Reviewer’s report

Title: A dynamic neural network model for predicting risk of Zika in real-time

Version: 2 Date: 03 Jun 2019

Reviewer: Natalie Dean

Reviewer's report:

Unfortunately I still feel that the authors have neither understood nor addressed my comment regarding the AUC, so I will try explaining it again because I think it is fundamental. The authors can correct me if I have misunderstood their procedure.

Let's imagine a setting with $R=0.40$. The authors run their model and output lots of prediction results, which could be values between 0 and 1. I call them Z because these seem to be different than the binary classifications Y.

SITE 1: Week 1, $Z=0.56$. Week 2, $Z=0.38$.

SITE 2: Week 1, $Z=0.63$. Week 2, $Z=0.45$.

They then consider varying the decision threshold for all weeks aggregated. So, say we set a decision threshold of 0.62. In Week 1, we will have 1 high risk site. In Week 2, we will have 0 high risk sites. (That's a bit confusing because the real model has time-varying thresholds, but this is not the core of my question.)

My question is *why would the Z outputs be different depending on the value of R specified by the user*? Maybe it is something I don't understand about neural networks, but my sense is that, if your model is outputting a continuous prediction result, classification is a post-processing step. So I don't see why the results would differ across R value. Can the authors explain why there would be a *systematic reason* why the AUC results vary across levels of R that cannot be attributed to sampling error?

This links directly to a fundamental question I have about the model. Why do we need to re-run the model for different specifications of R (or A)? Why can't we run the model a single time, generate these risk scores (e.g. 0 to 1), and then evaluate ALL potential specification of R (or A) in post-processing? It would seem that the latter would be more computationally efficient and place comparisons on a more even footing. If that is not what is happening, why? This would seem to be an important difference from other types of models.
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