Spatial assignment of test sample

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Input

Website Identifier: 198

Isotope values of test sample

Table 1: Isotope values of test sample

<table>
<thead>
<tr>
<th>13C/12C</th>
<th>15N/14N</th>
<th>18O/16O</th>
<th>2H/1H</th>
<th>34S/32S</th>
</tr>
</thead>
<tbody>
<tr>
<td>-21.2</td>
<td>6.7</td>
<td>16.7</td>
<td>-43.3</td>
<td>11.9</td>
</tr>
</tbody>
</table>

Output

Model

```r
## 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: South Africa, Ithala
- Country: ZA
- Region: Southern Africa
- CITES: Appendix II
- Lat: -27.51
- Lon: 31.29
**Assignment of test sample to nearest neighbours**

![Graph showing assignment of test sample to nearest neighbours.](image)

**Best fitted reference entries**

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

<table>
<thead>
<tr>
<th>lon</th>
<th>lat</th>
<th>location</th>
<th>13C/12C</th>
<th>15N/14N</th>
<th>18O/16O</th>
<th>2H/1H</th>
<th>34S/32S</th>
</tr>
</thead>
<tbody>
<tr>
<td>31.29</td>
<td>-27.51</td>
<td>South Africa, Ithala</td>
<td>-21.4</td>
<td>7.1</td>
<td>16.9</td>
<td>-41.0</td>
<td>10.8</td>
</tr>
<tr>
<td>31.29</td>
<td>-27.51</td>
<td>South Africa, Ithala</td>
<td>-21.2</td>
<td>7.0</td>
<td>17.7</td>
<td>-42.2</td>
<td>11.1</td>
</tr>
<tr>
<td>31.29</td>
<td>-27.51</td>
<td>South Africa, Ithala</td>
<td>-21.4</td>
<td>7.2</td>
<td>17.0</td>
<td>-37.8</td>
<td>11.1</td>
</tr>
<tr>
<td>31.67</td>
<td>-25.23</td>
<td>South Africa, Kr ger S-d-Ost, Grenze Mos</td>
<td>-21.1</td>
<td>7.8</td>
<td>17.3</td>
<td>-42.8</td>
<td>13.8</td>
</tr>
<tr>
<td>31.29</td>
<td>-27.51</td>
<td>South Africa, Ithala</td>
<td>-21.4</td>
<td>7.1</td>
<td>18.3</td>
<td>-39.9</td>
<td>11.8</td>
</tr>
</tbody>
</table>

**Country of prediction:** ZA

**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**

“0.65, 0.38, 0.35, 0.15, 0.13, 0.07”
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: “good fit”