable then it would be recognizable as well.

Now use the approach in the same way as uses for CFL.

String containing more number of 1s than 0s can be generated by a particular grammar pattern or can be said by using a Context Free Grammar then it would be a Context Free Language.

Now, it is already known that each and every context free language is decidable. Now prove that the context free language is decidable.

Construction:

M is a DFA that accepts string *w* that contains more number of 1s than 0s. Consider *A* be a CFG that generates *w*. Consider a Turing Machine that decides *w*. and built a copy of *w* in Turing Machine *A*.

Working of the Turing machine process is as shown:

T = Runs on input *w*

• Run Turing Machine *S* on input $\langle M, w \rangle$. Here, consider another Turing machine that generates output by considering input from *M* by running it on input *w*.

• If the string is accepted, then Turing machine accept that particular string.

• If the string is not accepted, the Turing machine rejects the particular string.

Conclusion:

So, by the above construction it is proved that string is decided by the Turing machine. Hence, it is said that the language *E* is decidable.