Here is the notation for our model

Let the overall amount of time taken to transverse pixels be given by and let the corresponding latent group assignment be denoted by . We assume that:

Where

Where

I am worried that and will be unidentifiable because both represent uncertainty. Perhaps this can be avoided if we assume that .

Furthermore, the problem with this formulation is that we will have tons of and there will be strong correlation between within the same step length because we have strong information on the sum , not on the individual values.

Furthermore, we assume that the latent group assignment is given by:

Finally, for our priors, we assume that:

This can be characterized as a mixture of Gamma regression models focused on modeling speed/velocity.

#---------

According to Wikipedia, if , then

Assume that:

Where