Geostatistics in the SPRING
Exercise 3

Course: Master of Science on Geospatial Technologies
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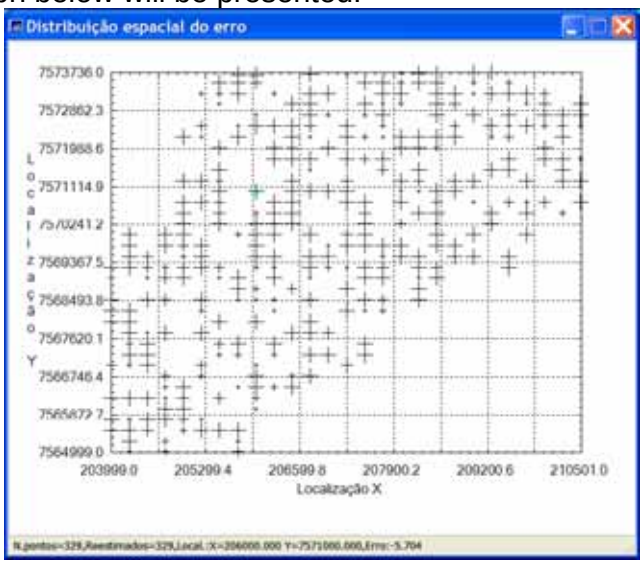
Contents

3 Modeling spatial variables considering isotropic behavior

3.6 Performing the crossvalidation for the isotropic model

- Select, in the control panel, the *pts_originais* IL of the *Altimetria* category
- In the **Analysis menu** of the SPRING, select **Geostatistics option** and, then, select the **Model Validation ... option**.

- Clicking on the **button** Model Verification... it is possible to verify, to input or to change the values that will be used as parameters for the structural model of the semivariogram to be validated.
- Define the Interpolation Parameters filling out the **field**s **Minimum** equal *4*, **Maximum** equal *16*, **R. Min** and **R. Max** equal to *981* and **Angle** equal *0* (anisotropic)
- Click on the **button** *Apply* of this window and, then, select as **Results**: *Error Spatial Diagram*. The graph below will be presented.

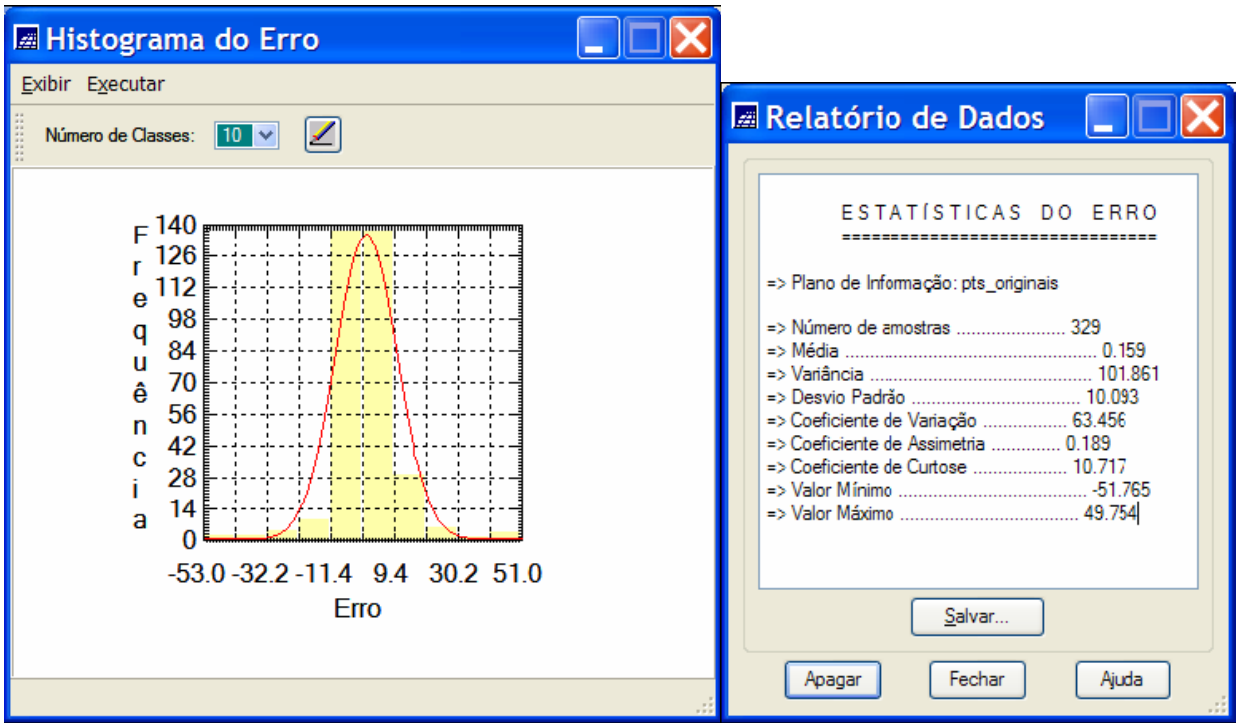


o Observe in this graph that the size of the + signals of the diagram are proportional to the estimated local error value related to the observed values. Click on any of this signal to get quantitative information about each individual error.

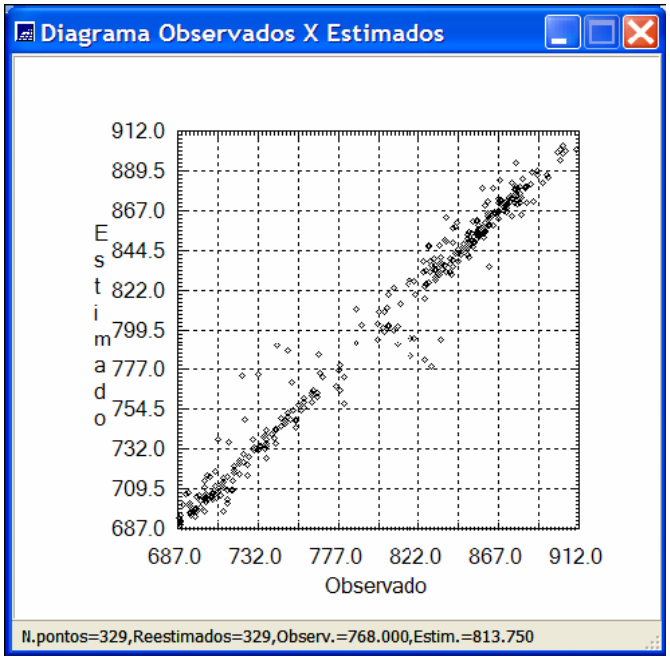
o Select *Histogram of Error* as the **Results**, in the Model Validation window, in order to show the graph of the error distribution. The Number of Classes, used to define the intervals for the histogram display can be changed to a different value. To display the histogram after choosing different number of classes click on the **draw button**.

o A numerical report displaying a summary of statistic of the errors can be obtained selecting the *Statistics of Error* in the **Results options** of the Model Validation window.

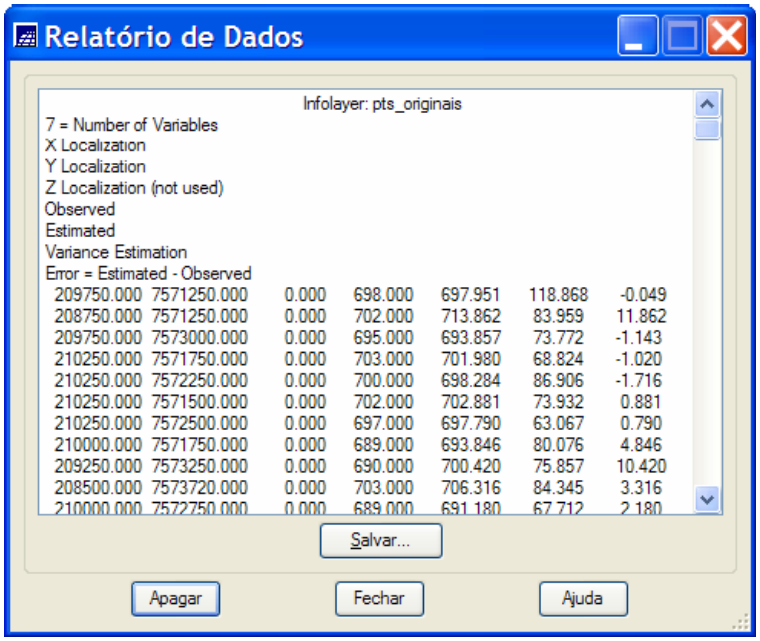
o Observe, in the figures below, the shape of the probability distribution functions (simetric? Gaussian?), the mean value of the errors (closer to 0 indicate non bias), the standard deviation (measure of global error?) and other statistic information.



o Select, in the Model Validation window, as an **option** of Results : Observed Diagram x Estimated, in order to display the scatter plot of the estimated values against the observed values of the IL pts_originais. Check the correlation between these two information and the presence of outliers in this graph.



o Select the *Numerical* **option**, in the Results area of the Model Validation window, to get a numerical report showing the values used to plot the scatter plot above.
o Click on the **Save… button,** of the Data Report window, if you want to save those information in a text file in your computer.



3.7 Estimating numeric grids using ordinary kriging

- Select, in the control panel, the IL *pts_originais* of *Altimetria* category.
- In the **Analysis menu** of SPRING, choose the **Geoestatístics option** and, then, seletct the **Kriging... option**
- In the Kriging window:

  • Click on the **button Model Verification** to check, or edit, the parameter values of the variogram model that was defined for the current sample set.

  • Select as a **Kriging type** the *Ordinary* **option**.

  • For the grid parameters keep the same **bounding box** of the project and the default values for resolutions X and Y(**ResX** and **RexY**). The default values will create a grid in the entire project area with 200 rows x 200 columns.

  • Fill out the **field**s related to the Interpolation Parameters as: **Minimum:** equal *4* and **Maximum** equal *16* (this parameters define the Minimum and Maximum number of the closest points that will be considered in the interpolation). **R. Min** and **R. Max** must be equal *981* (these parameters are related to the search ellipsoid that determine the influence area of each point to be interpolated. The values are equal because the attribute variation in space is been modeled as isotropic). The **Angle field** can be filled out with value *0* (or other because the attribute variation is considered isotropic)

  • Choose the *Atimetria* category clicking on the **Category… button**.

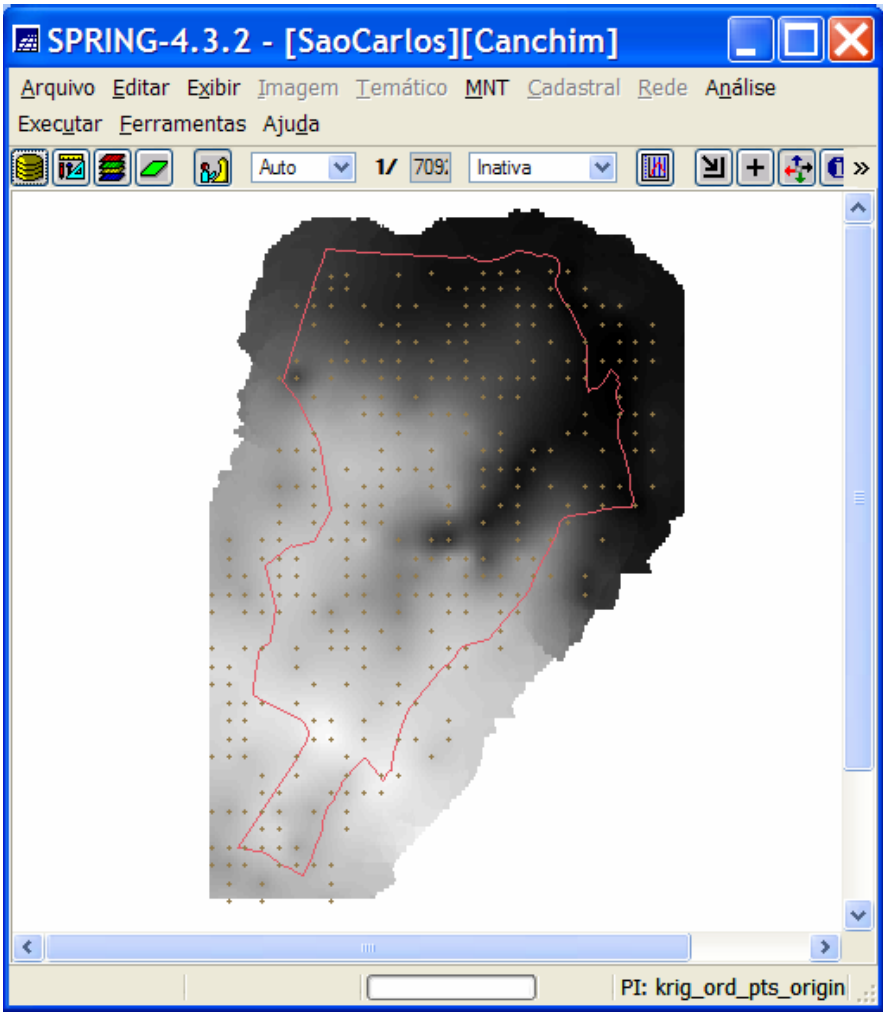
  • Fill out the **InfoLayer field** with the name: *krig_ord_pts_origin.*

  • Click on the **Apply button** to finally run the ordinary kriging.

3.8 Displaying the results in the main graphic display of the SPRING

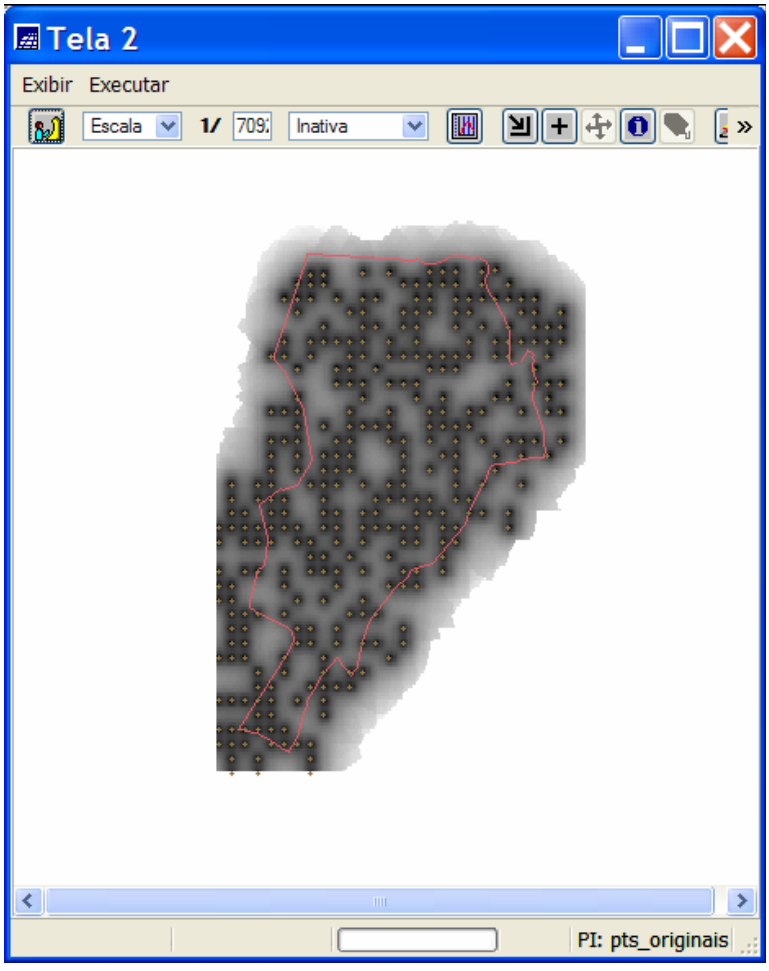
- Displaying the map of estimates evaluated by ordinary kriging
- In the Control Panel
  - Enable the **Display** *1*
  - Select in the list of **Categories***: Altimetria*
  - Select in the list of **Infolayers** : *krig_ord_pts_origin*
  - Select as representation: *Imagem*
  - Select also the *lines* of the Infolayer *recorte* of the *Limites* category
  - Select also the *samples* of the Infolayer *pts_originais* of the *Altimetria* category.
  - Click on **button** de **Draw**

• The figure below show the results of the display tasks suggested above. It can be seen the numerical grid evaluated by the ordinary kriging superposed by the elevation samples and the boundaries of the Canchim farm.



- Displaying the map of variance of the estimates evaluated by ordinary kriging
- In the Control Panel
    - Enable and Show the **Display** *2*
    - Select in the list of **Categories***: Altimetria*
    - Select in the list of **Infolayers** : *krig_ord_pts_origin_KV*
    - Select as representation: *Imagem*
    - Select also the *lines* of the Infolayer *recorte* of the *Limites* category
    - Select also the *samples* of the Infolayer *pts_originais* of the *Altimetria* category.
    - Click on **button** de **Draw**

• The figure below show the results of the display tasks suggested above. It can be seen the numerical grid of the variances evaluated by the ordinary kriging superposed by the elevation samples and the boundaries of the Canchim farm.



• Perform a visual analysis on the results obtained in the two maps above posted.

Consider the quality of the estimator and the spatial distribution of the kriging variance. What is opinion about this distribution? Compare the results above with the results of deterministic procedures used to estimate spatial attributes.