Infection Model

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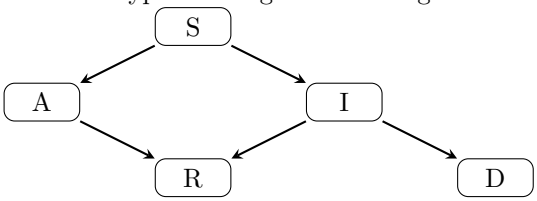
Taking into account the vastly varying conditions of affected patients in this Corona virus pandemic, we have come up with a model that consists of 5 stages.
The stages are S(Susceptible), I(Infected), A(Assymptomatic), R(Recovered) and D(Dead).
We have included the stage Assymptomatic(A), since there are more than negligible number of individuals who are not sick (and not tested) but have a consequential contribution to the spread of the infection. Since, reinfection by the Corona virus is not well observed, thus we have terminated the flow of infection at recovered.
Thus we are hypothesizing the following model:



The differential equation representing the above model is:

$$\begin{aligned}
\frac{dS}{dt} &= -\beta_A \frac{S}{N} A - \beta_I \frac{S}{N} I \\
\frac{dI}{dt} &= -\alpha_I I - \gamma_I I + \beta_I \frac{S}{N} I \\
\frac{dA}{dt} &= -\alpha_A A + \beta_A \frac{S}{N} A \\
\frac{dR}{dt} &= \alpha_I I + \alpha_A A \\
\frac{dD}{dt} &= \gamma_I I
\end{aligned} \tag{1}$$

where, S, I, A, R and D are time dependent and N is the total number of individuals in the population.