GSET Somi: A Game-Specific Eye Tracking Dataset for Somi

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GAMING INDUSTRY

- Wide range of gaming devices
- Gaming will hit $91.5 billion this year

1 http://www.gamesindustry.biz/articles/2015-04-22-gaming-will-hit-usd91-5-billion-this-year-newzoo
CLOUD GAMING

Cloud

Game Engine

Video Encoder

Video Decoder

Display System

Game Input Device

Client

Bandwidth!
**Bandwidth Challenge**

- Currently requires ~5Mbps per player

- Perceptual video coding is used to reduce bit rate while preserving perceived quality!

- Specific eye-tracking datasets are required to build specific perceptual models for gaming applications.
## Comparison of the Game-related Eye-tracking Datasets

<table>
<thead>
<tr>
<th></th>
<th>GSET</th>
<th>PETERS</th>
<th>BORJI</th>
<th>CRCNS</th>
<th>DIEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collected while playing</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Collected while watching</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Game video</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>○</td>
</tr>
<tr>
<td>Game video trailer</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>●</td>
</tr>
<tr>
<td>#Subjects*</td>
<td>84</td>
<td>5</td>
<td>21</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>#Videos*</td>
<td>135</td>
<td>24</td>
<td>27</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Resolution</td>
<td>720p</td>
<td>680x480</td>
<td>680x480</td>
<td>680x480</td>
<td>Varying</td>
</tr>
<tr>
<td>Video format</td>
<td>Raw</td>
<td>Raw</td>
<td>H.264/AVC</td>
<td>MPEG-1</td>
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<tr>
<td>Eyes</td>
<td>Both</td>
<td>Right</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Eye-tracker</td>
<td>Remote</td>
<td>Chin rest</td>
<td>Chin rest + Head mount</td>
<td>Chin rest</td>
<td>-</td>
</tr>
</tbody>
</table>
VIDEO GAME

• Title: “Somi, My Beautiful Doll”
• Game Genre: Side-scrolling
• Built by: GameMaker Studio
• Resolution: 720p
SOMI’s Game Objects

- Categorized into eight groups

<table>
<thead>
<tr>
<th>Main Character</th>
<th>Collectable</th>
<th>Explosion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enemy</td>
<td>Informative</td>
<td></td>
</tr>
<tr>
<td>Obstacle</td>
<td>Bullet</td>
<td>Cursor</td>
</tr>
</tbody>
</table>
DATA COLLECTION PROCEDURE

Introduction → Training → Calibration

Verification ← Playing
EYE-TRACKING DEVICE

• Tobii X2-30 Compact
  ▫ Remote eye-tracker
  ▫ Sampling rate of 30 Hz
  ▫ Accuracy of 0.4°
SAMPLE RESULTS 1

- Attention patterns are different among players of different skill levels

<table>
<thead>
<tr>
<th>SKILL LEVEL</th>
<th>SCORE RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginner</td>
<td>score &lt;= 1000</td>
</tr>
<tr>
<td>Intermediate</td>
<td>1000 &lt; score &lt;= 6000</td>
</tr>
<tr>
<td>Expert</td>
<td>6000 &lt; score</td>
</tr>
</tbody>
</table>

Average attention per category
Sample Results 2

- Attention patterns are different during different game states

Average attention per category in Jumping state

Average attention per category in Running state
Dataset Structure

- Each session contains
  - Gaze records
  - Keyboard strikes
  - Mouse info
  - Game objects’ info
    - Size
    - Location
  - Gameplay video
    - In a lossless format

http://www.site.uottawa.ca/~shervin/gaze/
CONCLUSION

• Compared to existing datasets, ours has the following features at once:
  ▫ HD resolution
  ▫ Collection during gameplay instead of watching
  ▫ Recording of mouse and keyboard inputs
  ▫ Recording of game objects’ locations
  ▫ A large number of subjects

• Can be used to recognize the different attention patterns among players
FUTURE WORK

• Adding more video games of the side-scrolling genre
• Adding video games of the other game genres
THANK YOU FOR YOUR ATTENTION