Video games for visual interface (eye tracking)

LIG - GETALP

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Introduction

- Eye tracking
  - In control of the device by naturally using eyes
  - Our interaction interface
- Special subject
  - Disabled children
- Help improve visual skills
- Create a source of entertaining experience
- Enhance the amount of knowledge
- Help gain understanding of eye movements

Eye movements

- Eyes always make tiny motions
  - Microsaccades
- Saccade
  - Between two points of interest
- Fixation
  - Focus on a single location

Eye movements

- Pursuit
  - Follow a moving target
- Blinking
  - Rapid closing of the eyelid

→ This study strongly focuses on fixation, saccade and pursuit

Eye tracker

- Projectors
  - Create a reflection pattern of NIR (Near-Infrared) light on the eyes
- Sensors
  - Take high-frame-rate images of the user’s eyes and the patterns
- Algorithm
  - Image processing
  - Find specific details of the eyes and patterns
  - Calculate the eyes’ position and gaze point

Eye tracker

- Use low-cost eye trackers
  - Tobii Eye Tracker 4C - 169$
  - The Eye Tribe

Tobii Eye Tracker 4C (Source: https://gaming.tobii.com/product/tobii-eye-tracker-4c/)

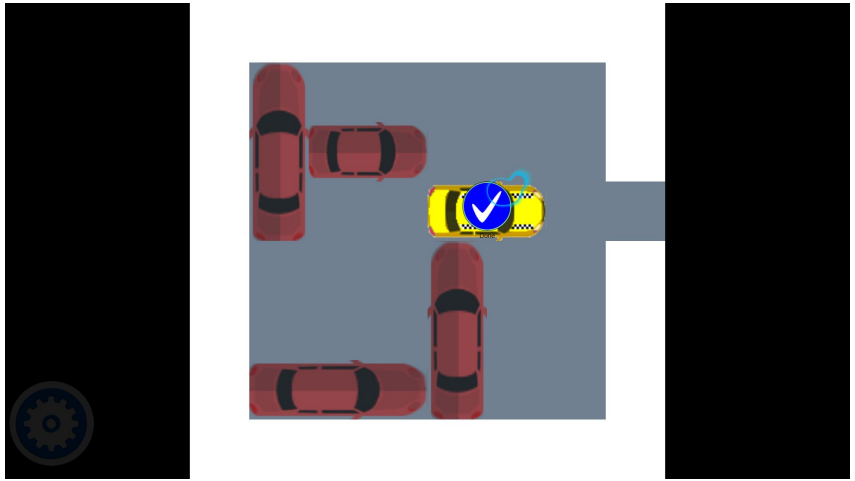
Games with eye tracking

- Always an attraction to children
- Natural controlling mechanism
  - Fast
  - Require less effort
  - More intuitive user experience
- Games as cognitive exercises
- Utilize the gaze

Game details

Rush Hour

- Problem-solving game
- Work on fixation and saccade
- In-game activities
  - Looking at an object in 0.5 second to choose it
  - Horizontally or vertically move the obstacles
  - Make a clear linear path to the door for the player's object
- Interaction between objects
  - Direction
  - Intersection

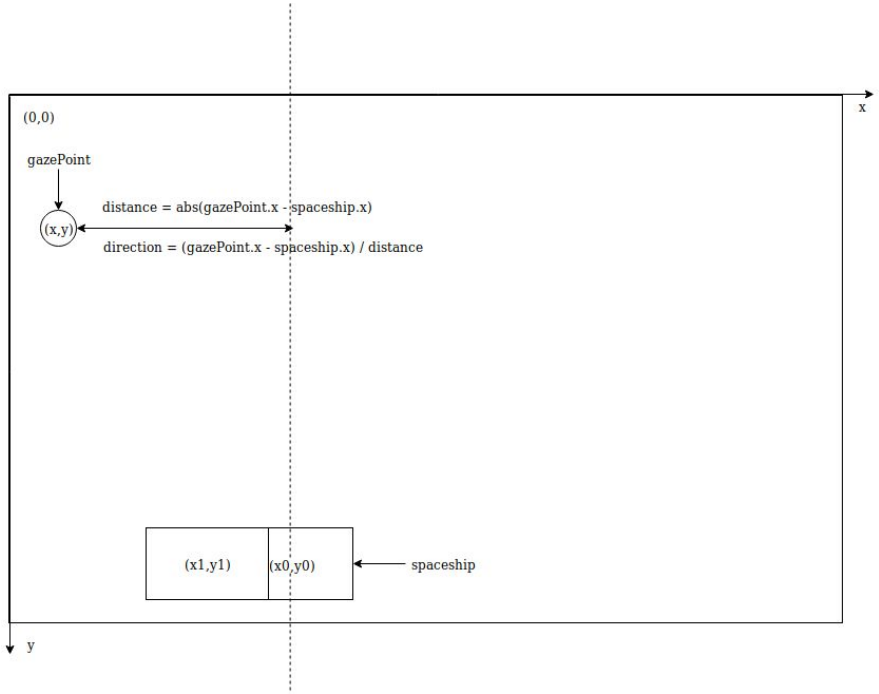


Space Game

- Arcade game
- Work on fixation, saccade and pursuit
- In-game activities
  - Horizontally control a spaceship
  - Shoot enemies
  - Avoid bullets of enemies

Space Game

- Controlling mechanism
  - Linear motion between two consecutive frames
    - x' = x + v * t
  - Direction can be 1, -1 or 0
  - V > 0 as velocity magnitude
  - Value of velocity
    - v = direction * V
- Bullets translate along *y*-axis



Demo

Conclusion

- Eye tracking as a good interaction interface
- Games are significant as sources of entertaining experience
- Games are cognitive exercises
- Fulfill the purpose of helping improve visual skills
- Understand more about eye movements

Thank you for listening