

# Analysis of soil at Casa de las Aguilas

Branch: results with a subsample of observations

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Here we compare the outcome of a classical kriging against a cost-based kriging which takes into account the presence of a semi-barrier.

We used here a subsample of only 50 of the 301 original observations, to assess the effect of this number on the difference between the Euclidean and Cost-based approach.

The results are clearly more noisy, but otherwise both with the Euclidean and Cost-based approaches they remain very similar.

## Data description

Figures 1 and 2 display the raw data, and an exploratory smoothed surface.



Figure 1: Measurement locations and observed values

## Euclidean kriging

It may make sense to use the *room* as a covariate in this model (Universal kriging). For the moment, we just perform an ordinary kriging.

The variogram model is Matérn. We choose to estimate the nugget effect, which may account for measurement error, for example.

## Cost-based kriging

Watch out! the cost surface can be derived either: - from a SpatialPolygon of the working area - from the SpatialPolygons of the border and of the inner structures

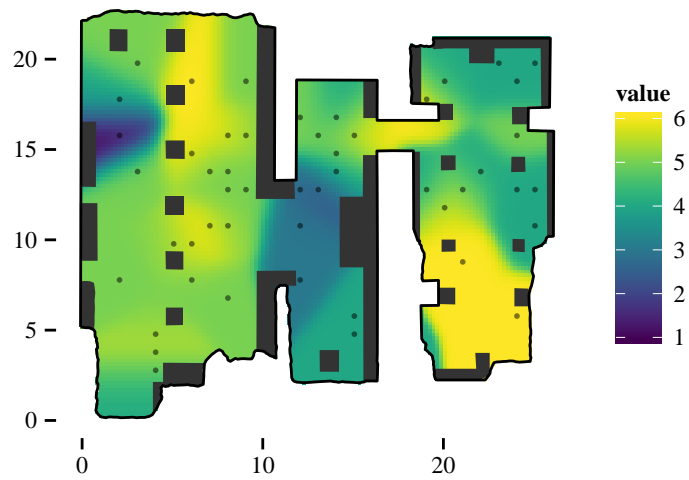


Figure 2: Exploratory kernel smoothing of the measurements

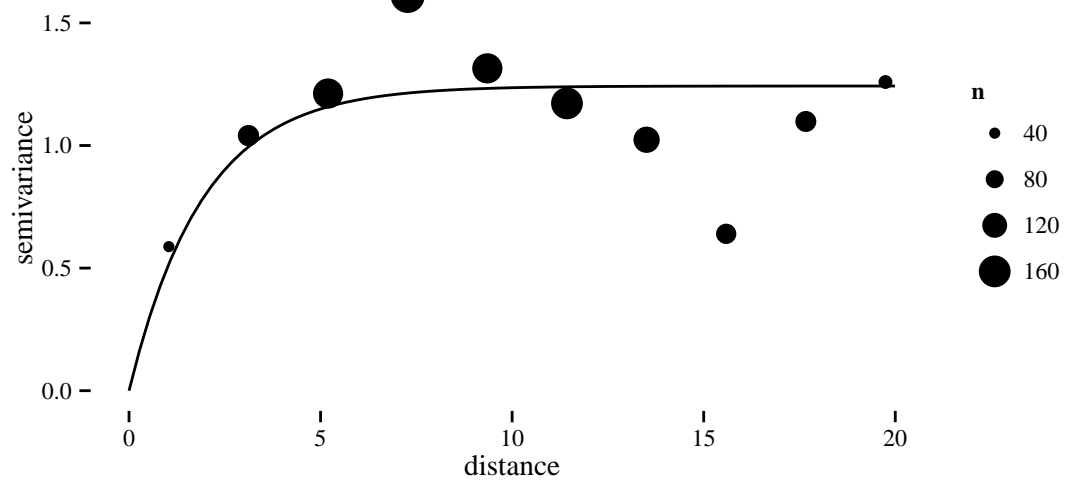


Figure 3: Empirical variogram and fitted model.

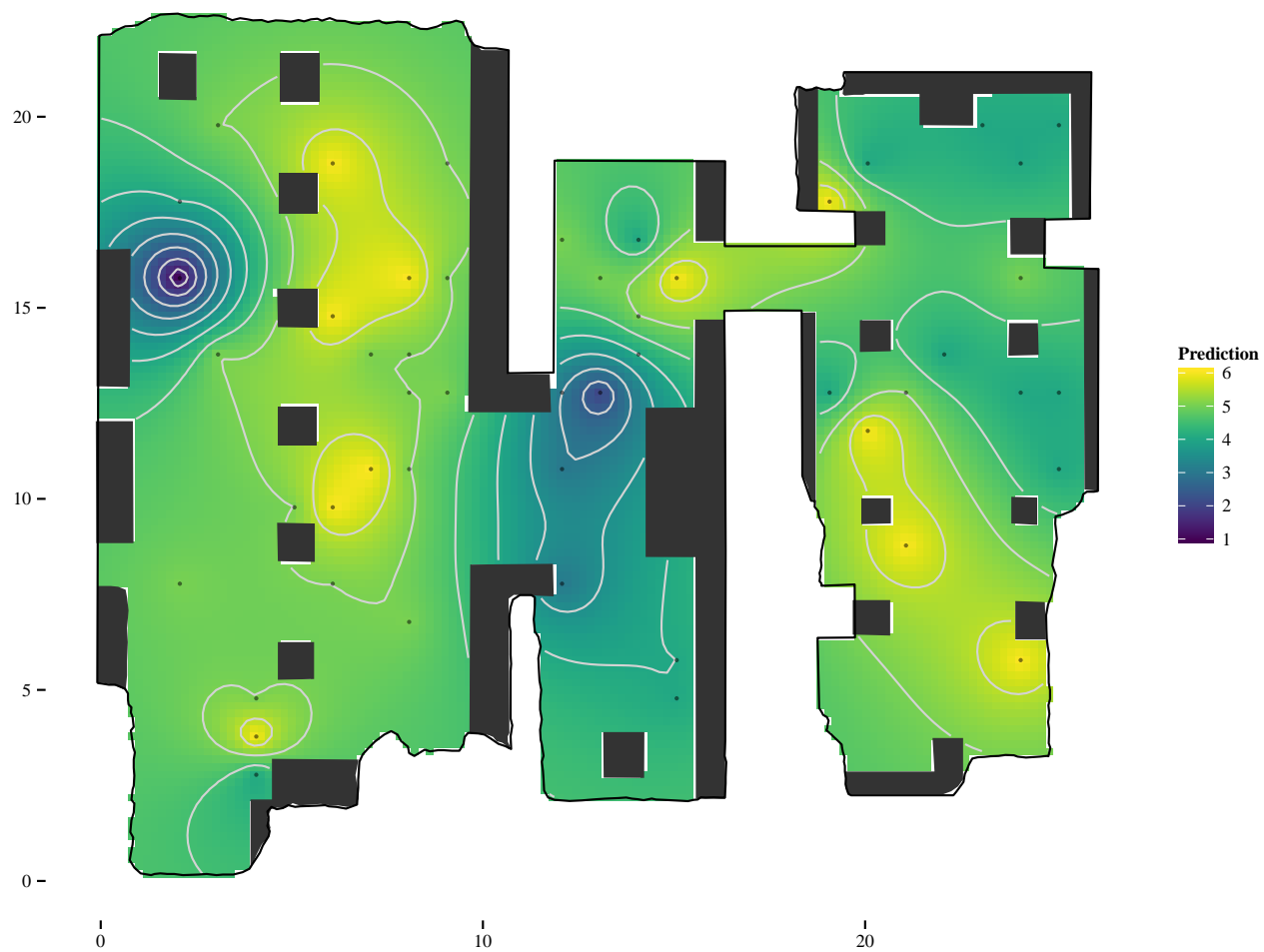


Figure 4: Euclidean kriging prediction

The results from both methods are not the same. In the first case, the cost of non-conductive inner areas is NA, while in the second is 0. This has an effect on one-pixel transitions (? this requires further investigation).

Some cost-based maps, for verifications purposes.

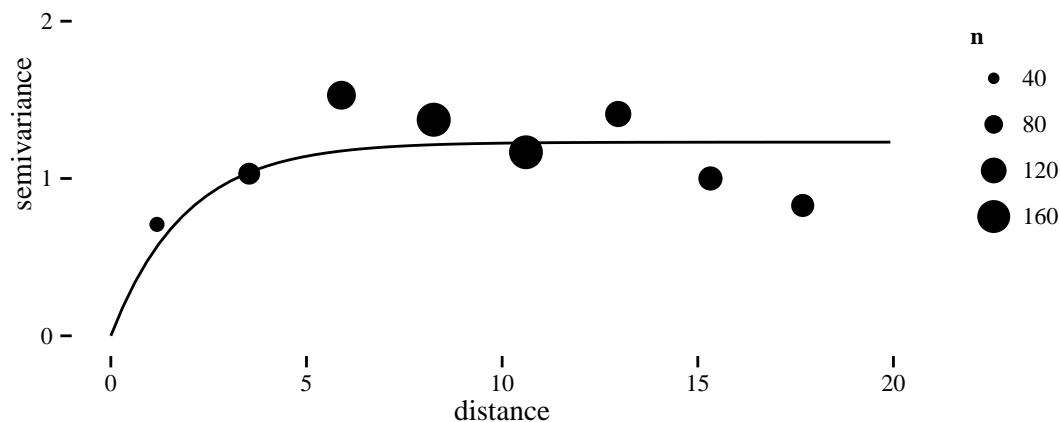


Figure 5: Empirical variogram and fitted model.

## Comparison of method outcomes

	Euclidean	Cost-based
Intercept	4.62	4.64
Nugget	0.00	0.00
Partial sill	1.24	1.23
kappa	0.50	0.50
phi	1.93	1.91
Pract. range	5.79	5.71

The estimated variogram models are very similar in this case, with log-likelihoods of -68.7094648 and -68.7114816 respectively. This yields very similar kriging predictions as well.

In the scatter plot, the horizontal patterns correspond to predictions on observed values. Otherwise, the differences are negligible.

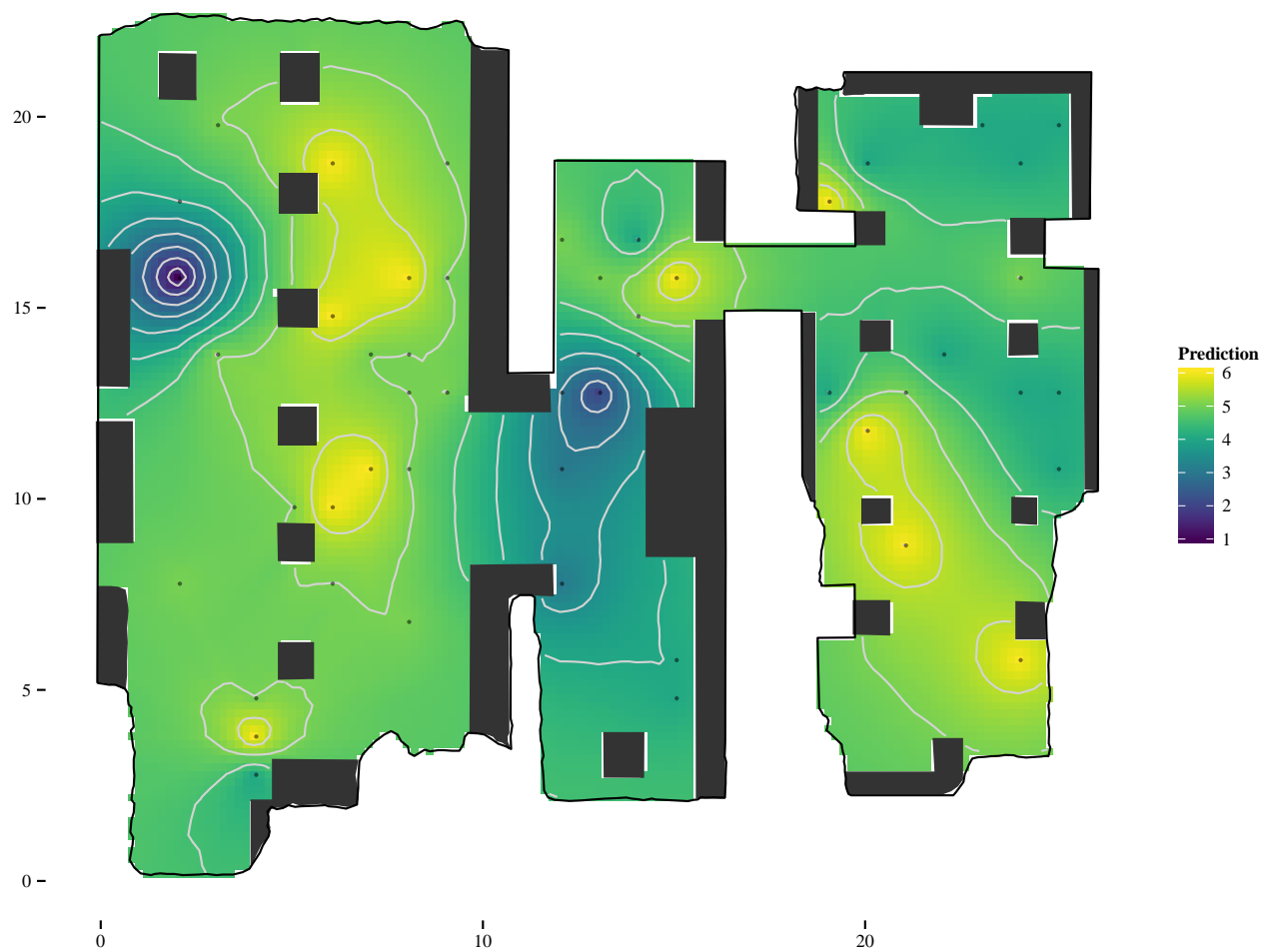


Figure 6: Cost-based kriging prediction

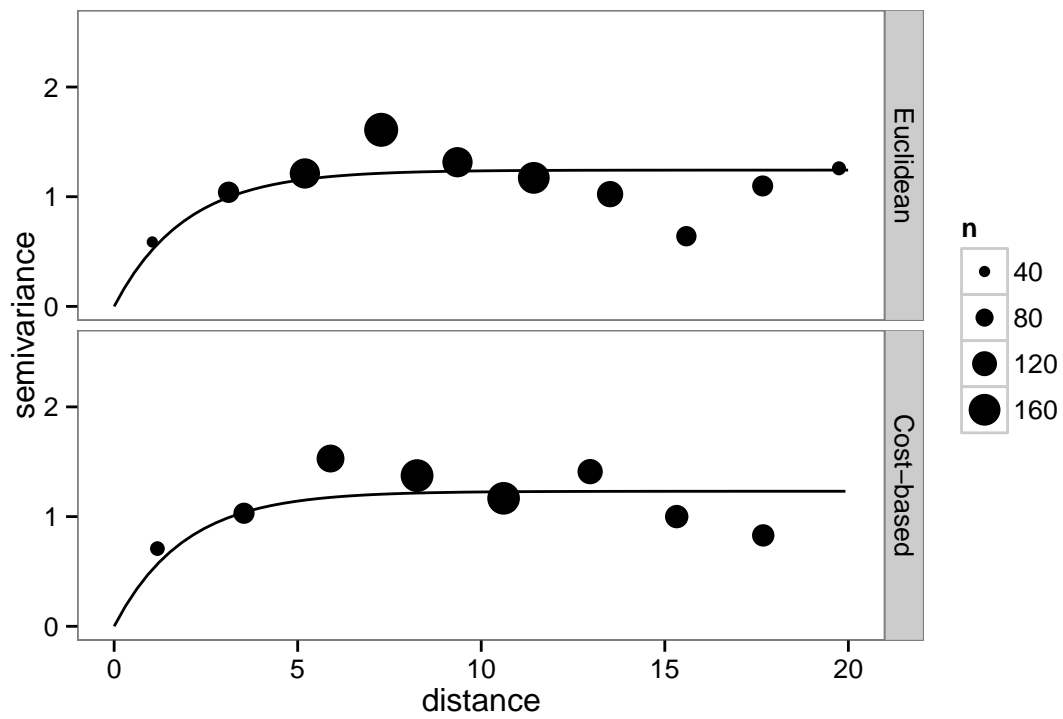


Figure 7: Empirical variogram and fitted models by method.

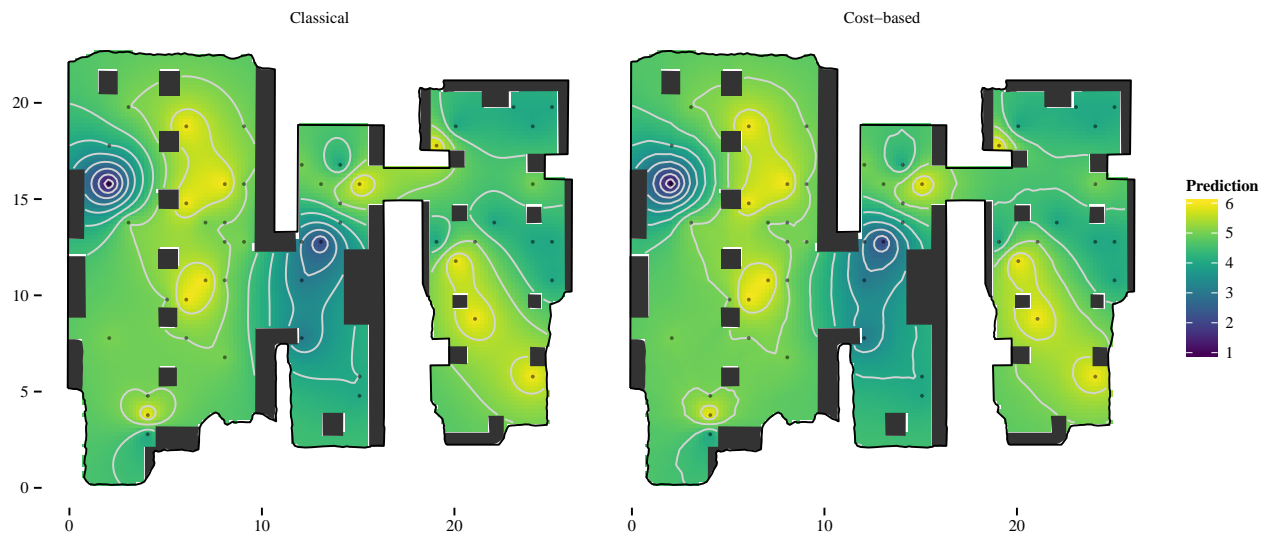


Figure 8: Comparison of Kriging estimates.

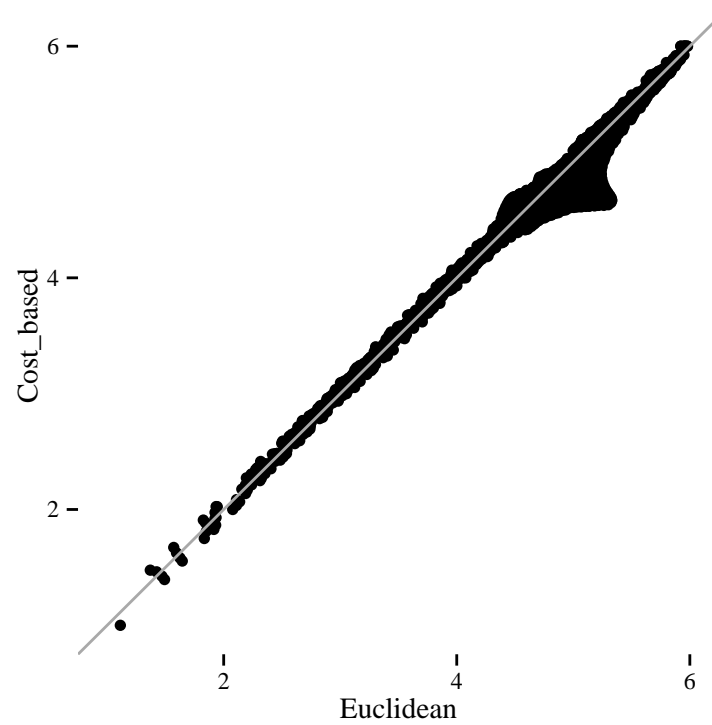


Figure 9:

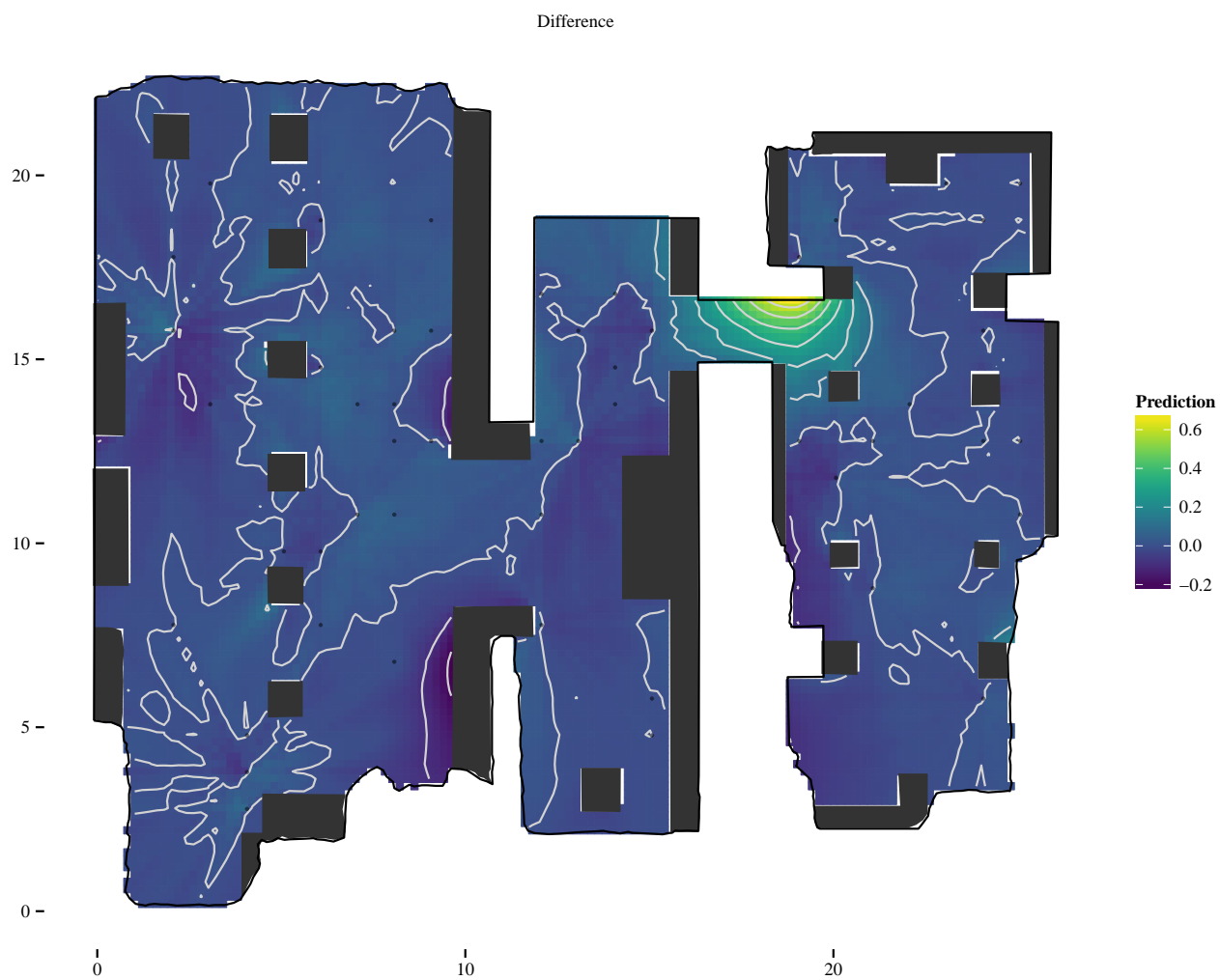


Figure 10: Difference between the cost-based prediction and the Euclidean prediction