**Effect of Query Length and Prospect Symbol Confidence in EEG-based Typing Systems**

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**INTRODUCTION**

Questions:

- Can we maximize the typing performance of BCI typing systems by choosing the most effective sequence length and prospect symbol confidence?

Goal:

- Find the most effective presentation parameters (sequence length and confidence level) which maximize the typing speed and accuracy for BCI typing systems.

Contribution:

- We investigate the use of two types of stimuli for BCI typing systems: rapid serial visual presentation (RSVP) presentation sequences and symbols (i.e., the top candidate in the alphabet according to the current posterior probability), which generate two different brain responses, ERP and ERR分别为。A non-physiological evidence which comes from the context information a 6 gram language model is used jointly to detect the user intent.

Experiments:

- Task: Copy-word-task with 10 predetermined sentences for which the language model contribution ranges from friendly to adversarial are performed using EEG data obtained from 12 healthy participants.
- RSVP query length={6, 8, 12, 16}, confidence levels to display the prospect = [0.4, 0.6, 0.7, 0.8, 0.9, 0.95]

Final Results:

- Reducing the query length to NRSVP = 12 and use a confidence level of 0.7 to display the prospect symbol, we get the best trade-off between typing speed and accuracy.

**METHOD**

3 Evidences to Detect User State:

- RSVP & Feedback Stimuli + LM

User State

Bayesian Fusion

**SIMULATION RESULTS**

- Task:
  Copy-word-task with 10 predetermined sentences for which the language model contribution ranges from friendly to adversarial are performed using EEG data obtained from 12 healthy participants.

- Results:
  40 Monte Carlo simulation results (probability of completion and expected time to complete task in seconds) for twelve users on average, using synthetic EEG features from models calibrated with real ERP/ErrP EEG data for different configurations RSVP query length= {6, 8, 12, 16} and confidence levels to display the prospect= [0.4, 0.6, 0.7, 0.8, 0.9, 0.95]

**CONCLUSION**

Results show that choosing an effective sequence length of the confidence level on a Bayesian fusion of ERP/ErrP/LM improves human-machine communication in terms of speed and accuracy for deploying EEG-based typing systems in real scenarios.

Future work:

Design an adaptive query Length and Prospect Symbol Confidence framework.

References:


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