The Science and Detection of Tilting

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citizen me

Innovate UK

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 singe 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
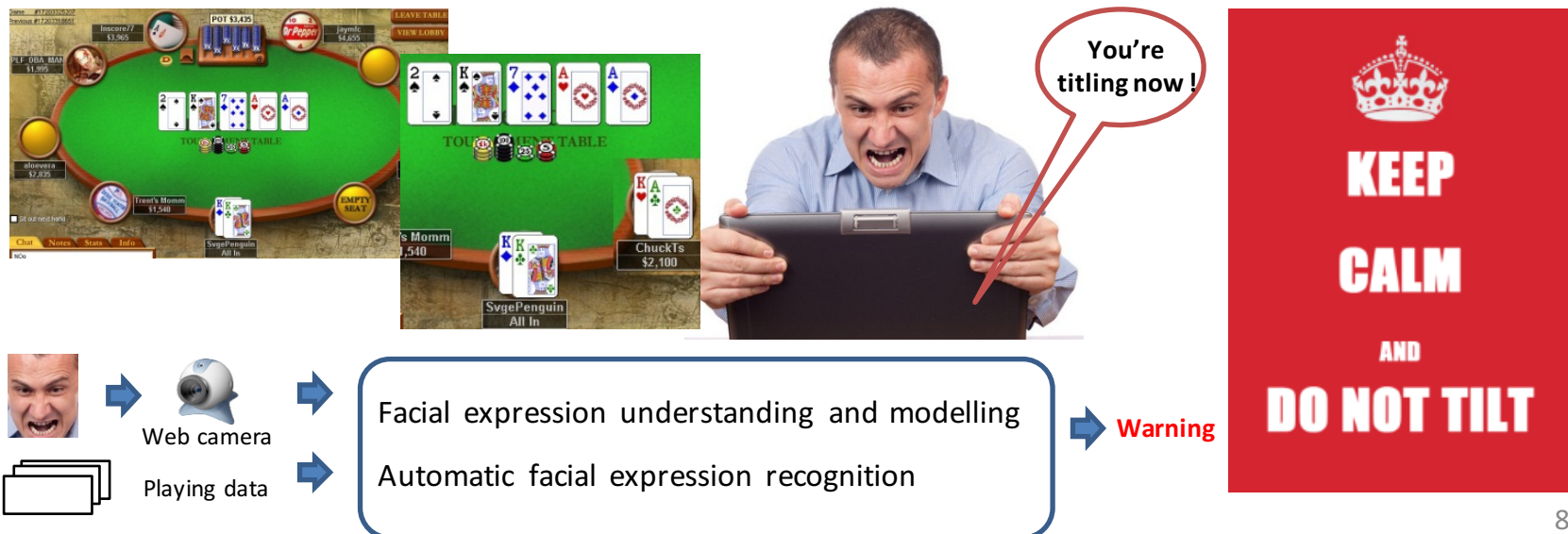
The study of tilting

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*)

Web camera

Playing data

Facial expression understanding and modelling

Automatic facial expression recognition

You're titling now !

Warning

KEEP CALM AND DO NOT TILT

Framework

Data collection
- Playing diary
- Poker hand records
- Video

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

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

Prior knowledge

Tilting detection
- Training
- Classifier
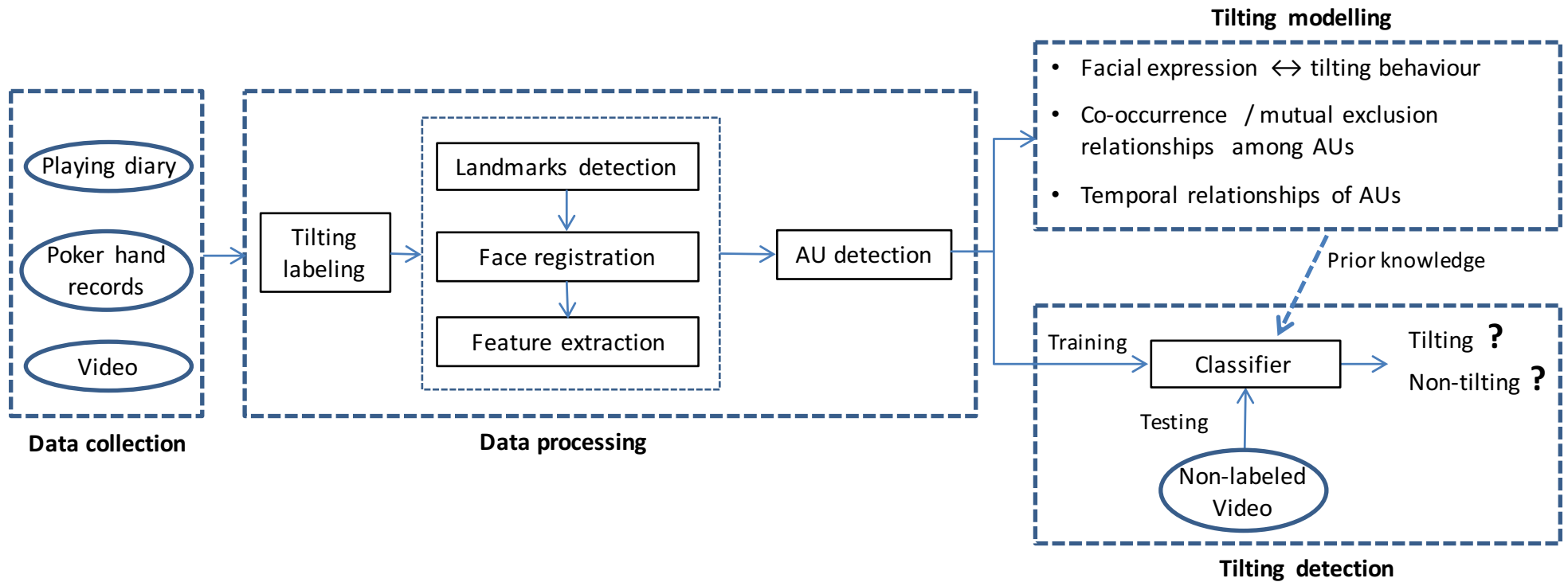- Testing
- Non-labeled Video
- Tilting ?
- Non-tilting ?

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
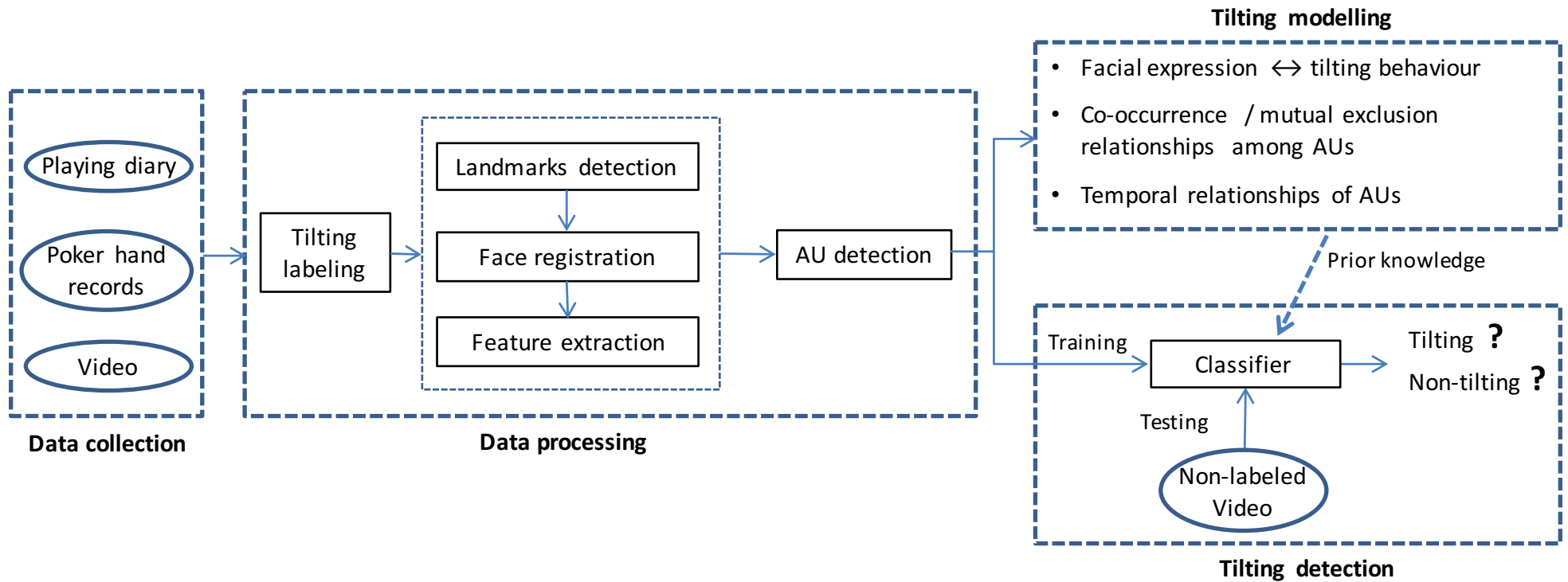 - Descriptions of the emotions felt

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Data processing

- Action unit (AU) detection

AU No.	Description	AU No.	Description
1	Inner Brow Raiser	17	Chin Raiser
2	Outer Brow Raiser	18	Lip Pucker
4	Brow Lowerer	20	Lip Stretcher
5	Upper Lid Raiser	22	Lip Funneler
6	Cheek Raiser	23	Lip Tightener
7	Lid Tightener	24	Lip Pressor
9	Nose Wrinkler	25	Lips Part
10	Upper Lip Raiser	26	Jaw Drop
11	Nasolabial Deepener	27	Mouth Stretch
12	Lip Corner Puller	43	Eyes Closed
14	Dimpler	45	Blink
15	Lip Corner Depressor	46	Wink
16	Lower Lip depression		

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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)

Framework
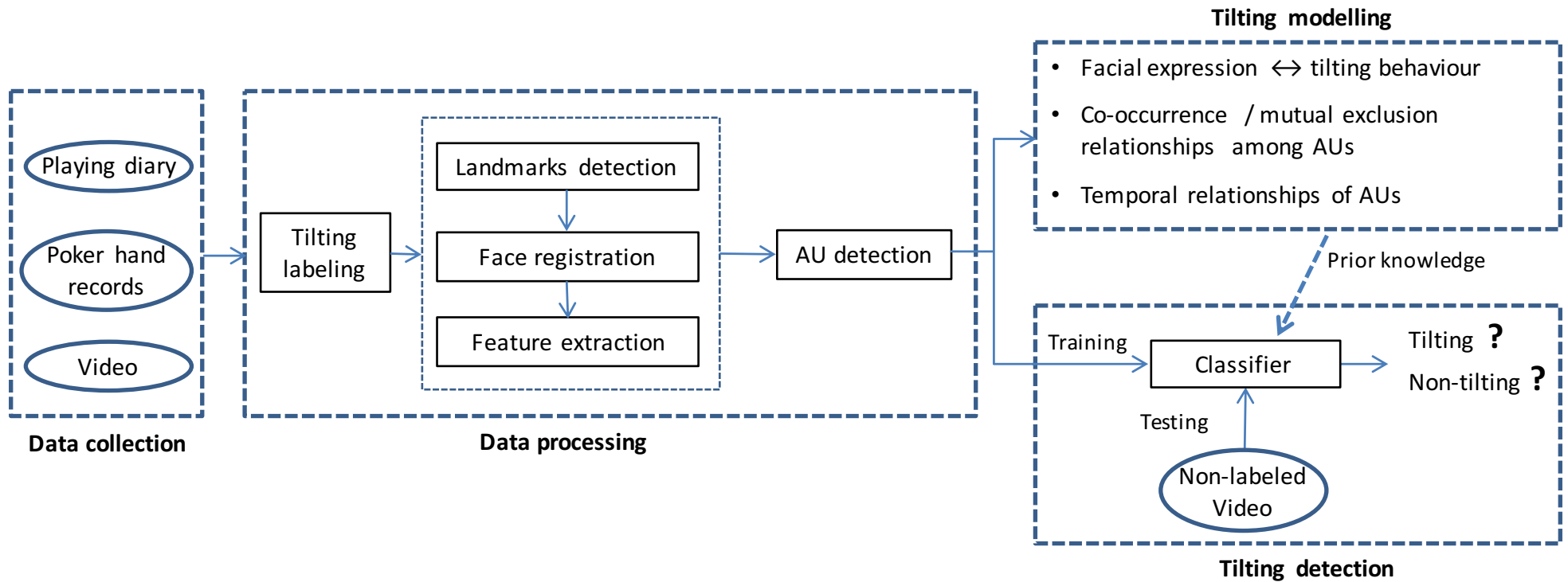
Significances

- 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

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