SEIR Model

About: SEIR stands for susceptible (S), exposed (E), infected (I), and resistant (R). It simplifies mathematical modeling of infectious diseases. The population considered in this model is categorized in S, E, I and R categories. The flow pattern is depicted by the order of the labels of each compartment. The parameters of the flow of control are:

alpha and beta: control the rate of flow of people through the pattern

sigma: controls the rate of flow from exposed to infected

gamma: controls the rate of flow from infected to resistant

mu: mortality ate of those unaffected by the disease

nu: controls the rate of flow from susceptible to resistant by vaccinating to avoid getting infected

Algorithms used: According to the national institutes of health, this model uses a two-step diagnostic algorithm.

The algorithm is as follows:

1] The first diagnostic (denoted dx1) is assumed to have sensitivity $s1$ and specificity $sp1$. The second diagnostic (denoted dx2) is assumed to have sensitivity $s2$ and specificity $sp2$.

2] It follows that the overall sensitivity of the algorithm (in which the tests are applied sequentially, and a positive overall result requires a positive result on both tests) is $s1 \cdot s2$, and the overall specificity is $sp1+(1-sp1)\cdot sp2$.
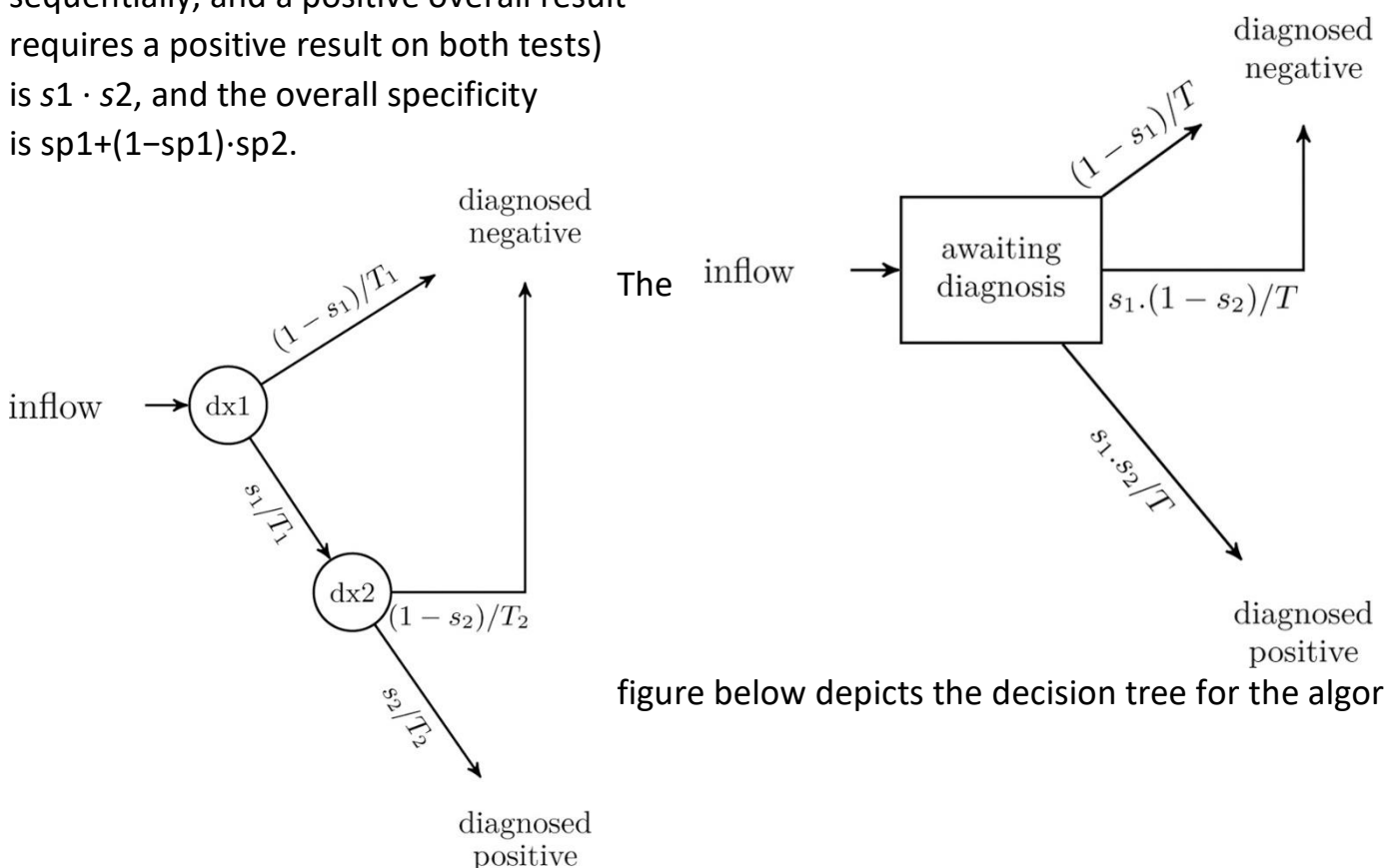
The figure below depicts the decision tree for the algorithm:

References: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6711160/

http://www.public.asu.edu/~hnesse/classes/seir.html