The Science and Detection of Tilting

Xingjie Wei (Uni. of Cambridge), Jussi Palomäki (Uni. of Helsinki)
Jeff Yan (Uni. of Lancaster) and Peter Robinson (Uni. of Cambridge)

xw323@cam.ac.uk
http://xingjiewei.me
Poker

• Played by > 100 M players worldwide (most online)
• Market value (online poker): billions $$$ / year
• Cultural significance
  – Movies/TV: James Bond, X-Men
  – Everyone is familiar with terms like *bluff, poker-face*
• Scientific significance
  – Involves constant *decision-making & risk analysis*
  – Inspired game theory (the study of strategic cooperation and conflict between intelligent rational decision makers)
Texas hold 'em
Rank

1, Straight flush
2, Four of a kind
3, **Full house**  Play 2 (AK)
4, Flush
5, Straight
6, **Three of a kind**  Play 1 (KK)
7, Two pair
8, One pair
9, High card

On the first 3 cards: AK vs. KK: < 1% win rate
On the first 4 cards: AK vs. KK: 4%~5% win rate

Texas hold 'em
Tilting

• Refers to losing control due to negative emotions, making detrimental decision and thereby losing superfluous amounts of money
  – Losing despite being a strong statistical favourite to win (i.e. losing due to bad luck)
  – Prolonged series of losses (losing streaks)
  – External factors external (e.g. fatigue, needling by other players)

“I deserved to win but didn’t; I have to win back what was/is mine”
The study of tilting

Why

• Highly prevalent among poker players
  – Within last 6 months of playing, 88% reported having tilted severely at least once, 43% > 5 times, 24% > 10 times

• Causes significant detrimental consequences
  – E.g. losing entire life saving in a single 20-min session

• Rarely studied
  – Current: based on subjective self-reports from players

Helps to better understand how emotions influence our behavior and well-being
The study of tilting

What

We know how tilting feels (subjectively), but not what it actually looks like (objectively)

• How does tilting manifest via facial expressions?
• Is this manifestation automatically detectable via computer vision methods?

Computing techniques → Psychological behaviour
The study of tilting

How

- Map the facial (micro) expressions detected during actual tilting behaviour by employing facial expression analysis techniques
- Pioneer the development of an automatic system that detects expressions of tilting and warns players when tilting is imminent *(Tilt-detector)*
Framework

Data collection
- Playing diary
- Poker hand records
- Video

Data processing
- Tilting labeling
  - Landmarks detection
  - Face registration
  - Feature extraction
- AU detection

Tilting modeling
- Facial expression ↔ tilting behaviour
- Co-occurrence / mutual exclusion relationships among AUs
- Temporal relationships of AUs

Prior knowledge

Training
- Classifier

Testing
- Non-labeled Video

Tilting detection

Tilting ?
Non-tilting ?
Data collection

• Poker hand records
  – Using poker tracking and analysis software
• Playing diary
  – Perceived cause (e.g., bad beat)
  – Exact time and duration
  – Perceived severity of tilt
  – Descriptions of the emotions felt
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Video

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Data processing

- Action unit (AU) detection

<table>
<thead>
<tr>
<th>AU No.</th>
<th>Description</th>
<th>AU No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Inner Brow Raiser</td>
<td>17</td>
<td>Chin Raiser</td>
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<tr>
<td>2</td>
<td>Outer Brow Raiser</td>
<td>18</td>
<td>Lip Pucker</td>
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<tr>
<td>4</td>
<td>Brow Lowerer</td>
<td>20</td>
<td>Lip Stretcher</td>
</tr>
<tr>
<td>5</td>
<td>Upper Lid Raiser</td>
<td>22</td>
<td>Lip Funneler</td>
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<td>6</td>
<td>Cheek Raiser</td>
<td>23</td>
<td>Lip Tightener</td>
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<td>7</td>
<td>Lid Tightener</td>
<td>24</td>
<td>Lip Pressor</td>
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<td>9</td>
<td>Nose Wrinkler</td>
<td>25</td>
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<td>10</td>
<td>Upper Lip Raiser</td>
<td>26</td>
<td>Jaw Drop</td>
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<td>11</td>
<td>Nasolabial Deepener</td>
<td>27</td>
<td>Mouth Stretch</td>
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<tr>
<td>12</td>
<td>Lip Corner Puller</td>
<td>43</td>
<td>Eyes Closed</td>
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<td>14</td>
<td>Dimpler</td>
<td>45</td>
<td>Blink</td>
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<tr>
<td>15</td>
<td>Lip Corner Depressor</td>
<td>46</td>
<td>Wink</td>
</tr>
<tr>
<td>16</td>
<td>Lower Lip depression</td>
<td></td>
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</tr>
</tbody>
</table>
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Tilting and Non-tilting?
Tilting modelling

• Facial expression ↔ tilting behaviour
  – Titling AU set vs. non-tilting AU set
  – Tilting AU set vs. AU sets of other basic facial expressions

• Co-occurrence / mutual exclusion relationships among AUs
  – Probabilistic graph models, e.g., Bayesian networks

• Temporal relationships of AUs
  – Dynamic Bayesian Network (DBN)
  – Hidden Makov Model (HMM)
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Tilting detection
- Tilting
- Non-tilting

Facial expression ↔ tilting behaviour
• Co-occurrence / mutual exclusion relationships among AUs
• Temporal relationships of AUs
Significances

• Authentic and spontaneous negative emotion data
  – First in the world on actual tilting behaviour
  – Negative emotion: more difficult to obtain in naturalistic conditions

• Tilting prevention solution for poker
Applications in other contexts

• Other gambling: people chase their losses
• Road rage
  – Aggressive or dangerous behaviour
• Game & sports
  – Tilted in Starcraft 2: player lose self-control
• Rapid multiple decisions
  – online stock trading which is influenced by emotions
Thank you

- Xingjie Wei
- xw323@cam.ac.uk
- http://xingjiewei.me
- www.psychometrics.cam.ac.uk