Solutions to Homework 2.2

August 13, 2013

Goal

Build decision tree models on different sets of features from the task of Word Sense Disambiguation. For each of them, get its performance on both training and test data.

Performance

<table>
<thead>
<tr>
<th>features used</th>
<th>trained model</th>
<th>data set</th>
<th>performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>$A_4$</td>
<td>M1</td>
<td>train</td>
<td>57.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>test</td>
<td>57.95</td>
</tr>
<tr>
<td>$A_1, \ldots, A_{11}$</td>
<td>M2</td>
<td>train</td>
<td>63.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>test</td>
<td>63.64</td>
</tr>
<tr>
<td>$A_2, A_3, A_4, \ldots, A_9$</td>
<td>M3</td>
<td>train</td>
<td>63.43</td>
</tr>
<tr>
<td></td>
<td></td>
<td>test</td>
<td>63.64</td>
</tr>
<tr>
<td>$A_1, A_6, A_7$</td>
<td>M4</td>
<td>train</td>
<td>54.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>test</td>
<td>58.24</td>
</tr>
<tr>
<td>$A_1, A_{11}$</td>
<td>M5</td>
<td>train</td>
<td>52.77</td>
</tr>
<tr>
<td></td>
<td></td>
<td>test</td>
<td>55.40</td>
</tr>
</tbody>
</table>

Table 1: Summary of five trained models

Visualization of trained decision trees
WSD task: decision tree trained on feature A4

A4>=0.5

phone  product
WSD task: decision tree trained on A1,...,A11
WSD task: decision tree trained on A2, A3, A4, A9

```
    A4 >= 0.5
     /      \\
    |      |
   phone  A2 >= 0.5
          /    |   |
         |    |   |
        division formation A3 >= 0.5
                           /    |   |
                          |    |   |
                          division product A9 >= 0.5
```
WSD task: decision tree trained on A1, A6, A7

```
A1 > 0.5
  /      \
/        \  
cord     A6 < 0.5
         /      \
        /        \  
A7 > 0.5  text
         /      \
        /        \  
  phone    product
```
WSD task: decision tree trained on A1 and A11

A1\geq0.5

- cord
- product