

Spatial assignment of test sample

November 24, 2016

Contents

| | |
|---|----------|
| Input | 1 |
| Isotope values of test sample | 1 |
| Output | 1 |
| Model | 1 |
| Map of best fitted reference sample | 2 |
| Best fitted reference entries | 3 |
| Testing robustness of assignment: Wilcoxon signed rank test | 3 |
| P-values for the k nearest neighbours in Wilcoxon Test | 4 |
| Goodness of fit of test sample: | 4 |

Input

Website Identifier:

Isotope values of test sample

Table 1: Isotope values of test sample

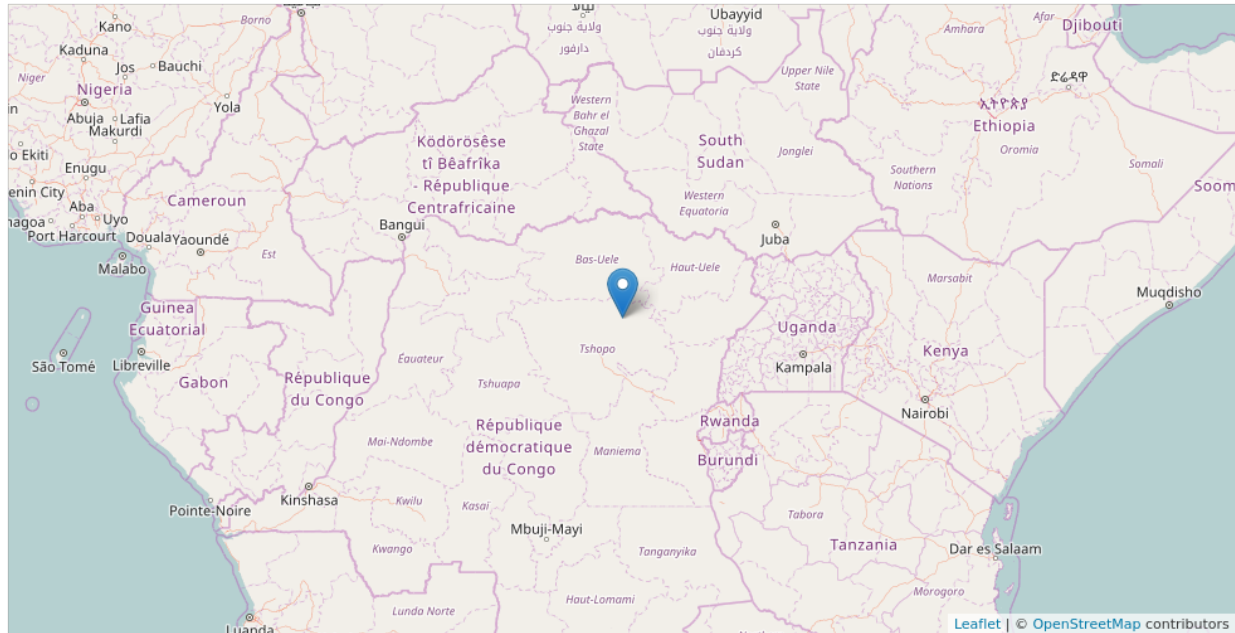
| 13C/12C | 15N/14N | 18O/16O | 2H/1H | 34S/32S |
|---------|---------|---------|-------|---------|
| -24.9 | 12.9 | 20.1 | -45.2 | 5.1 |

Output

Model

```
##
## Call:
## train.kknn(formula = fmla, data = ivory.train, kmax = 15, distance = 2, kernel = knl)
##
## Type of response variable: nominal
## Minimal misclassification: 0.3765867
## Best kernel: triangular
## Best k: 15
Classifier: country_code
```

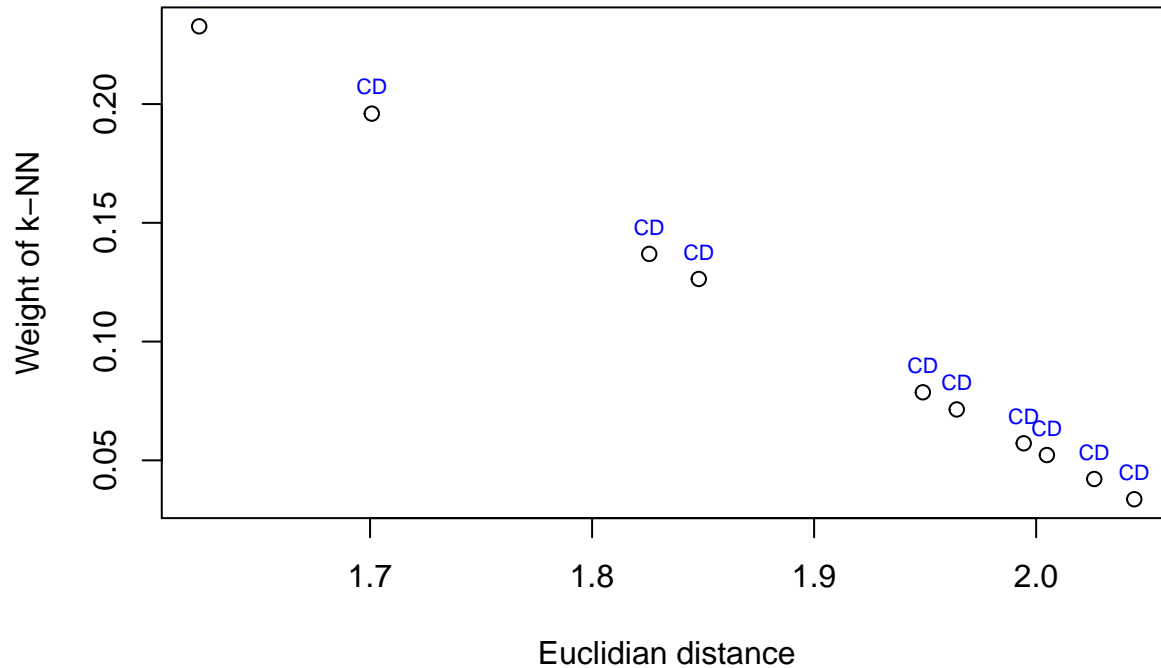
Map of best fitted reference sample



Best fitted reference sample:

- Site: Dem. Rep. Congo, Panga
- Country: CD
- Region: Central Africa
- CITES: Appendix I
- Lat: 1.52
- Lon: 26.23

Assignment of test sample to nearest neighbours



Best fitted reference entries

Table 2: Details of best fitted reference entry (row 1) and other fitted entries within best classifier

| lon | lat | location | 13C/12C | 15N/14N | 18O/16O | 2H/1H | 34S/32S |
|-------|-------|-----------------------------------|---------|---------|---------|-------|---------|
| 26.23 | 1.52 | Dem. Rep. Congo, Panga | -24.6 | 12.1 | 17.1 | -39.9 | 5.2 |
| 27.18 | 2.25 | Dem. Rep. Congo, Medje | -24.2 | 11.9 | 17.4 | -37.8 | 6.8 |
| 29.29 | 0.29 | Dem. Rep. Congo, Beni | -24.7 | 11.4 | 17.1 | -37.3 | 5.3 |
| 13.02 | -1.43 | Dem. Rep. Congo, Itoko | -24.2 | 10.4 | 18.1 | -38.4 | 7.0 |
| 23.55 | -1.35 | Dem. Rep. Congo, Moma | -25.6 | 10.8 | 16.9 | -44.4 | 5.7 |
| 18.20 | -1.55 | Dem. Rep. Congo, Leopold ii meer | -25.9 | 10.9 | 17.1 | -39.7 | 6.2 |
| 25.09 | -0.28 | Dem. Rep. Congo, Loyoy | -24.6 | 10.7 | 16.8 | -42.7 | 5.1 |
| 27.37 | 1.40 | Dem. Rep. Congo, Nepoko | -24.3 | 10.5 | 18.0 | -34.9 | 7.4 |
| 23.55 | -1.35 | Dem. Rep. Congo, Moma | -24.1 | 11.3 | 16.6 | -40.9 | 6.3 |
| 29.09 | 3.40 | Dem. Rep. Congo, Gangala na Bodio | -24.4 | 11.7 | 17.6 | -29.7 | 3.9 |

Country of prediction: CD

Testing robustness of assignment: Wilcoxon signed rank test

If $p\text{-value} > 0.05$, the test concludes that the isotope signature of the test sample is similar to the respective nearest neighbour reference sample.

P-values for the k nearest neighbours in Wilcoxon Test

“0.000017612, 0.000000103, 0.000000026, 0.000000026, 0.000000026, 0.000000026, 0.000000026, 0.000000026, 0.000000026, 0.000000026”

Goodness of fit of test sample:

- good fit: if $p > 0.05$ for at least two tested nearest neighbour reference samples;
- moderate fit: if $p > 0.05$ for at least one tested nearest neighbour reference samples;
- uncertain: if $p > 0.05$ for none of the tested nearest neighbour reference samples.

Assumption: At least two nearest reference samples are available.

Overall goodness of fit of test sample: “**uncertain**”