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Selecting thresholds for decision making in geological units definitions

Introduction

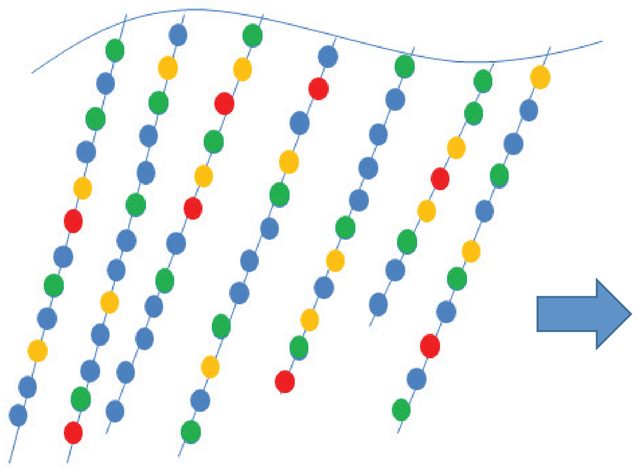
There are several decisions related to selecting a threshold in geological modelling and mineral resource evaluation:

1.- Choice of the percentage of secondary sulphides minerals (chalcocite+covelite) to define secondary enrichment.

2.- Selection of the proportion of an alteration mineral to set the dominant "alteration".

3.- Definition of a threshold for high arsenic mineralization.

How many populations are there on this data of % Coveline?

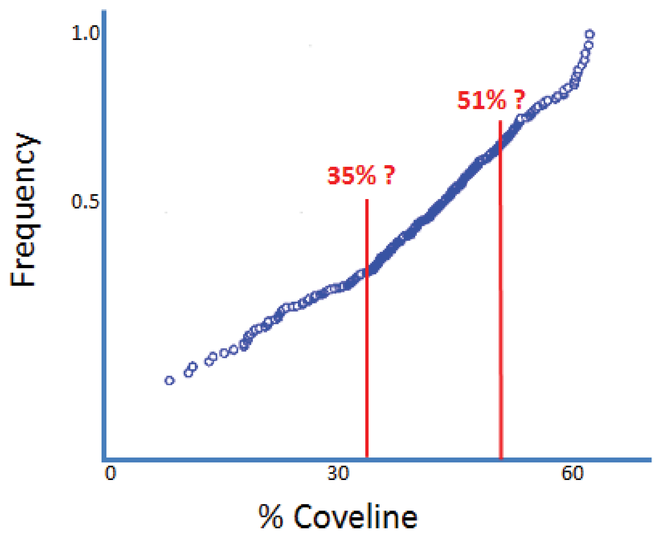


No control of:
Mineral Zone
Lithology
Alteration

We try to find a critic threshold of % Coveine for units of estimation. There are two aproaches:

1. Operational Threshold Aproach

Uses limits that are critical for the operation or processes, in this case critic % Coveline.



But, this aproach do not consider...

...Spatial relations of data

2. Phenomenological Threshold Aproach

Methodology

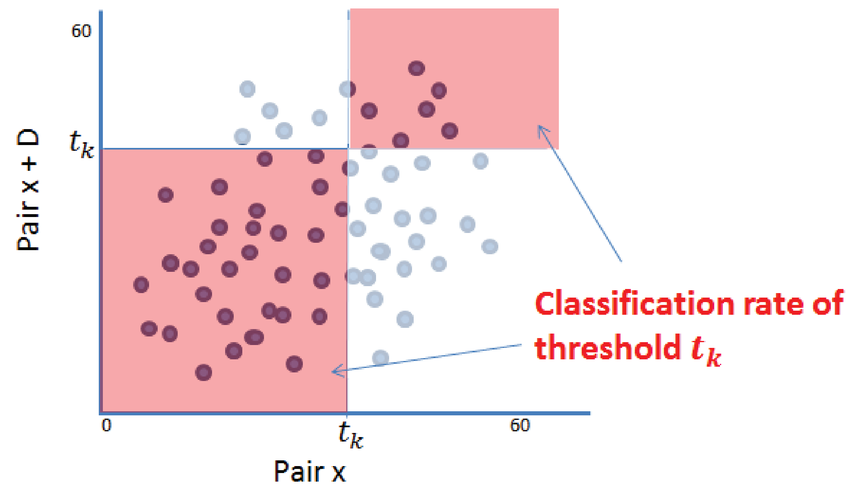
Generation of N thresholds in database:

$$T = \{t_1,\ldots,t_k,\ldots,t_N\} \text{ for} K \epsilon N$$

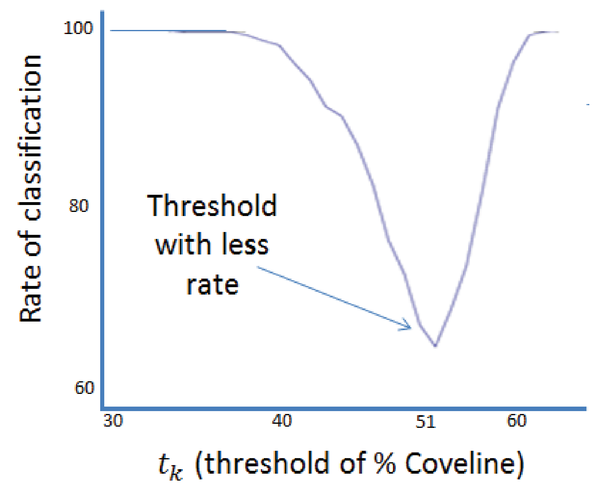
Where each t_k defines a indicator I_k as:

$$I_k = \begin{cases} 1 & if \quad x \geq t_k \\ 0 & if \quad x < t_k \end{cases}$$

We generate pairs of data spaced in predeterminated distance D, this has a scatter plot of pairs

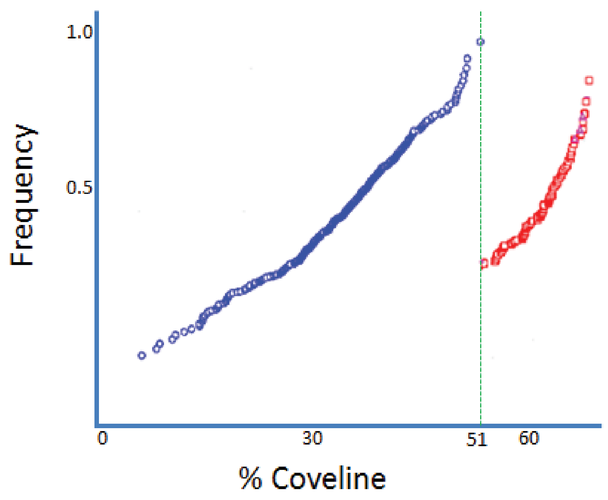


Each threshold has a Classification rate. Minimum rate shows the natural division of data. Variables are ploted in the following graph:



Results

Data of % Coveline is splitted by threshold with minimum rate. Results shows a categorical distributions with two populations



Conclusions

The methodology presents a useful tool for definition of units of estimation and separation of populations of data when geological atributes does not show good results

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