Spatial assignment of test sample  
November 24, 2016

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Input

Website Identifier: Blind 9_MW

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>-20.9</td>
<td>7.8</td>
<td>15.5</td>
<td>-34.6</td>
<td>9.3</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: Mozambique, Niassa Nature Reserve
- Country: MZ
- Region: Southern Africa
- CITES: Appendix I
- Lat: -13.3
- Lon: 37.44
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>37.44</td>
<td>-13.30</td>
<td>Mozambique, Niassa Nature Reserve</td>
<td>-20.1</td>
<td>7.5</td>
<td>16.2</td>
<td>-35.0</td>
<td>9.7</td>
</tr>
<tr>
<td>38.22</td>
<td>-12.18</td>
<td>Mozambique, Lugenda south bank (block C)</td>
<td>-22.0</td>
<td>7.8</td>
<td>15.5</td>
<td>-39.5</td>
<td>10.1</td>
</tr>
<tr>
<td>36.86</td>
<td>-11.90</td>
<td>Mozambique, Chipuputa area (block L5)</td>
<td>-21.7</td>
<td>7.0</td>
<td>15.9</td>
<td>-39.0</td>
<td>10.3</td>
</tr>
<tr>
<td>39.00</td>
<td>-11.18</td>
<td>Mozambique, Rovuma river area</td>
<td>-20.8</td>
<td>7.0</td>
<td>15.4</td>
<td>-40.0</td>
<td>7.5</td>
</tr>
<tr>
<td>37.84</td>
<td>-12.30</td>
<td>Mozambique, Block L7 - Lugenda south bank</td>
<td>-22.0</td>
<td>7.5</td>
<td>15.5</td>
<td>-41.6</td>
<td>8.4</td>
</tr>
<tr>
<td>38.42</td>
<td>-11.55</td>
<td>Mozambique, Lugenda north bank - Chipopu</td>
<td>-22.5</td>
<td>6.9</td>
<td>15.7</td>
<td>-35.8</td>
<td>8.4</td>
</tr>
<tr>
<td>32.00</td>
<td>-14.75</td>
<td>Mozambique, Kambako</td>
<td>-20.8</td>
<td>7.8</td>
<td>16.0</td>
<td>-45.0</td>
<td>9.8</td>
</tr>
<tr>
<td>32.10</td>
<td>-14.70</td>
<td>Mozambique, Kambako block - L8</td>
<td>-21.5</td>
<td>7.1</td>
<td>16.2</td>
<td>-42.3</td>
<td>10.8</td>
</tr>
<tr>
<td>37.85</td>
<td>-11.32</td>
<td>Mozambique, Chipupa / Rovuma</td>
<td>-22.0</td>
<td>6.9</td>
<td>16.7</td>
<td>-37.7</td>
<td>10.5</td>
</tr>
</tbody>
</table>

Country of prediction: MZ

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

"0.74719, 0.68295, 0.59074, 0.01568, 0.00506, 0.00226, 0.00134, 0.00134, 0.00052"
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”