

Can every DFA be converted into an NFA?

Since, this question is in the theory of computation category, I'm going to assume that you're asking if a deterministic finite automaton; hereinafter, DFA; can be converted into a nondeterministic finite automaton; hereinafter, NFA; that recognizes the same language as that DFA.

Simply put, yes.

The easiest way to demonstrate that any DFA can be converted into an NFA that recognizes the same language as that DFA follows.

Consider an arbitrary DFA D ; then, add a nondeterministic transition from any state of D to itself; doing so will flourish that DFA into an NFA.

Of course, you don't need to add a nondeterministic transition since every DFA is already an NFA.

Finally, I can conclude that every DFA can be converted (and actually trivially is) an NFA. Every NFA can be converted to a DFA (although perhaps suffering combinatorial explosion).

Every [automata theoretic] regular expression (not every PCRE one, no back references nor some other twists) can be also and vice versa.

All three forms describe exactly the same set of *languages* sets of strings that they match (accept). There are even mechanical ways to do the transformations.