CAP 238 – 2020 – PROVA – PARTE B – Prof. Reinaldo R. Rosa

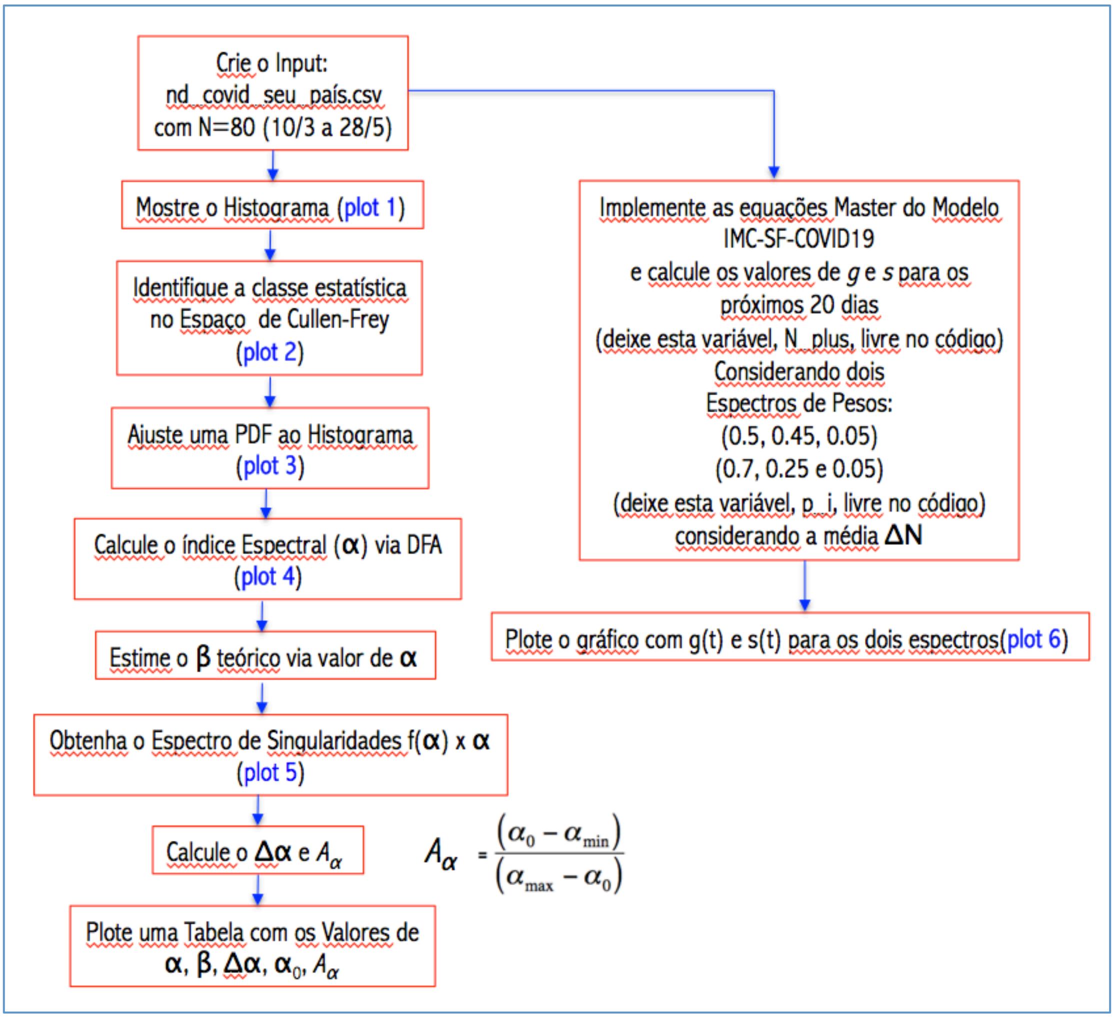
Parte A (Valor 7)

Implemente dois códigos em Python e obtenha os resultados identificados nos fluxogramas da Figura abaixo.

- Branch esquerdo: 5 pontos
- Branch da Direita: 2 pontos

Parte B (Valor 3)

Três questões objetivas de Múltipla Escolha em Relação aos Resultados da Parte A (na *live*).



The in-homogeneous multiplicative cascade structural configuration admits as inputs the seven-days rolling average for the number of confirmed cases ($\langle N_{nb} \rangle_7$) and today (N_{kt}), to predict the number of confirmed cases tomorrow (N_s).

The master formula of the model is as follows:

$$N_{s_{min}} = g(2 \times n_1 + 4 \times n_2 + 5 \times n_3) \tag{1}$$

$$N_{s_{max}} = g(4 \times n_1 + 7 \times n_2 + 10 \times n_3), \tag{2}$$

where $N_{s_{min}}$ and $N_{s_{max}}$ are the respective values (minimum and maximum) of daily infection cases estimated for the next day,

with

$$n_1 = p_1 \times N_{kt}, \tag{3}$$

$$n_2 = p_2 \times N_{kt}, \tag{4}$$

$$n_3 = p_3 \times N_{kt}. \tag{5}$$

and

$$g = \frac{\langle N_{nb} \rangle_7}{N_{kt}} \qquad if \qquad N_{kt} > \langle N_{nb} \rangle_7$$

(6)

and

$$g = \frac{N_{kt}}{\langle N_{nb} \rangle_7} \qquad if \qquad N_{kt} < \langle N_{nb} \rangle_7$$

(7)

The model also allows calculating the suppression factor, $s(t)$, based on the derivatives of $g : \Delta_g$ and $n : Delta_{nk}$ as follows:

The derivative Δ_g is defined as

$\Delta_g = (g_0 - g) - q_g \qquad if \qquad g_0 < g$

or

$\Delta_g = (g_0 - g) + q_{g_0} \qquad if \qquad g_0 \geq g,$

where

$q_g = (1 - g)^2$ and $q_{g_0} = (1 - g_0)^2$.

The derivative Δ_{nk} is defined as

$$\Delta_{nk} = \frac{(\langle N_{nb} \rangle_7 - N_{kt})}{N_{kt}} \tag{8}$$

so that,

$$s = \frac{2\Delta_g + \Delta_{nk}}{3} \tag{9}$$