CHAS – Introduction to the Chinese Handwriting Analysis System for Primary School Students

Dr. Howard Leung (howard@cityu.edu.hk)
Department of Computer Science
City University of Hong Kong

26 October 2013
Importance of Chinese Handwriting (1)

- 50% of the school day engaged in handwriting tasks (Tseng & Chow, 2000)
- Used both inside and outside the classroom (Feder & Majnemer, 2007)
- Important means of communication: expression, recording and transmission of ideas (Dennis & Swinth, 2001, Wakely et al., 2006)
Importance of Chinese Handwriting (2)

- In 2001/2002, 5-10% school-aged population in Hong Kong have handwriting difficulty. They experience difficulties in:
  - academic achievement
  - social participation and integration
- It is thus important for students to grasp proper handwriting skills so that they are able to effectively:
  - Communicate with others
  - Jot notes in a lesson
An occupational therapist, educational psychologist or teacher may assess individual students and identify potential problems.

Time is limited in class/appointment.

The workload may become too tedious when the number of students is too high.
CHAS Project

- To standardize the norm of handwriting construct, an objective, computerized assessment tool for assessing handwriting legibility is necessary to account for the unique characteristic of Chinese handwriting.

- Since August 2008, we have started a project with the PolyU team to develop the Chinese Handwriting Assessment System (CHAS). This system is divided into 2 parts:
  1. Chinese Handwriting Assessment Tool (CHAT)
  2. Handwriting Assessment System (HAS)

- We obtained the Quality Education Fund of HK$2,478,500 for this project
Handwriting Data Collection

Some template characters are shown on the screen and we collect handwritings of more than 1000 students from 6 primary schools by asking them to copy the characters on the paper pasted on the tablet.
Handwriting Record Loading
Part 1: CHAT - Assessment of the Handwriting Process

- Quantitative analysis of the handwriting trajectory: the data can be compared with the norm of the same age students to screen their potential handwriting problem.
Part 2: HAS - Assessment of the Handwriting Product

- Aim: to determine the handwriting accuracy by identifying stroke production errors
Broken Stroke
Missing Stroke

Missing stroke
Additional Stroke
Concatenated Stroke
Normative Study

A local norm of handwriting construct of Hong Kong students has been created.
## Assessment Report

### Assessment report can be generated as PDF file

#### 衡量筆字表現

<table>
<thead>
<tr>
<th>項目</th>
<th>學習表達</th>
<th>同級表達</th>
<th>平均表達</th>
<th>Z分數</th>
<th>狀態</th>
</tr>
</thead>
<tbody>
<tr>
<td>書寫速度</td>
<td>1.61 字/分鐘</td>
<td>6.23(1.62) 字/分鐘</td>
<td>-2.85</td>
<td>極度關注</td>
<td></td>
</tr>
<tr>
<td>總書寫時間</td>
<td>2897.87 分</td>
<td>923.18(233.40) 分</td>
<td>8.47</td>
<td>極度關注</td>
<td></td>
</tr>
<tr>
<td>學習時間/表現分</td>
<td>4.16</td>
<td>2.74(0.10)</td>
<td>2.66</td>
<td>極度關注</td>
<td></td>
</tr>
<tr>
<td>學習時間/表現差</td>
<td>23.28</td>
<td>13.83(10.03)</td>
<td>-0.72</td>
<td>正常</td>
<td></td>
</tr>
<tr>
<td>筆壓標準差</td>
<td>0.98</td>
<td>1.46(0.82)</td>
<td>-0.9</td>
<td>正常</td>
<td></td>
</tr>
<tr>
<td>壓力標準差</td>
<td>0.406</td>
<td>0.76(0.36)</td>
<td>-0.95</td>
<td>正常</td>
<td></td>
</tr>
<tr>
<td>字體大小</td>
<td>12.27</td>
<td>12.81(1.27)</td>
<td>-0.42</td>
<td>正常</td>
<td></td>
</tr>
<tr>
<td>大小標準差</td>
<td>5.17</td>
<td>2.08(0.50)</td>
<td>6.18</td>
<td>極度關注</td>
<td></td>
</tr>
</tbody>
</table>

### 項目

<table>
<thead>
<tr>
<th>項目</th>
<th>平均分</th>
<th>1或以下</th>
<th>1-2</th>
<th>2或以上</th>
</tr>
</thead>
<tbody>
<tr>
<td>書寫速度</td>
<td>1.61</td>
<td>6.23</td>
<td>-2.85</td>
<td>極度關注</td>
</tr>
<tr>
<td>總書寫時間</td>
<td>2897.87</td>
<td>923.18</td>
<td>8.47</td>
<td>極度關注</td>
</tr>
<tr>
<td>學習時間/表現分</td>
<td>4.16</td>
<td>2.74</td>
<td>2.66</td>
<td>極度關注</td>
</tr>
<tr>
<td>學習時間/表現差</td>
<td>23.28</td>
<td>13.83</td>
<td>-0.72</td>
<td>正常</td>
</tr>
<tr>
<td>筆壓標準差</td>
<td>0.98</td>
<td>1.46</td>
<td>-0.9</td>
<td>正常</td>
</tr>
<tr>
<td>壓力標準差</td>
<td>0.406</td>
<td>0.76</td>
<td>-0.95</td>
<td>正常</td>
</tr>
<tr>
<td>字體大小</td>
<td>12.27</td>
<td>12.81</td>
<td>-0.42</td>
<td>正常</td>
</tr>
<tr>
<td>大小標準差</td>
<td>5.17</td>
<td>2.08</td>
<td>6.18</td>
<td>極度關注</td>
</tr>
</tbody>
</table>
Conclusions

We have presented the Chinese Handwriting Assessment System (CHAS) for assessing the handwriting legibility of primary school students.

CHAS has 2 parts:

1. CHAT for checking the handwriting process
2. HAS for checking the handwriting product

The functions of CHAS include record management, paper calibration, handwriting data collection, assessments, report generation, etc.
Related Publications


Project Information

CHAS
- Project homepage:
  http://vache.cs.cityu.edu.hk/chatweb

Contact
- Dr. Howard Leung (howard@cityu.edu.hk)
- Personal Homepage:
  http://www.cs.cityu.edu.hk/~howard