Review of: "NP on Logarithmic Space"

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The reason that I have not given a high rating for this article is that I cannot follow the arguments in the article. The defintions of L and NL seem fine, but I do not understand the logic behind Hypothesis 1 nor the form of the definitions of TAGAP and onwards (Definition 3 et seq). A definition should in my view have the defining term followed by a clear description of what is being defined, which is missing for Definition 3 onwards.

It is known by Savitch's theorem (see https://en.wikipedia.org/wiki/Savitch%27s_theorem) that NL is a subset of L^2. Savitch himself in “Relationships Between Nondeterministic and Deterministic Tape Complexities” notes that deciding whether an input can be accepted can be though of as the question of whether a thread (a path) can be found through the possible state transitions of a Turing machine to an accepting state. Since Savitch shows that thread-ability is quadratic in the length of the input of the Turing machine, Savitch's theorem follows.

What the author needs to show is that a thread-able indeterministic Turing machine can be computed linearly in the length of the input of the Turing machine, which I can determine. This argument might be in Theorems 7 and 8, but I cannot tell whether it is or not. Oracles are not needed if the complexity class needed is a sub-class of the class used in the computation.

I would recommend that the paper is re-written to make the linearity result clear. I am also not sure what the discussion of P≠NP adds, particularly since L is a space complexity class, while P is a time complexity class.