Analysis of soil at Casa de las Aguilas

Branch: selecting most convenient 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.

In this branch we select manually the observations in order to mostly emphasize the differences among Euclidean and Cost-based methodologies.

Note that the predictions of soil composition are **invalid**. This is data manipulation, and completely equivalent to modify manually the observed values. Therefore, this has **no scientific value**, but only as a methodological demonstration.

Data description

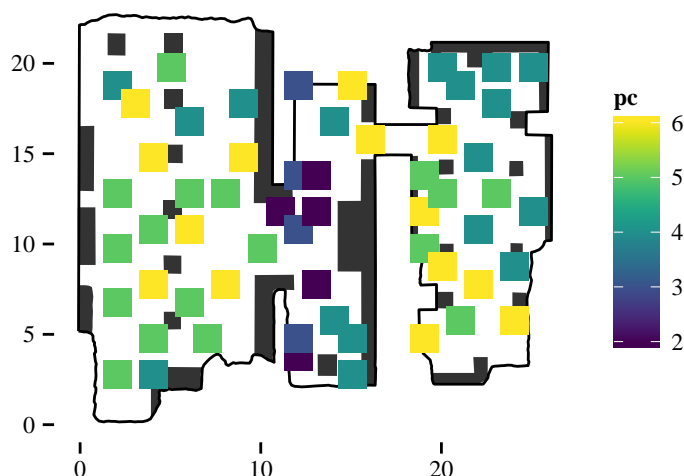Figures 1 and 2 display the raw data, and an exploratory smoothed surface.

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
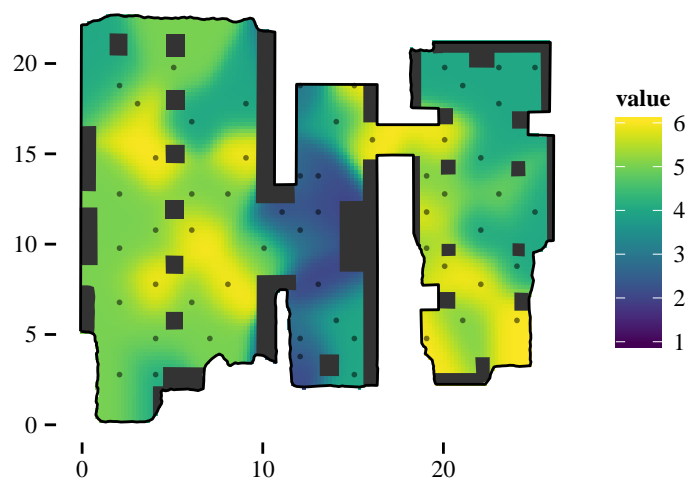
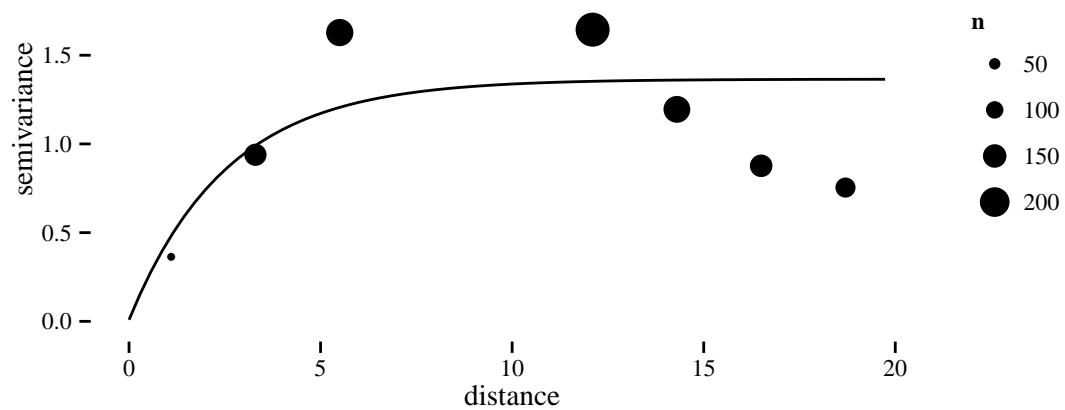Figure 2: Exploratory kernel smoothing of the measurements

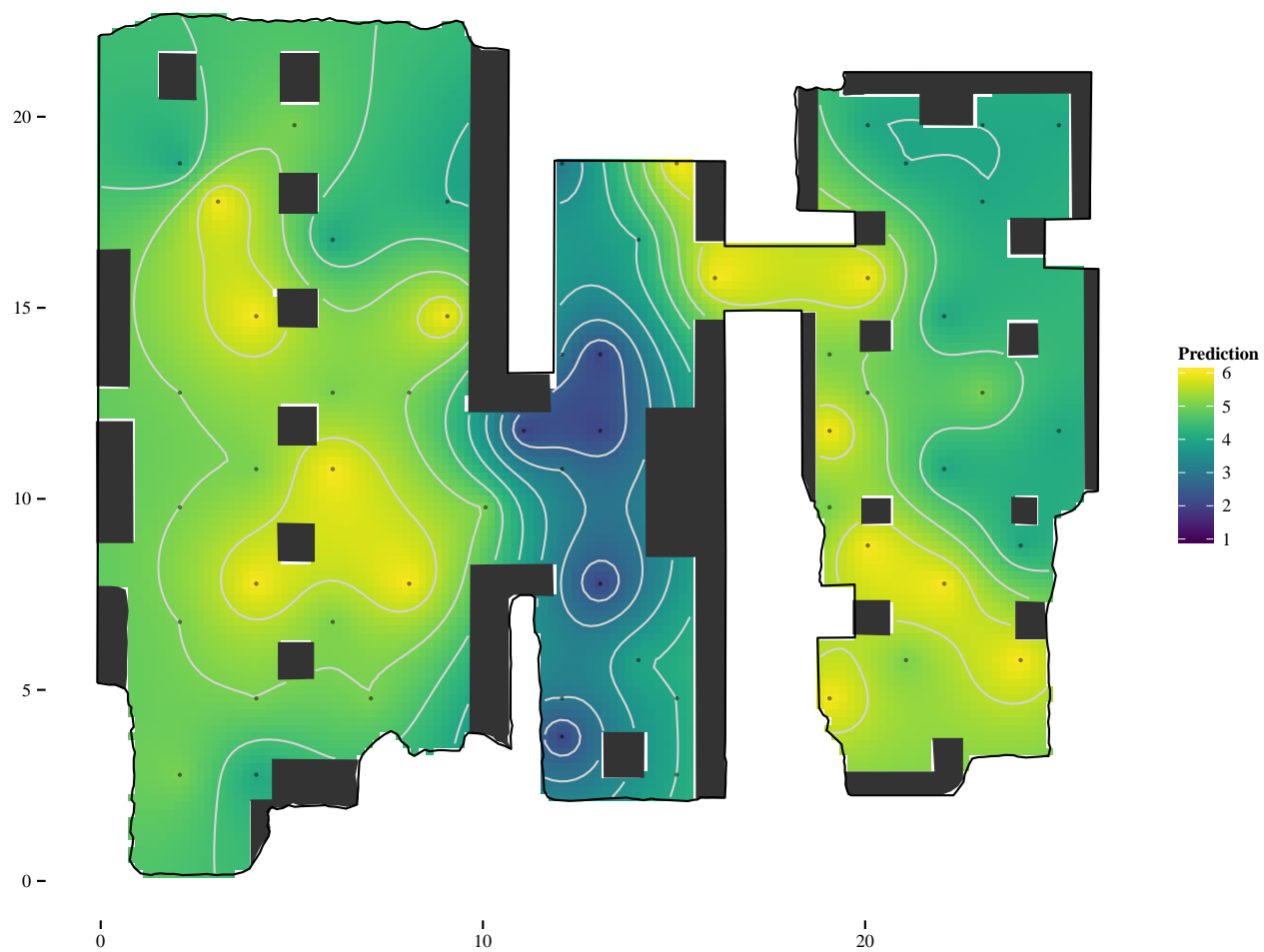Figure 3: Empirical variogram and fitted model.

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 inverstigation).

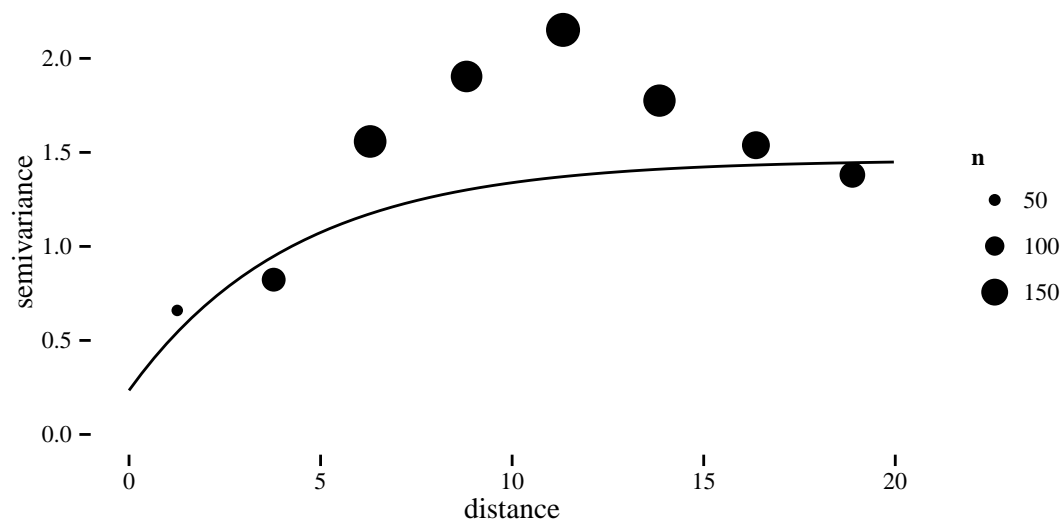Some cost-based maps, for verifications purposes.

Figure 5:

Figure 6: Empirical variogram and fitted model.

Comparison of method outcomes

	Euclidean	Cost-based
Intercept	4.55	4.51
Nugget	0.01	0.23
Partial sill	1.36	1.23
kappa	0.50	0.50
phi	2.56	4.33

	Euclidean	Cost-based
Pract. range	7.68	12.98

The estimated variogram models are very similar in this case, with log-likelihoods of -80.2032205 and -78.8323662 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 negligeable.
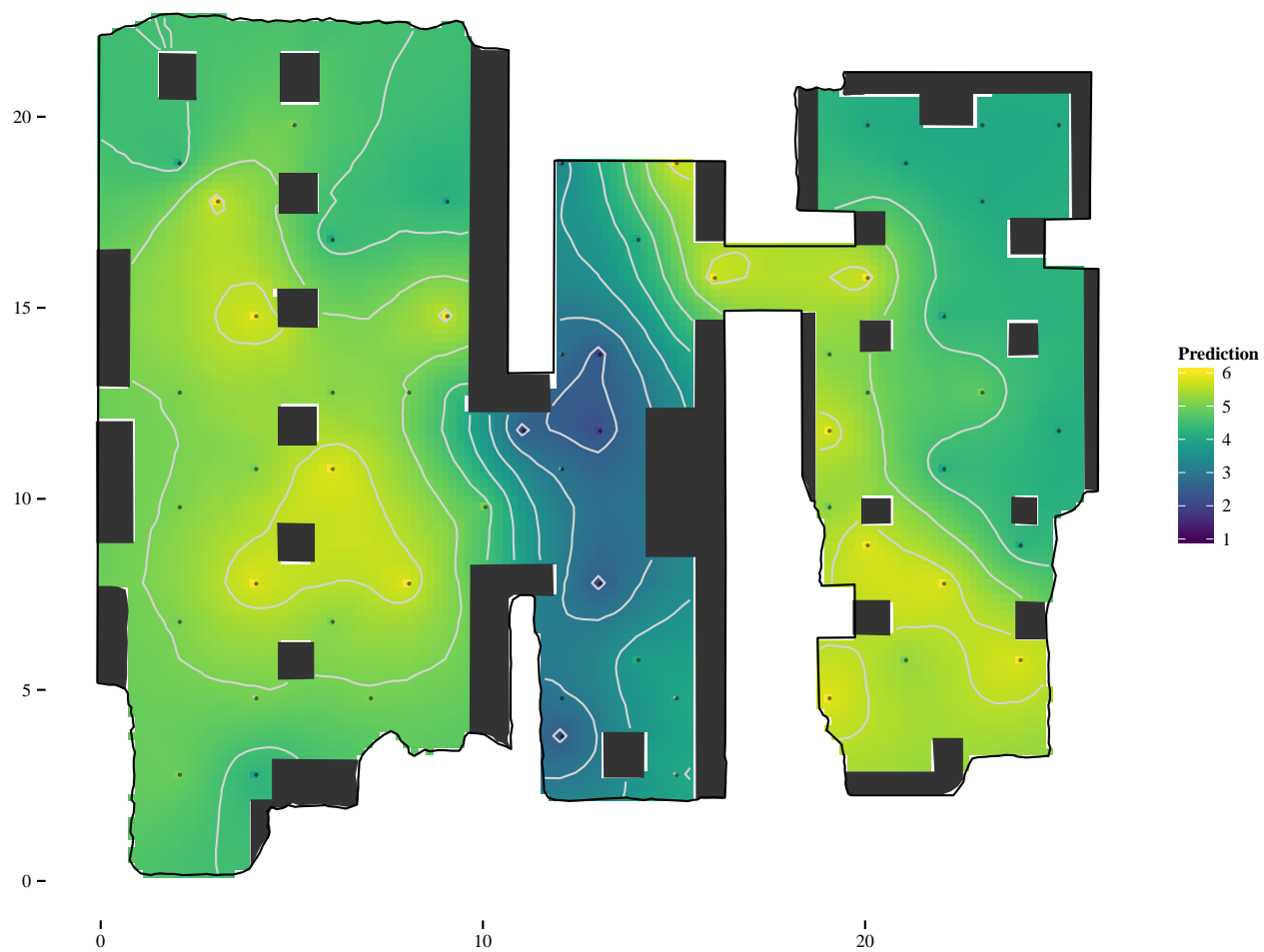
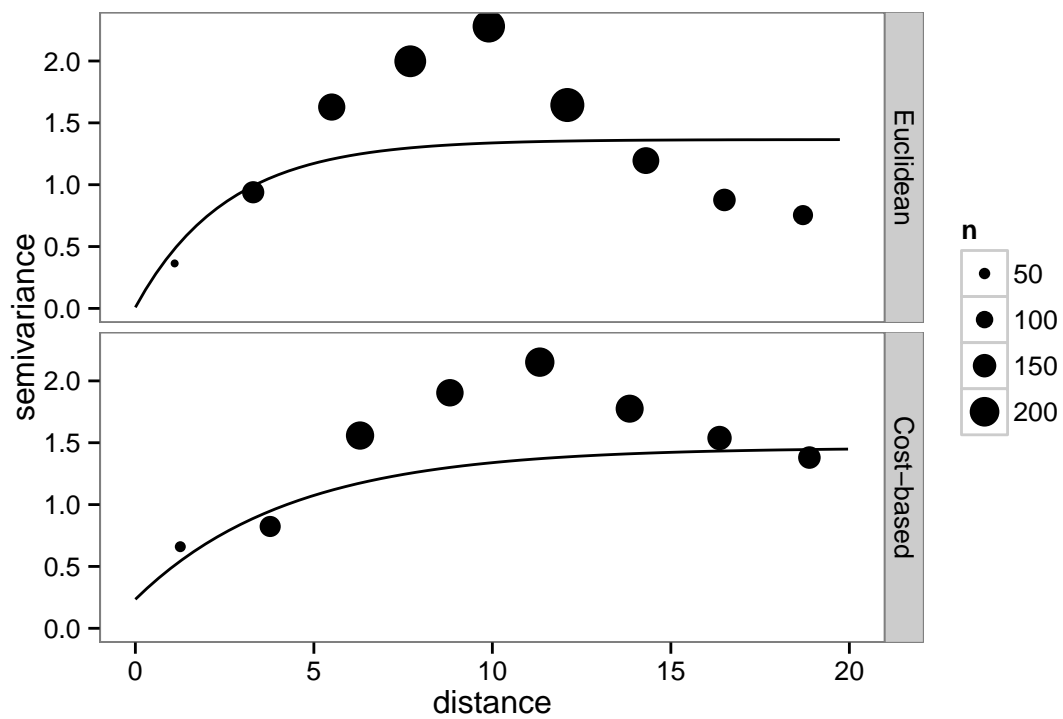Figure 7: Cost-based kriging prediction

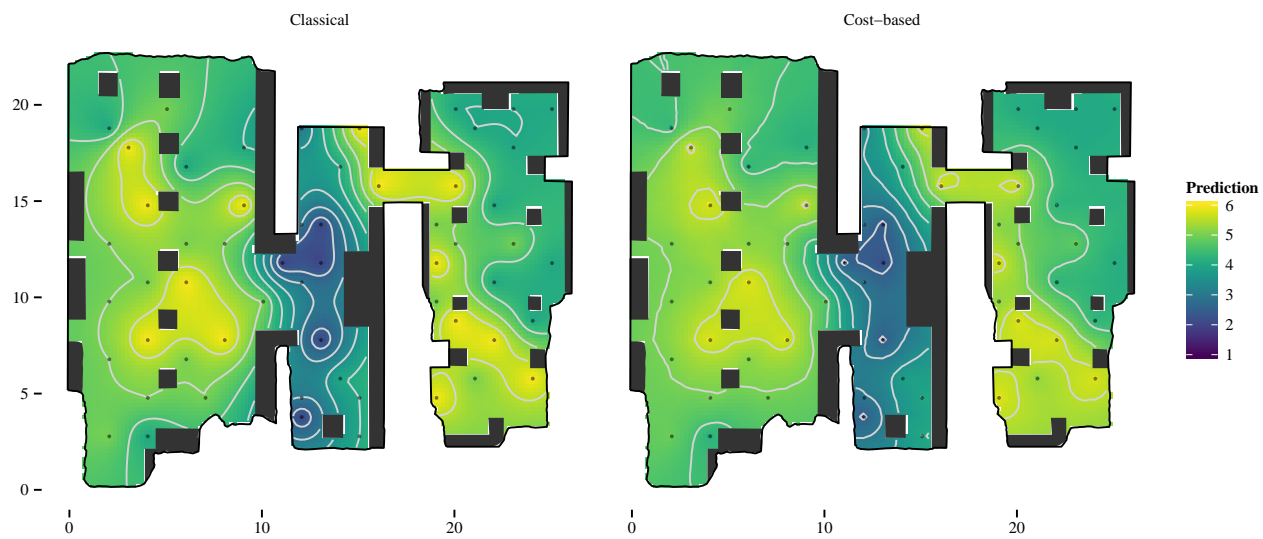Figure 8: Empirical variogram and fitted models by method.
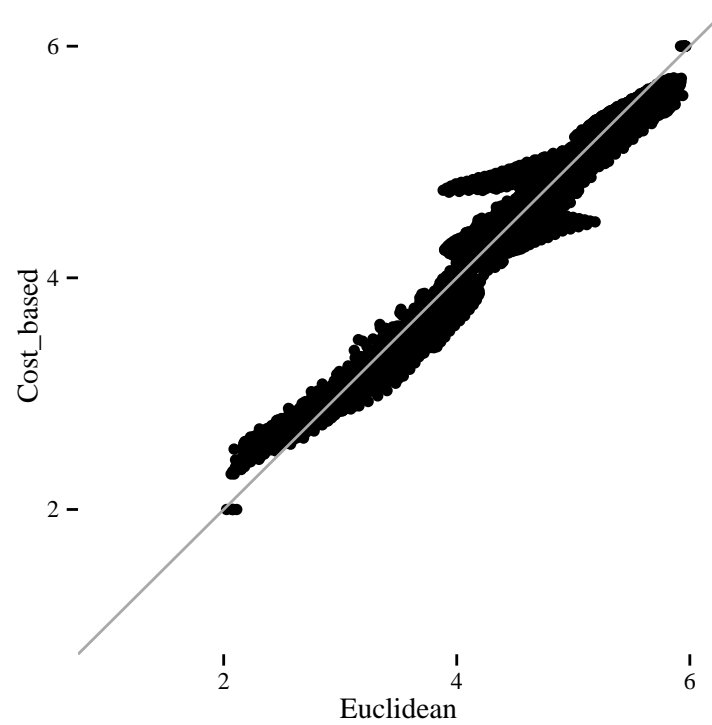

Figure 9: Comparison of Kriging estimates.

Figure 10:

Figure 11: Difference between the cost-based prediction and the Euclidean prediction