Spatial assignment of test sample

December 12, 2016

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Input

Website Identifier: 231

Isotope values of test sample

Table 1: Isotope values of test sample

<table>
<thead>
<tr>
<th></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>-23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15N/14N</td>
<td></td>
<td>8.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18O/16O</td>
<td></td>
<td></td>
<td>18.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2H/1H</td>
<td></td>
<td></td>
<td></td>
<td>-35.6</td>
<td></td>
</tr>
<tr>
<td>34S/32S</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.2</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: -12.200805
- Lon: 26.487889
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>26.49</td>
<td>-12.20</td>
<td>Southern Zambia</td>
<td>-22.8</td>
<td>8.2</td>
<td>18.0</td>
<td>-36.8</td>
<td>9.3</td>
</tr>
<tr>
<td>32.06</td>
<td>-11.38</td>
<td>Southern Zambia</td>
<td>-22.6</td>
<td>8.7</td>
<td>19.0</td>
<td>-37.8</td>
<td>8.9</td>
</tr>
<tr>
<td>26.21</td>
<td>-14.38</td>
<td>Southern Zambia</td>
<td>-23.0</td>
<td>7.9</td>
<td>18.2</td>
<td>-43.4</td>
<td>9.2</td>
</tr>
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<td>32.46</td>
<td>-11.08</td>
<td>Southern Zambia</td>
<td>-22.1</td>
<td>8.1</td>
<td>18.3</td>
<td>-42.0</td>
<td>9.7</td>
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<tr>
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<td>Southern Zambia</td>
<td>-22.2</td>
<td>8.8</td>
<td>19.4</td>
<td>-37.7</td>
<td>9.5</td>
</tr>
<tr>
<td>31.57</td>
<td>-12.28</td>
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<td>-22.1</td>
<td>8.8</td>
<td>18.8</td>
<td>-39.2</td>
<td>10.6</td>
</tr>
<tr>
<td>31.37</td>
<td>-14.17</td>
<td>Southern Zambia</td>
<td>-21.7</td>
<td>8.8</td>
<td>17.8</td>
<td>-37.9</td>
<td>8.8</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

“0.9486, 0.2340, 0.1456, 0.1023, 0.0120, 0.0068, 0.0011”
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”