Spatial assignment of test sample
November 24, 2016

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Input

Website Identifier: T2_42cm

Isotope values of test sample

Table 1: Isotope values of test sample

<table>
<thead>
<tr>
<th>Isotope values (ppm)</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>13C/12C</td>
<td>-19.7</td>
<td>6.2</td>
<td>18.9</td>
<td>-47.4</td>
<td>8.9</td>
</tr>
</tbody>
</table>

Output

Model

##

## Call:

```r
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: -12.05
- Lon: 32.1
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>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>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>32.19</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>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>32.38</td>
<td>-11.29</td>
<td>North Zambia, near Msitu</td>
<td>-20.7</td>
<td>7.0</td>
<td>18.2</td>
<td>-44.8</td>
<td>10.6</td>
</tr>
<tr>
<td>31.21</td>
<td>-13.62</td>
<td>Zambia, Luangwa River, western of Chipat</td>
<td>-18.7</td>
<td>7.5</td>
<td>19.3</td>
<td>-43.7</td>
<td>9.9</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>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>32.30</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>
</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

“0.112069791, 0.112069791, 0.000420507, 0.000221484, 0.000013100, 0.0000009619, 0.000000103, 0.000000103, 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: “good fit”