Computer Aided Diagnosis (CAD) is a fast-growing area of interest for medical professionals and machine learning (ML) engineers alike in which practitioners use a specialist algorithm to complement their diagnosis and to offer a second opinion, it is not expected that the computer’s classifications are equal to or better than the professionals (1) Due to rising case numbers in emergency departments clustering and classification algorithms are increasingly used to enhance the efficiency of hospital emergency systems, often having comparably accurate predictions to those of medical staff, whether this is the intention or not (2).

Boosting algorithms such as those used in this project are often employed, creating an ensemble classifier constructed of weaker entities, offering the distinct advantage of reducing bias in a model, which could prove important in a medical scenario. A high bias runs the risk of not capturing trends within data (3), due to the black box model being employed whereby our knowledge of the feature set is limited, it is critical that the algorithm itself is able to avoid underfitting and successfully capture important correlations.

The risk of overfitting in a medicinal application is great, if an algorithm performs extremely successfully on a training set it is possible that the model is fitting too closely to existing datapoints, when the model is exposed to new, unseen data it is possible that the classifier will do little more than make an educated guess. Using a weak classifier such as a 1-level decision trees alone does little more than make a prediction based on one feature, however when built into an ensemble they offer a robust classifier with a typically healthy bias-variance balance achieved through iterative weight adjustments (4).

REFS

1 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1955762/>

2- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6732202/>

3- <https://www.bmc.com/blogs/bias-variance-machine-learning/#:~:text=Bias%20and%20variance%20are%20inversely,but%20it%20will%20increase%20variance>.

4 - https://www.hindawi.com/journals/cmmm/2017/6083072/