Analysis of soil at Casa de las Aguilas

Facundo Muñoz

September 1, 2015

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

Data description

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

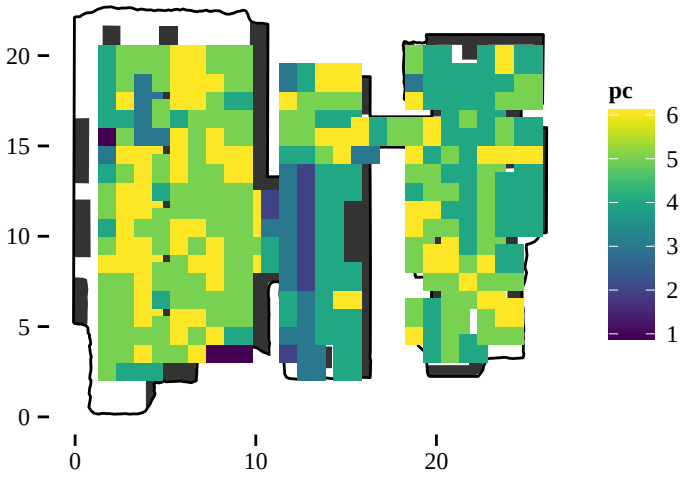

Figure 1: Measurement locations and observed values

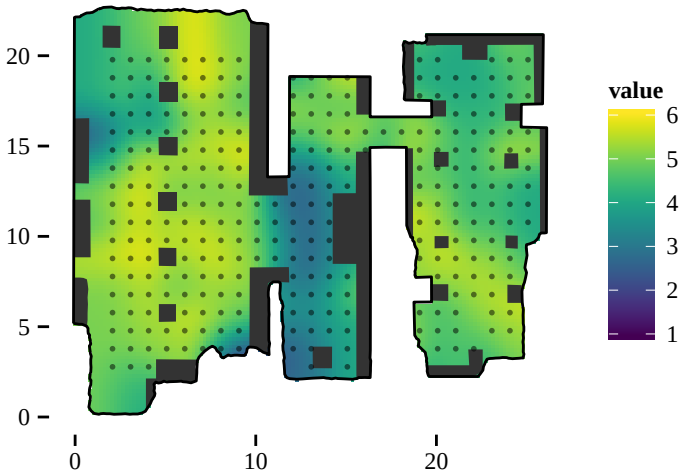

Figure 2: Exploratory kernel smoothing of the measurements

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.

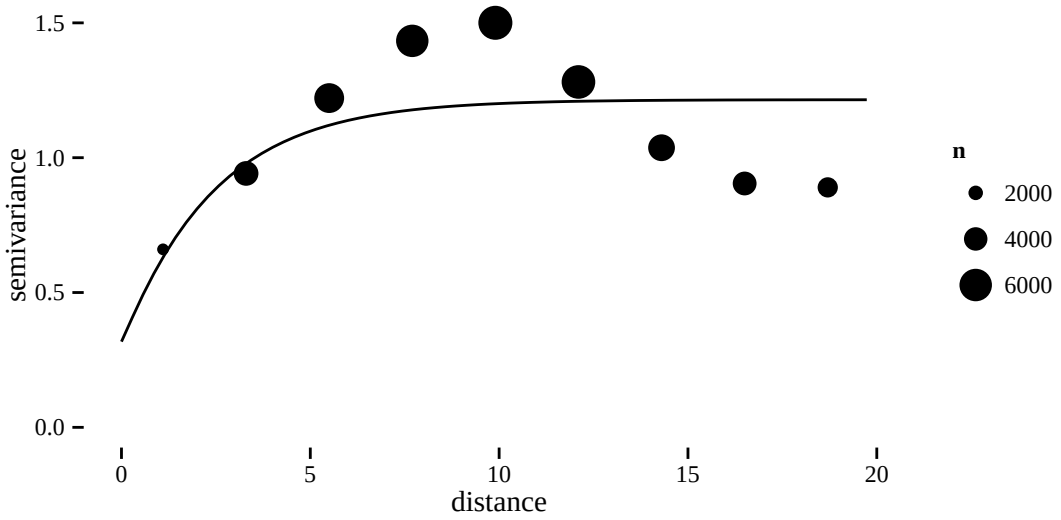

Figure 3: Empirical variogram and fitted model.

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

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.

Comparison of method outcomes

	Euclidean	Cost-based
Intercept	4.55	4.55
Nugget	0.32	0.12
Partial sill	0.90	1.09
kappa	0.53	0.35
phi	2.37	2.63
Pract. range	7.29	6.78

The estimated variogram models are very similar in this case, with log-likelihoods of -386.5587859 and -386.5018638 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.

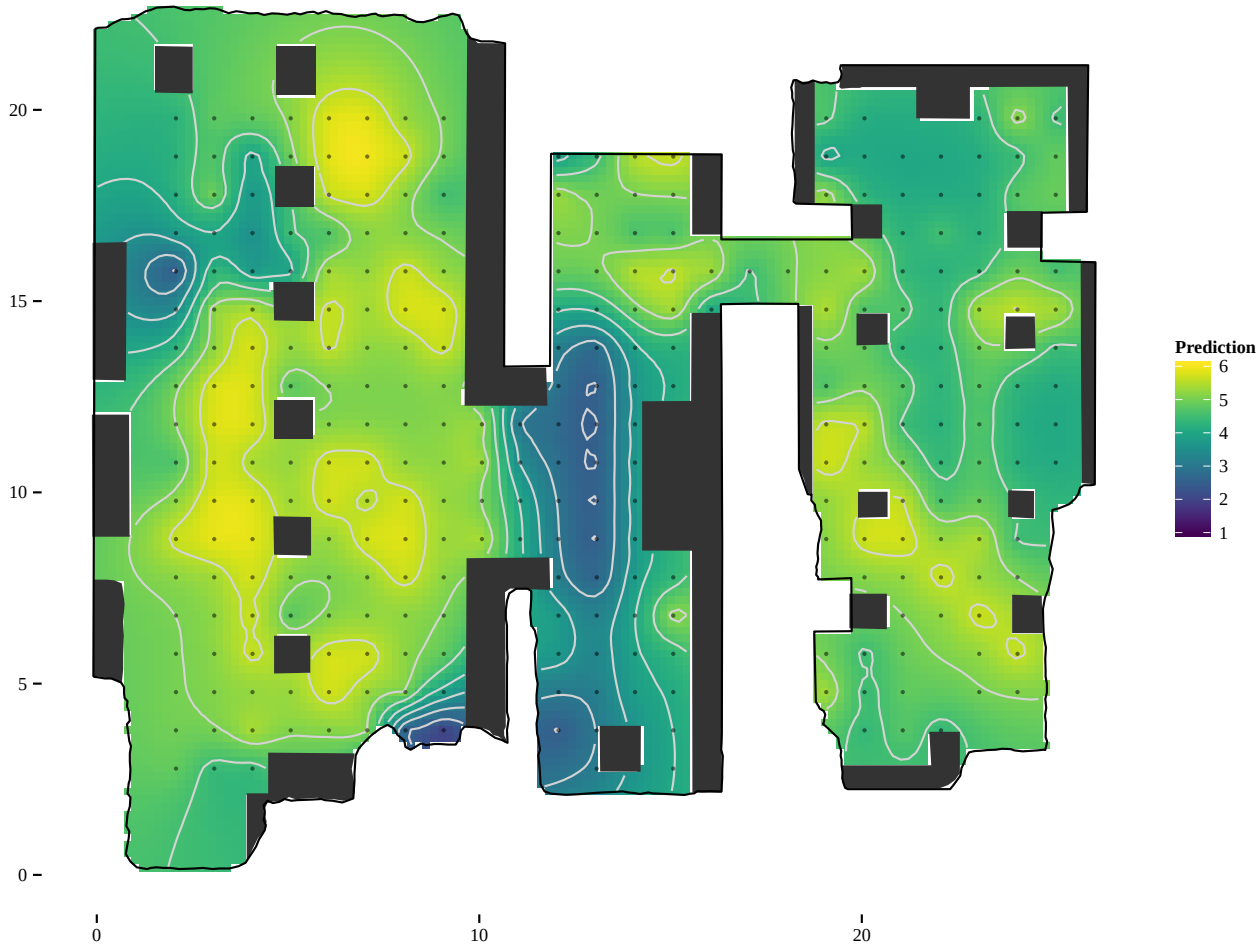

Figure 4: Euclidean kriging prediction

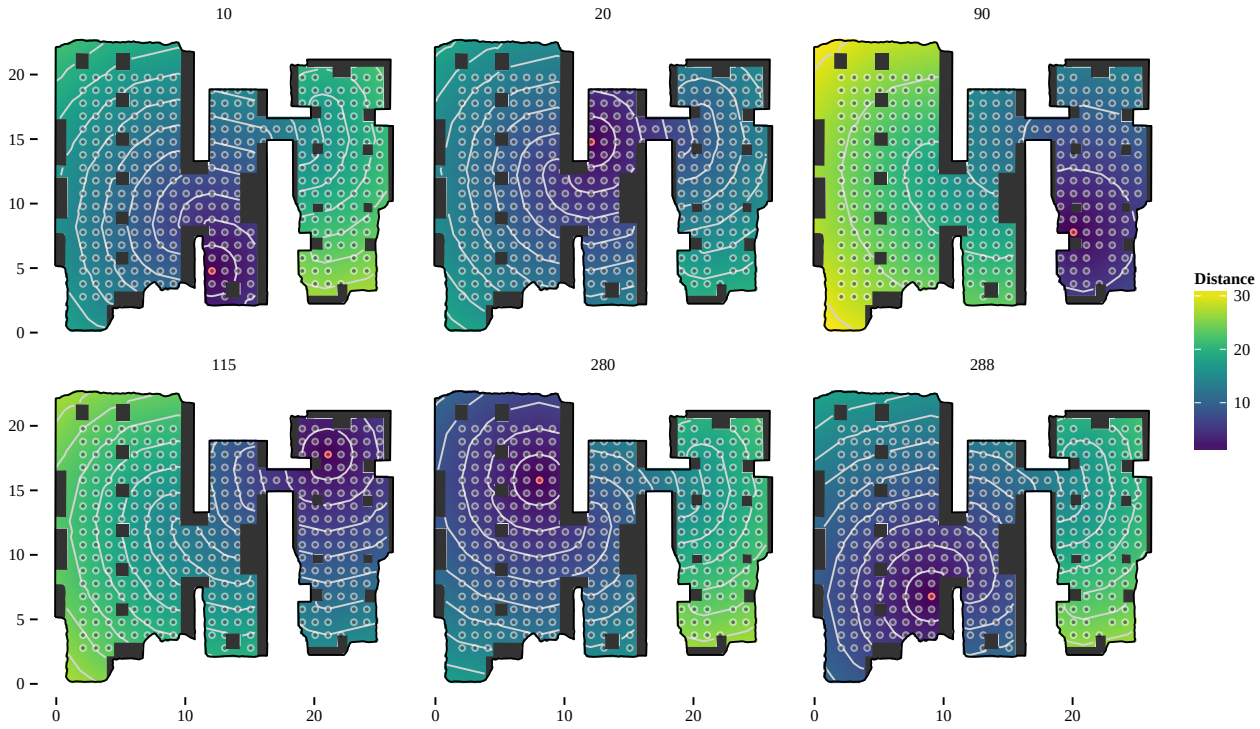

Figure 5:

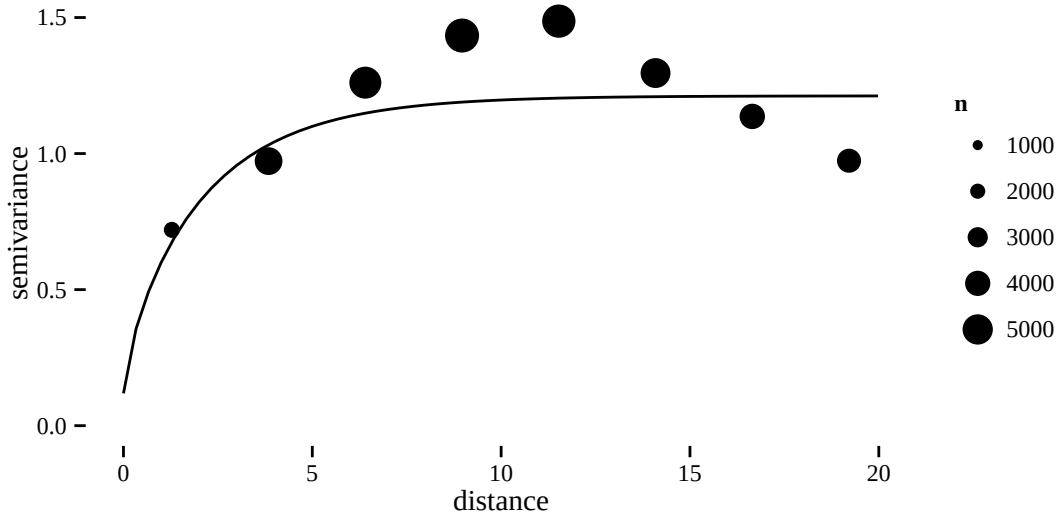

Figure 6: Empirical variogram and fitted model.

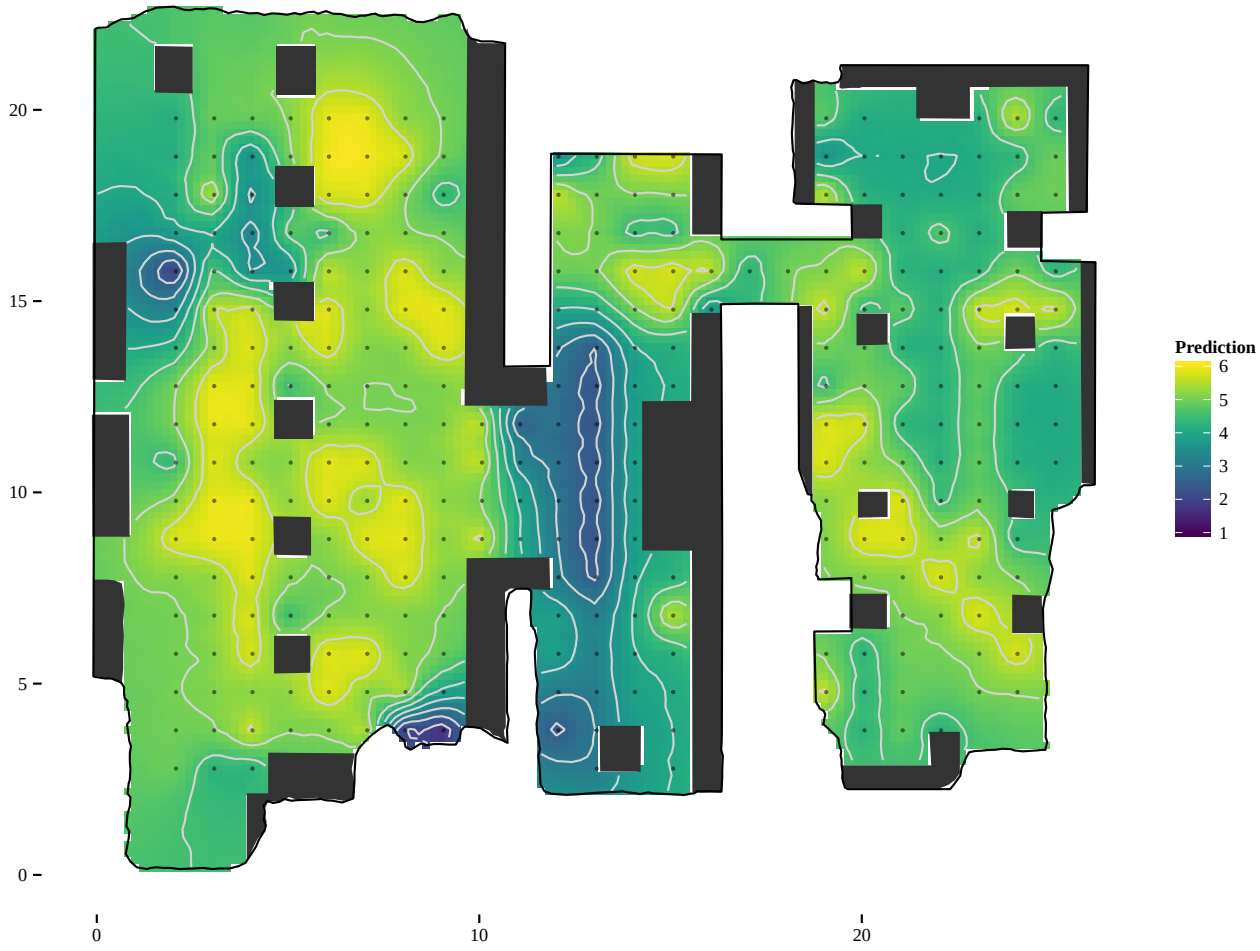

Figure 7: Cost-based kriging prediction

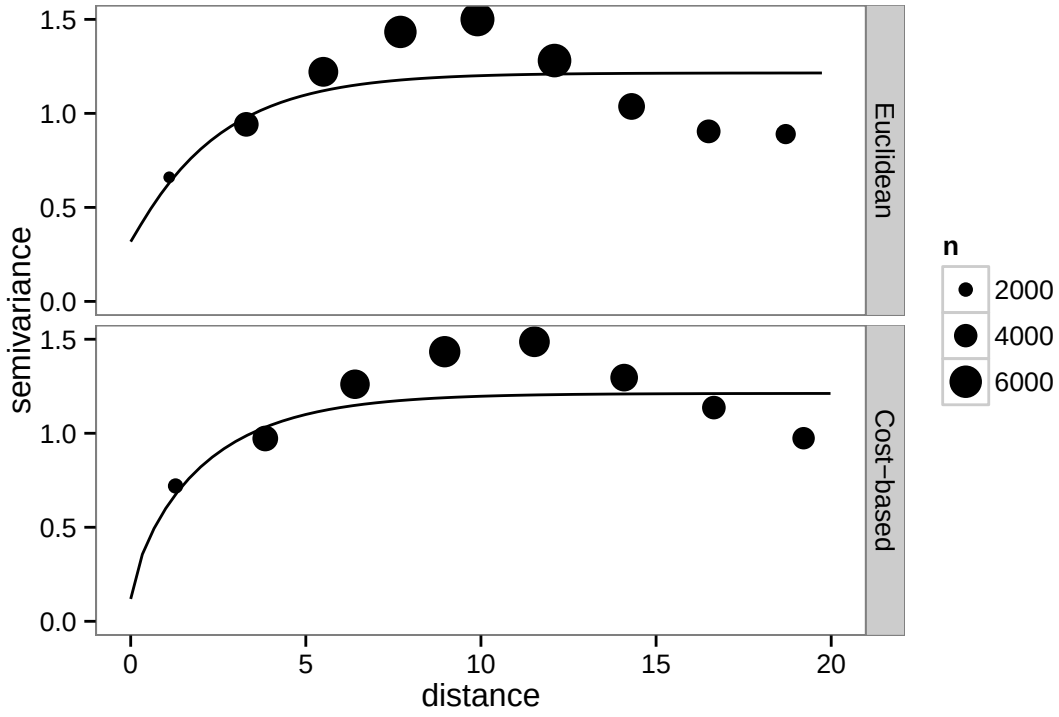

Figure 8: Empirical variogram and fitted models by method.

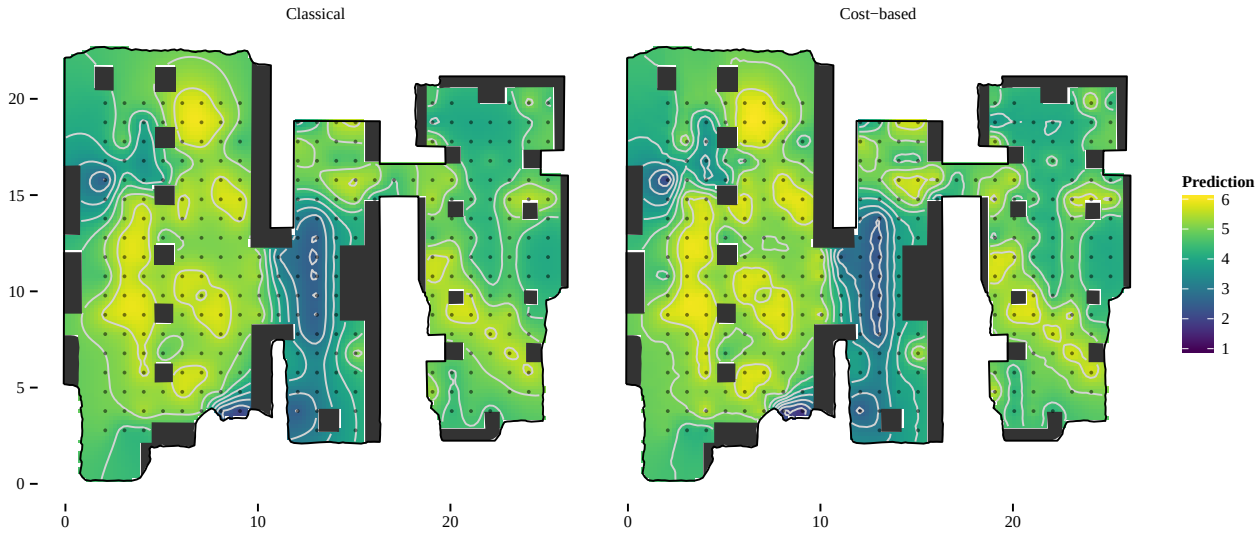

Figure 9: Comparison of Kriging estimates.

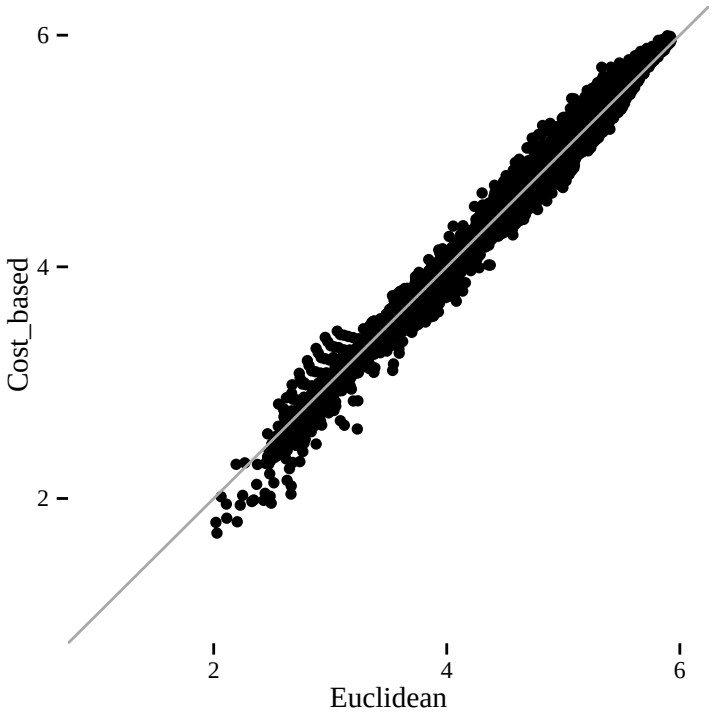

Figure 10:

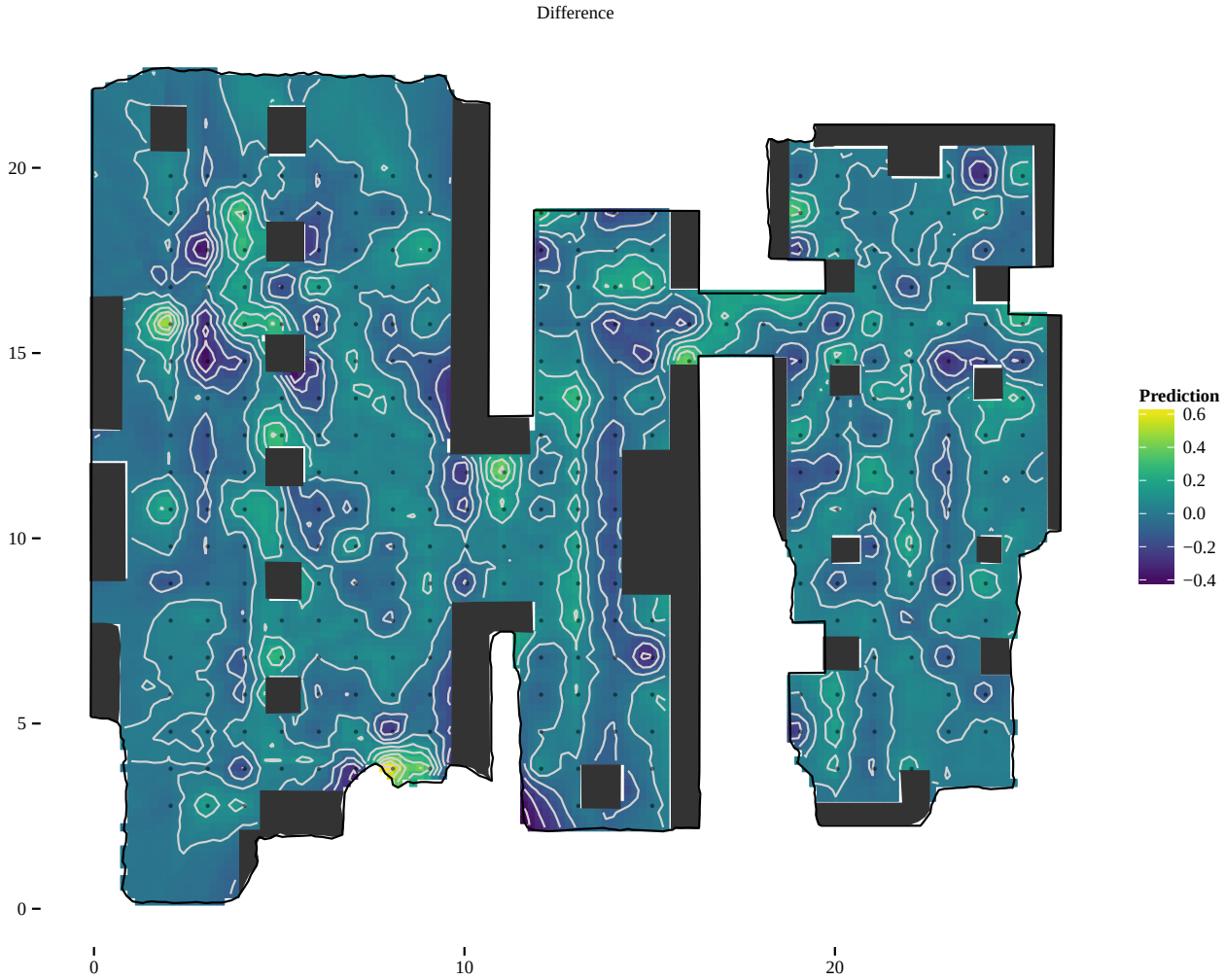

Figure 11: Difference between the cost-based prediction and the Euclidean prediction