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THIR2 at the NTCIR-13 Lifelog-2 Task:

Bridging Technology and Psychology through the Lifelog

Personality, Mood and Sleep Quality

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Outline

- Introduction
- Big Five Personality Traits Measurement
- Mood Prediction
- Music Mood and Style Detection
- Sleep Quality Prediction
- Visualization and Insights
- Summary
- Future Works



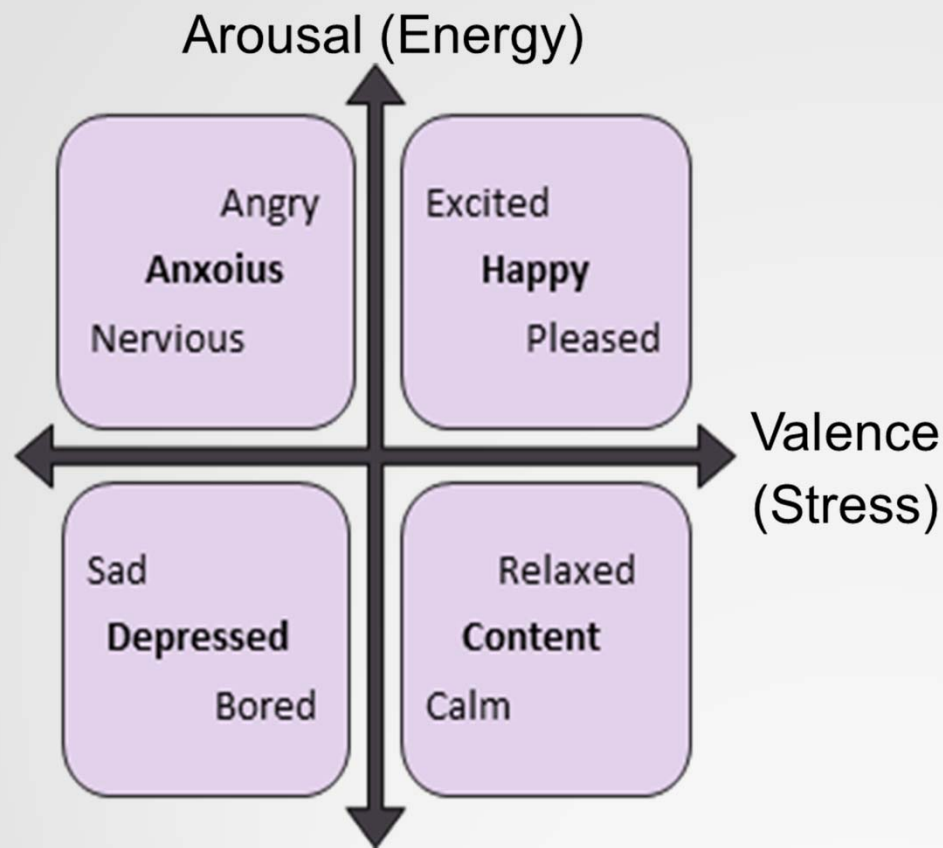
From physical world to psychological world.

Understand and model the life-logger in 4 psychological categories:

- 1. Study of **big five** personality traits
- 2. **User mood** detection
 - Arousal, Valence
- 3. **Music mood** and **style** detection
 - Music records in the users' history
- 4. **Sleep quality** prediction



Thayer's 2D Model of Mood



Thayer's 2D mood model

Applied in:

- Big 5 personality eval.
- User mood detection
- Music mood detection



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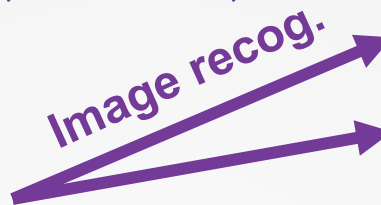
1-Big Five Personality Evaluation

Lifelog instead of questionnaires

- **Big 5:** Openness to experience, Conscientiousness, Extraversion, Agreeableness, Neuroticism

- **Self-collected Lifelog Data**

- 40 participants, 3 days' lifelog data
- Label: NEO-FFI (traditional questionnaire-based test) results
- Heart rate and Mood record (Nervous, Angry, Excited, Pleased, Relaxed, Calm, Sad and Bored)
- Panoramic images of office and bedroom everyday

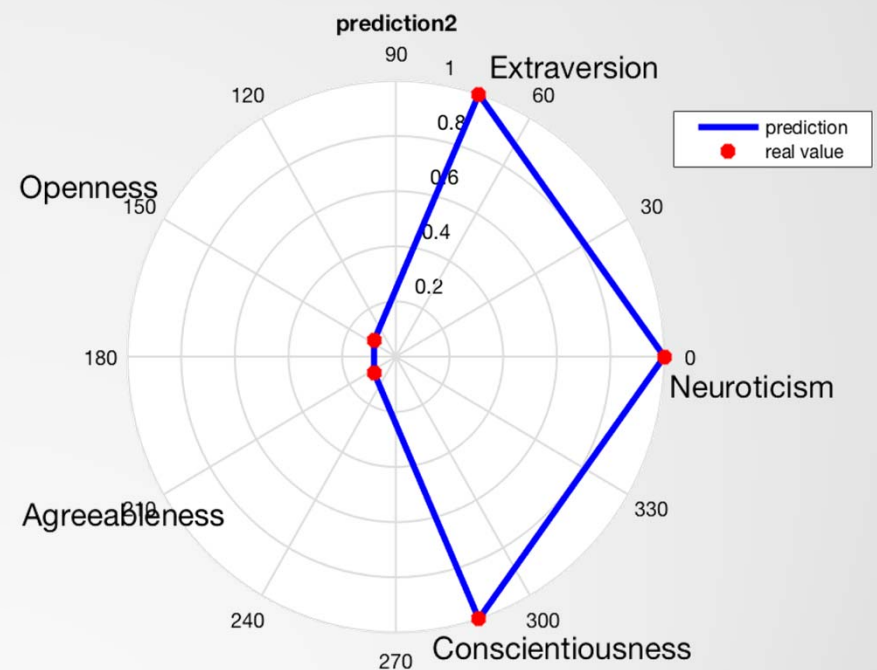
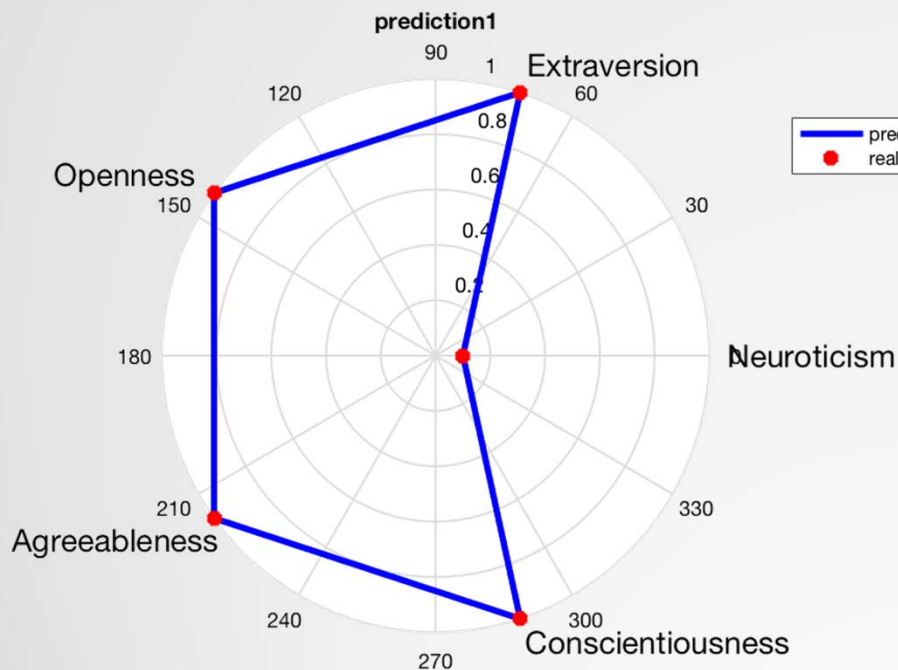


Features
Gender
Moody index
Optimistic index
Heart rate Stability
Room tidiness Index
Room decorative index



1-Big Five Personality Evaluation Lifelog instead of questionnaires

- 5 logistic regression models for 5 factors
- Training: 38 samples (20% Cross Val)
- Test: 2 samples, Test Accuracy: 100% (too small dataset)





2-Mood Prediction

Based on Lifelog instead of self surveys

Data:

- Lifelog-2 user 1 data +
- Extended dataset on 5 participants
- 256 days of data in total

Model and Experiment Design

- 2 Logistic Regressions for 2 Dimensions
 - Valence, Arousal
- Training: Test = 9: 1

Test Accuracy

- Mood-Valence: 76%
- Mood- Arousal: 73%

Features	Exp.
Weekend	Both
Home /Work	Both
Commuting	Both
Total Calories	Both
Total Steps	Both
Average HR	Both
Wakeup Time	Both
Sleep Duration	Both
Sleep Quality	Both
Average Arousal	Arousal
Previous Day Arousal	Arousal
Average Valence	Valence
Previous Day Valence	Valence



3-Music Mood and Style Detection Based on Lifelog instead of lyrics or audio

Data: Lifelog-2 music record of user 1

763 songs in 45 days

Features: Activities, Biometrics, Time stamp

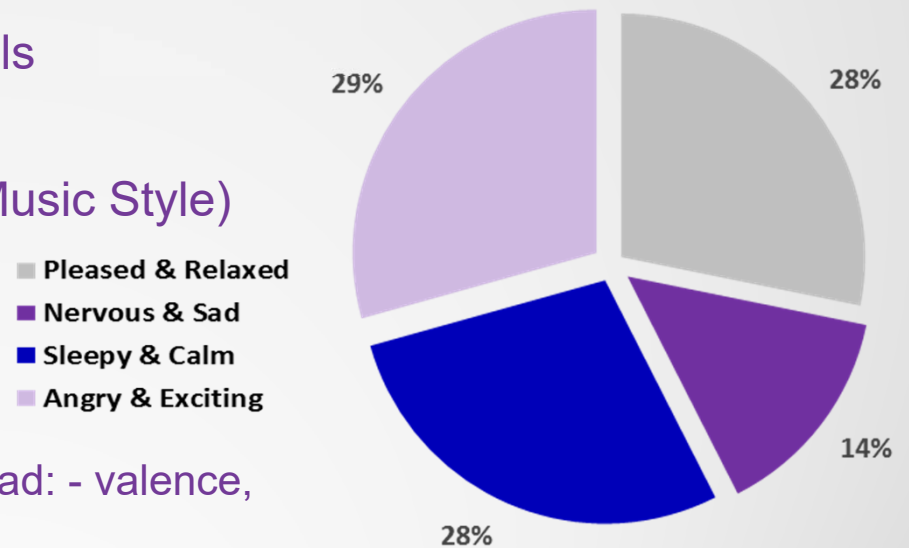
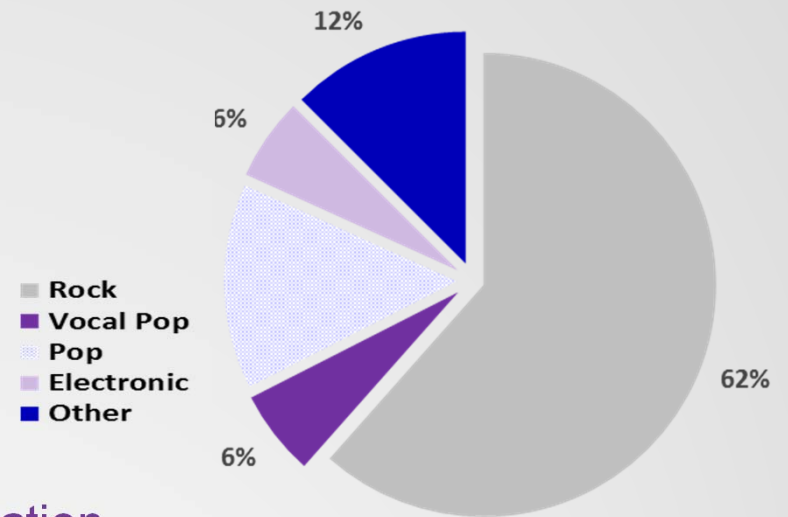
Labels: Retrieved from online resources

Model, Experiment, Results

- Data augmentation using retrieved music duration
- 2 AdaBoost.M1 + Decision Tree Models
- Training: Test = 8: 2
- Accuracy: 85% (Music Mood), 80% (Music Style)

Styles: Metal, Jazz, Soul, Pop, Easy Listening, Soundtrack, R&B, Country, New Age, Rock, International, Vocal Pop, Electronic, Folk

Moods: Pleased&relaxed: +valence ,Nervous&sad: - valence, Bored&calm: -arousal, Angry&excited: +arousal





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4- Sleep Quality Prediction

Based on time aware lifelog features
instead of signals during sleep or user survey

Data:

- Lifelog-2 both users' data +
- Extended dataset on 5 participants
- 473 days of data in total

Model and Experiment Design

- Labels: Poor:0-35; Borderline:36-55;
Good: 56-100
- Classification with Linear Regression
- Training: Test = 9: 1

Test Accuracy

- Sleep Quality Prediction:78%

Features

Weekend

Home /Work

Commuting

Total Calories

Total Steps

Average HR

Calories in Time

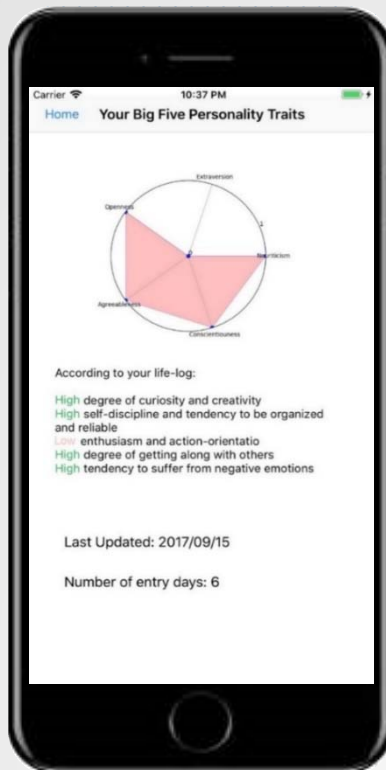
Steps in Time

Heart Rate in Time



5-Visualization

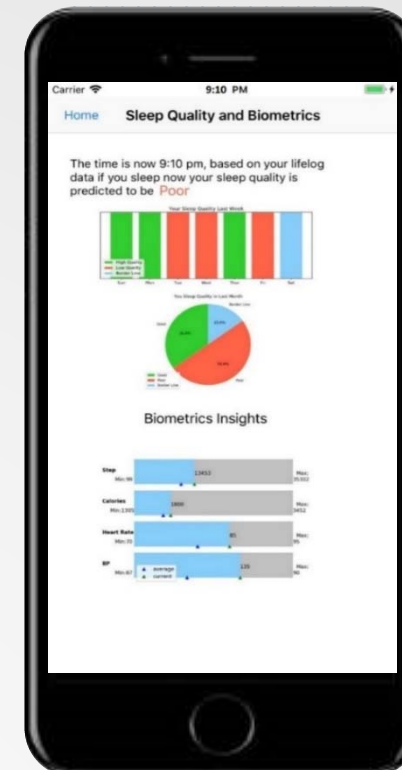
- Visual insights on historical data, and gives insights on user's psychological life



Big-5 Personality



Music Mood/Style
User Mood



Sleep Quality
and Biometrics



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Novel methods to **psychologically** understand the user and track user's **mental health**:

- Personality evaluations based on objective data

Time-saving and can obtain real-time evaluation

- Mood prediction based on biometrics

Using previous mood records of the user

- Determination of music mood and music style

Based on biometrics and physical activities of the audience

- Sleep quality prediction

Based on not sleep signals monitoring but Lifelog before sleep

Using time aware features



Future work

- **Enlarge** and **diversify** the sample set
- Considering **more features**
 - Make use of culture differences, daily activities, hobbies, age and more environmental features
- Improve the **models**
- **Intervention**
 - Giving Suggestions to users during the day for better sleep quality and mood



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Thank You!

Bridging Technology and Psychology
through the Lifelog

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