Optical Verification of Mouse Event Data for Anti-Cheat Purposes in Competitive Gaming
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Motivation
- Software based anti-cheat monitoring systems, can be circumvented by client side software and devolves to a cat and mouse game between hackers and developers.
- eSports viewership is rising; monthly viewers predicted to increase to 149 million in 2017 [1]
- And those moments of awe -- the very ones that make your head perk up and wish someone else could have seen it -- are often met with accusations of cheating...It's the same type of ugly that has marred Major League Baseball [2]

Project Goals
1) Track large mouse movements by using pre-recorded video and verify using mouse events
2) Track fine mouse movements (very small movements amounting to < 15 pixels)

Future Work
- Increase fidelity and real-time tracking using faster capture methods and higher resolution of tracking
- Autocorrect periodically using mouse events data to inject "key frames"
- Track mouse lift (physical movement of mouse without changing pointer location)

Method Flow
- Initial Method
  - Tracking Initialization
    - Threshold Using Static Color Map
    - Acquire Tracker Location
  - Generate Binary Mask Using Color Map
  - Dilate Image and Find Morphological Gradient to Create an Edge
  - Apply Hough Transform on Edge to Detect Rotation
  - Apply Rotation and Geometric Translation to Locate Mouse Sensor
  - Translate Global Offset to Region of Interest
  - Return Predicted Location Mouse Sensor and IIR Filtered Tracking Data to Compare with Mouse Events
- Optimized Method
  - Pre Calibrate ROI
  - Threshold HSV Color Space
  - Predict Initial Location
  - Crop Frame to Adjusted Region of Interest
  - Dynamically Detect and Threshold

Experimental Results
- Region of Interest Map
- Initial vs Optimized Method
  - Tracking Speed on Quad Core Processor:
    - Initial > 500 ms per frame (at 60 FPS)
    - Optimized > 10 ms per frame (at 10 FPS)

Method Comparison

References