Experimental report on deep learning of symbolic value data

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01

Former Work
Generate Data

Number of Instances: 1,000,000
Number of Attributes: 10
number of each Attributes: 10
label: 0, 1

Hash: 1526930275

0 <= first number <= 4
0

5 <= first number <= 9
1

0 1
488822 511178
Result

neural networks

Accuracy vs Layer

- Training Accuracy
- Testing Accuracy
02

Recent Work
## ELM Model

<table>
<thead>
<tr>
<th>Training accuracy</th>
<th>Testing accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5293</td>
<td>0.50245</td>
</tr>
</tbody>
</table>
Use new way to get label

\[
\begin{array}{cccccccccc}
6 & 8 & 0 & 9 & 4 & 8 & 8 & 9 & 9 & 9 \\
\end{array}
\rightarrow \ hash \rightarrow 1526930275
\]

- 0 <= first number <= 4
  - Label: 0

- 5 <= first number <= 9
  - Label: 1

\[
\begin{array}{cccccccccc}
6 & 8 & 0 & 9 & 4 & 8 & 8 & 9 & 9 & 9 \\
\end{array}
\rightarrow \ hash \rightarrow 1526930275
\]

\[
\begin{array}{cccccccccc}
gap=1 & 1526930275 & \rightarrow & sum & 40 & \lfloor 40 / \text{gap} \rfloor \% 2 & \rightarrow & 0 \\
\end{array}
\]

\[
\begin{array}{cccccccccc}
gap=1 & 1810054138 & \rightarrow & sum & 31 & \lfloor 31 / \text{gap} \rfloor \% 2 & \rightarrow & 1 \\
\end{array}
\]
formula to get label:  ⌊ \frac{\text{sum}(N)}{\text{gap}} \rfloor \% 2

<table>
<thead>
<tr>
<th>sum (N)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>...</th>
</tr>
</thead>
<tbody>
<tr>
<td>gap=1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>...</td>
</tr>
<tr>
<td>gap=2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>...</td>
</tr>
<tr>
<td>gap=3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>...</td>
</tr>
<tr>
<td>gap=4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>...</td>
</tr>
<tr>
<td>gap=5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>...</td>
</tr>
</tbody>
</table>

......
## Result

<table>
<thead>
<tr>
<th>gap</th>
<th>Training accuracy</th>
<th>Testing accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.53055</td>
<td>0.5013</td>
</tr>
<tr>
<td>2</td>
<td>0.53025</td>
<td>0.50325</td>
</tr>
<tr>
<td>9</td>
<td>0.5314875</td>
<td>0.49985</td>
</tr>
<tr>
<td>10</td>
<td>0.5292625</td>
<td>0.5058</td>
</tr>
</tbody>
</table>
03
Future Work
Future Work

1、Generate more data to see if the testing accuracy is improved.

2、Use another way to generate a label.

3、Figure out how the neural networks model works, so I can improve it myself.
THANK YOU!