**Weekly Work Report 5/17/2024**

**This Week:**

* **Completed IRB Human Subjects Training.**
  1. Conflicts of Interest

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* 1. Social & Behavioral Research Investigators

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* 1. Social and Behavioral Responsible Conduct of Research

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* **Received the latest dataset** from Xuanchang.
* **Collaborated with Gai** on work planning and task assignment.
* **Read two papers** related to eye movements and EDA signals:
  1. Investigating the Role of Eye Movements and Physiological Signals in Search Satisfaction Prediction Using Geometric Analysis

*Investigating the Role of Eye Movements and Physiological Signals in Search Satisfaction Prediction Using Geometric Analysis.*Journal of Information Retrieval*, 42(3), 123-137.*

**Goal**: To explore users’ information-seeking behaviors on search engine result pages (SERPs)

**Input**: eye-tracking, electrodermal activity (EDA), and user logs

**Result**: Based on 1,590 search queries, showed that the proposed strategies effectively predicted query-level user satisfaction using EDA and eye-tracking data. Combining these physiological signals with user behavior data extracted from user logs led to a significantly better linear model fit than using user behavior data alone.

**Performance (EDA + Eye-tracking + Behavior) > Performance (single dataset)**

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* Incorporate subject behavior features.
* Apply the new GBDT model to our updated dataset.

1. Significant Measures of Gaze and Pupil Movement for Evaluating Empathy between Viewers and Digital Content

*Zhang, J., Park, S., Cho, A., & Whang, M. (2022). Significant Measures of Gaze and Pupil Movement for Evaluating Empathy between Viewers and Digital Content.*[*Sensors, 22(5), 1700*](https://www.mdpi.com/1424-8220/22/5/1700)

**Goal:** This study explores feature changes in eye movements when a viewer empathizes with the video’s content. They were interested in the relationship between pupil size and the empathic and non- empathic video conditions.

**Hypothesis:** Based on the aforementioned literature review, we **hypothesized a significant difference in eye movement features (pupil size, fixation, and saccade) when a person views digital content:**

**Hypothesis 1 (H1).** . . . *between the empathic and non-empathic conditions in all videos (i.e., pleasant-aroused, pleasant-relaxed, unpleasant-aroused, and unpleasant-relaxed)*.

**Hypothesis 2 (H2).** . . . *between empathic and non-empathic conditions in aroused videos*.

**Hypothesis 3 (H3).** . . . *between empathic and non-empathic conditions in relaxed videos*.

**Hypothesis 4 (H4).** . . . *between empathic and non-empathic conditions in pleasant videos*.

**Hypothesis 5 (H5).** . . . *between empathic and non-empathic conditions in unpleasant videos*.

**Hypothesis 6 (H6).** . . . *between empathic and non-empathic conditions in pleasant-aroused videos*.

**Hypothesis 7 (H7).** . . . *between empathic and non-empathic conditions in pleasant-relaxed videos*.

**Hypothesis 8 (H8).** . . . *between empathic and non-empathic conditions in unpleasant-relaxed videos*.

**Hypothesis 9 (H9).** . . . *between empathic and non-empathic conditions in unpleasant-aroused videos*.

**Experiment:**

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**Input:** Seven feature variables of eye movements

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* 1. change of pupil diameter (pupil)
  2. peak pupil dilation (pupil)
  3. **very short (<150 ms)** fixation duration (Gaze)
  4. **mid (150 ms <= duration <= 900 ms)** fixation duration (Gaze)
  5. **over long (>900 ms)** fixation duration (Gaze)
  6. saccadic amplitude
  7. saccadic count

***saccadic***

*Experimental studies of saccadic eye movements have produced a considerable amount of data.*

*In the case of eye movements elicited by specific visual targets, the significant measures were the metrics of saccadic amplitude and saccadic count.*

*The amplitude is the angle in degrees between two fixation points. Measures were provided based on the calculation of* ***GazePoint equipment****, which averages eye positions.*

*They* ***hypothesized*** *that the saccadic amplitude would be greater in the empathic condition than in the non-empathic condition.*

**Left pupil vs Right pupil**

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They calculated the mean baseline pupil diameter for each participant.

* CLPD: the change in the left pupil diameter
* CRPD: the change in the right pupil diameter
* PLPD: the peak of left pupil dilation
* PRPD: the peak of right pupil dilation

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A graph of tall buildings

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Result:

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**Next Week:**

* Review **literature** on relevant signals.
* Collaborate with Gai on the new dataset:
  + Conduct **data analysis.**
  + Perform **processing** using insights from the literature.