Spatial assignment of test sample
November 24, 2016

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Input

Website Identifier: T2_21cm

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>-19.5</td>
<td>5.9</td>
<td>18.9</td>
<td>-50.2</td>
<td>8.8</td>
</tr>
</tbody>
</table>

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**: Southern Zambia
- **Country**: ZM
- **Region**: Southern Africa
- **CITES**: Appendix I
- **Lat**: -14.972185
- **Lon**: 25.957587
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

<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>25.96</td>
<td>-14.97</td>
<td>Southern Zambia</td>
<td>-20.6</td>
<td>7.1</td>
<td>19.6</td>
<td>-51.9</td>
<td>8.2</td>
</tr>
<tr>
<td>25.96</td>
<td>-14.97</td>
<td>Southern Zambia</td>
<td>-20.4</td>
<td>7.0</td>
<td>20.1</td>
<td>-49.2</td>
<td>8.5</td>
</tr>
<tr>
<td>32.10</td>
<td>-12.05</td>
<td>Southern Zambia</td>
<td>-19.6</td>
<td>7.3</td>
<td>18.3</td>
<td>-45.3</td>
<td>7.4</td>
</tr>
<tr>
<td>31.44</td>
<td>-12.12</td>
<td>Northeastern Zambia, near Chilonga</td>
<td>-20.9</td>
<td>6.9</td>
<td>18.7</td>
<td>-53.0</td>
<td>7.4</td>
</tr>
<tr>
<td>32.19</td>
<td>-11.41</td>
<td>Southern Zambia</td>
<td>-20.6</td>
<td>7.2</td>
<td>18.4</td>
<td>-46.4</td>
<td>7.3</td>
</tr>
<tr>
<td>32.30</td>
<td>-11.37</td>
<td>Southern Zambia</td>
<td>-20.8</td>
<td>7.3</td>
<td>18.6</td>
<td>-54.2</td>
<td>9.6</td>
</tr>
<tr>
<td>25.88</td>
<td>-16.09</td>
<td>Southern Zambia</td>
<td>-21.0</td>
<td>6.4</td>
<td>18.1</td>
<td>-56.6</td>
<td>9.6</td>
</tr>
<tr>
<td>25.45</td>
<td>-16.52</td>
<td>Southern Zambia</td>
<td>-21.3</td>
<td>7.1</td>
<td>18.8</td>
<td>-49.7</td>
<td>8.9</td>
</tr>
<tr>
<td>25.68</td>
<td>-16.76</td>
<td>Southern Zambia</td>
<td>-20.7</td>
<td>6.4</td>
<td>18.0</td>
<td>-57.7</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Country of prediction: ZM

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

“0.000221484, 0.000002501, 0.000001160, 0.000000103, 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”