Reviewer’s report

Title: Automated Detection of Altered Mental Status in Emergency Department Clinical Notes: A Deep Learning Approach

Version: 0 Date: 13 May 2019

Reviewer: Ross Jacobucci

Reviewer's report:

I thoroughly enjoyed reading this paper and believe that it can make a contribution to the literature on automatic decision making in clinical settings. My criticisms are somewhat brief, but can be encapsulated in two main points.

My first criticism is treating the clinical labeled data as ground truth. This speaks to a larger problem in not spending more time in the beginning of the paper outlining the issues with the ICD codes. I didn't catch this until the bottom of page 15 and top of 16. I think the author's could improve the rationale for the paper by outlining this as one of the main motivations, particularly in that you find high reliability across raters, but low agreement with ICD codes.

The manuscript is written in a way that it seems as though the initial goal was to demonstrate the benefits of deep learning in this context. Although deep learning, and the additional word embedding, improve upon the bag of word specifications, it isn't by much with respect to random forests, notably with overlapping AUC CI's. One of my takes is that the simpler models are pretty sufficient, particularly that we get interpretation out of it. The variable importance from random forests leads me to believe that a set of single words were used by both the classifiers and probably the clinicians to arrive at their diagnosis conclusion.

- It is my preference that most of the deep learning discussion is taken out from the paper, and more space is given to the clinical implications. My viewpoint would be different if the CNNs did much better than the simpler models.

Smaller:

Figure 3 - I take it "Mean" refers to mean across k-fold runs?

Pg. 9, line 170 - "forest"

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes
Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
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Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
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I am able to assess the statistics

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