Spatial assignment of test sample

November 24, 2016

Contents

Input
Isotope values of test sample ................................................................. 1

Output
Model ........................................................................................................ 1
Map of best fitted reference sample ............................................................ 2
Best fitted reference entries ................................................................. 3
Testing robustness of assignment: Wilcoxon signed rank test ........... 3
P-values for the k nearest neighbours in Wilcoxon Test ................. 4
Goodness of fit of test sample: ............................................................ 4

Input
Website Identifier:

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>-19.8</td>
<td>6.2</td>
<td>15.1</td>
<td>-65.6</td>
<td>13.8</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
Best fitted reference sample:

- Site: Malawi, Rhumpi, Vwasa Marsh Game Reserve
- Country: MW
- Region: Southern Africa
- CITES: Appendix I
- Lat: -11.03
- Lon: 33.5
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>33.50</td>
<td>-11.03</td>
<td>Malawi, Rhumpi, Vwasa Marsh Game Reserve</td>
<td>-20.7</td>
<td>6.7</td>
<td>15.9</td>
<td>-58.0</td>
<td>12.3</td>
</tr>
<tr>
<td>33.62</td>
<td>-11.91</td>
<td>Malawi, Mzimba</td>
<td>-20.7</td>
<td>6.1</td>
<td>15.8</td>
<td>-57.0</td>
<td>10.2</td>
</tr>
<tr>
<td>33.13</td>
<td>-12.91</td>
<td>Malawi, Kasungu</td>
<td>-19.4</td>
<td>6.9</td>
<td>15.9</td>
<td>-57.5</td>
<td>10.0</td>
</tr>
<tr>
<td>33.13</td>
<td>-12.91</td>
<td>Malawi, Kasungu</td>
<td>-20.3</td>
<td>6.2</td>
<td>15.8</td>
<td>-51.9</td>
<td>11.4</td>
</tr>
<tr>
<td>33.13</td>
<td>-12.91</td>
<td>Malawi, Kasungu</td>
<td>-21.1</td>
<td>6.1</td>
<td>13.7</td>
<td>-57.7</td>
<td>10.2</td>
</tr>
<tr>
<td>33.13</td>
<td>-12.91</td>
<td>Malawi, Kasungu</td>
<td>-20.8</td>
<td>5.6</td>
<td>15.0</td>
<td>-54.2</td>
<td>10.2</td>
</tr>
<tr>
<td>35.33</td>
<td>-14.90</td>
<td>Malawi, Liwonde National Park</td>
<td>-21.5</td>
<td>6.2</td>
<td>15.6</td>
<td>-55.7</td>
<td>10.0</td>
</tr>
<tr>
<td>33.13</td>
<td>-12.91</td>
<td>Malawi, Kasungu</td>
<td>-21.1</td>
<td>5.8</td>
<td>15.0</td>
<td>-53.0</td>
<td>10.3</td>
</tr>
<tr>
<td>35.25</td>
<td>-14.48</td>
<td>Malawi, Mangochi</td>
<td>-22.1</td>
<td>7.3</td>
<td>14.7</td>
<td>-54.4</td>
<td>12.8</td>
</tr>
<tr>
<td>33.13</td>
<td>-12.91</td>
<td>Malawi, Kasungu</td>
<td>-20.4</td>
<td>6.4</td>
<td>14.9</td>
<td>-51.0</td>
<td>10.1</td>
</tr>
</tbody>
</table>

Country of prediction: MW

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

“0.000030996, 0.000007014, 0.000000052, 0.00000026, 0.000000026, 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”