

# Spatial assignment of test sample

December 12, 2016

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## Input

Website Identifier: 232

### Isotope values of test sample

Table 1: Isotope values of test sample

| 13C/12C | 15N/14N | 18O/16O | 2H/1H | 34S/32S |
|---------|---------|---------|-------|---------|
| -22.7   | 6.2     | 17.7    | -41.5 | 13.2    |

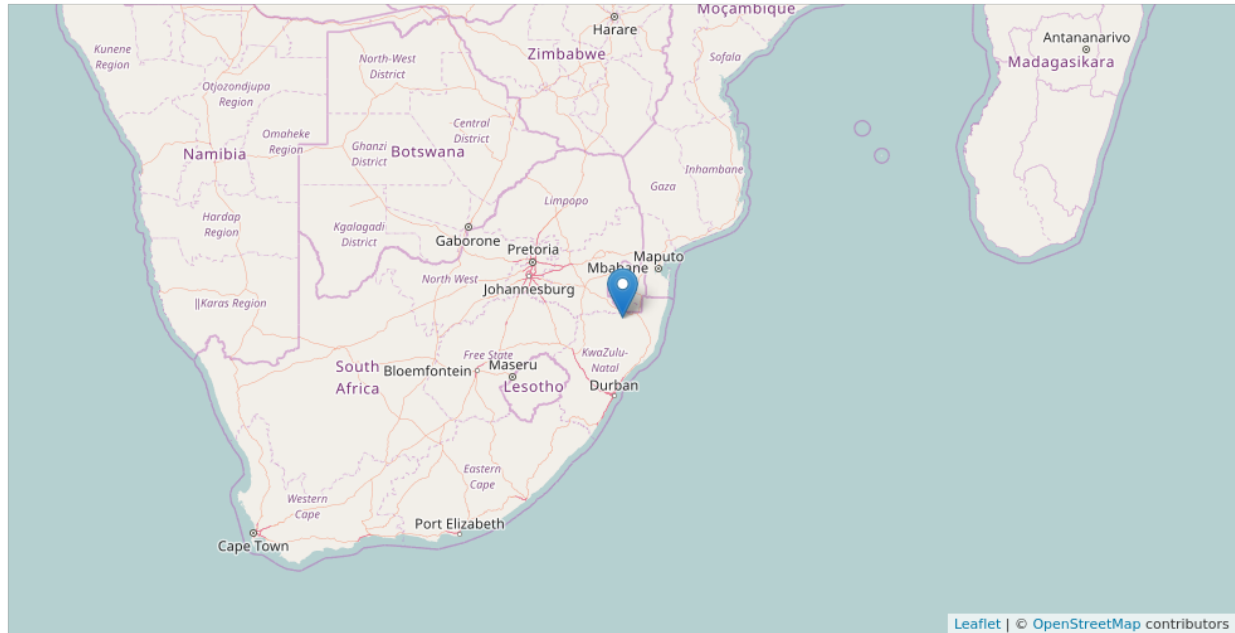
## Output

### Model

```
##  
## Call:  
## train.kknn(formula = fmla, data = ivory.train, kmax = 15, distance = 2, kernel = knl)  
##  
## Type of response variable: nominal  
## Minimal misclassification: 0.1889986  
## Best kernel: triangular  
## Best k: 14
```

Classifier: **region**

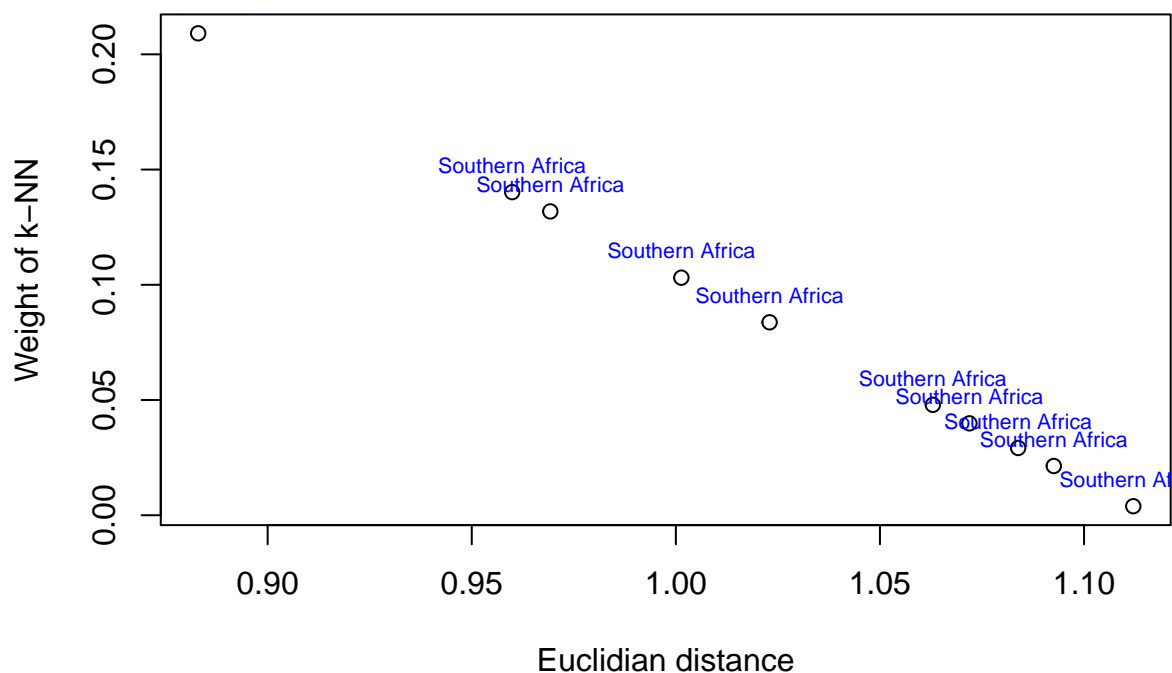
## Map of best fitted reference sample



### Best fitted reference sample:

- Site: South Africa, Ithala
- Country: ZA
- Region: Southern Africa
- CITES: Appendix II
- Lat: -27.51
- Lon: 31.29

## 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 |
|-------|--------|--|---------|---------|---------|-------|---------|
| 31.29 | -27.51 | South Africa, Ithala                     | -22.1   | 6.5     | 17.9    | -37.8 | 10.7    |
| 25.95 | -16.03 | Southern Zambia                          | -22.0   | 5.6     | 18.1    | -46.4 | 10.9    |
| 31.29 | -27.51 | South Africa, Ithala                     | -21.4   | 7.1     | 18.3    | -39.9 | 11.8    |
| 20.00 | -17.00 | Angola, Cenando-Cubango im S dosten Ango | -22.1   | 8.0     | 17.3    | -40.5 | 12.6    |
| 33.45 | -11.02 | Malawi, Rhumpi, Vwasa Marsh Game Reserve | -22.2   | 6.1     | 18.6    | -45.1 | 10.4    |
| 30.21 | -15.78 | Zimbabwe, in the north of the country    | -22.3   | 8.0     | 16.7    | -41.1 | 12.8    |
| 31.29 | -27.51 | South Africa, Ithala                     | -21.2   | 7.0     | 17.7    | -42.2 | 11.1    |
| 31.29 | -27.51 | South Africa, Ithala                     | -21.8   | 6.6     | 18.1    | -42.4 | 10.0    |
| NA    | NA     | South Africa, HiP                        | -21.7   | 7.6     | 18.9    | -39.1 | 13.7    |
| 32.00 | -14.75 | Mozambique, Kambako                      | -23.6   | 7.7     | 17.4    | -37.0 | 11.5    |

Region of prediction: Southern Africa

### Testing robustness of assignment: Wilcoxon signed rank test

If  $p$ -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

“0.7563768, 0.0106990, 0.0010194, 0.0000372, 0.0000194, 0.0000067, 0.0000045, 0.0000019, 0.0000007, 0.0000004”

### 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: “**moderate fit**”