An Introduction to Cognitive Science

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Deadline: 20 Khordad

I. Introduction

In previous assignment behavioral tasks of Barakchian's paper [1] and Suzuki's paper [2] were implemented. In current assignment modeling and analysis on them will be implemented.

II. Mixed Problems

A. Problem 1

For Barakchian's paper [2], you have to implement the analysis on the two sets of data you have.

B. Problem 2

Please read supplementary information firstly. For next step, modeling for

$$U(X) = E(X) + \alpha V(X) \tag{1}$$

and

$$U(X) = p\, r^{\rho} \tag{2}$$

should be implemented for session 1,3,5.

III. Submission

Please check the uploaded files cheerfully, all data that you might need to doing this assignment are uploaded. All materials should be consolidated into a single .zip file, including runnable files.

For the programming section, each student is required to submit a well-structured, typed PDF report that presents a concise summary of their analysis. The report should include the figures mentioned in the problem description and offer a detailed discussion of each. Please avoid uploading theoritical problem in .jpg format and upload them in a single .pdf file. For each section of the report, a separate script is expected, which can be written in MATLAB (.m), Python 3 (.py or .py3), or R (.r). Avoid submitting scripts in formats like MATLAB live scripts, Python notebooks, or R Markdown. It is crucial that the submitted code is compatible with the grader's system. Be sure to include all relevant functions and any non-standard libraries used in your code.

The report should be treated as an academic piece of writing, and it should not contain any code snippets or expla- nations of coding logic. Instead, it should provide the author's insights about the results and demonstrate a strong grasp of the reference article. Academic reports typically maintain a concise and highly formal tone.

Each section of the report should briefly outline the hypothesis being tested. The responsibility for designing and implementing the tests lies with the students, as does explaining the results. Interpretations should be comprehensive without unnecessary verbosity. The report can be written in either Persian or English, with no preference for either. In Persian reports, use B Nazanin with a font size of 14 for the text body and B Titr with a font size of 18 for titles. English reports should use Times New Roman 12 for the body text and Times New Roman 16 for titles. Sentences should be written in the passive tense. In Persian reports, the correct usage of the zero-width non- joiner is mandatory. In all reports, equations, figures, and tables must be labeled with unique numbers and referenced accordingly. Referring to figures as "the following figure," "the figure above," and similar expressions is considered incorrect. Every figure in the report should be accompanied by a descriptive caption below it, while tables should have captions above them. Feel free to use footnotes and citations as necessary for clarity and proper attribution.

References

[1] Zahra Barakchian, Amir Hesam Vahabie, and Mohammad Nili Ahmadabadi. "Implicit Counterfactual Effect in Partial Feedback Reinforcement Learning: Behavioral and Modeling Approach." *Frontiers in Neuroscience*, vol. 16, p. 631347, May 10, 2022. doi: 10.3389/fnins.2022.631347. PMID: 35620668; PMCID: PMC9127865.

[2] Suzuki S, Jensen EL, Bossaerts P, O'Doherty JP. Behavioral contagion during learning about another agent's risk-preferences acts on the neural representation of decision-risk. *Proc Natl Acad Sci U S A*. 2016 Apr 5;113(14):3755-60. doi: 10.1073/pnas.1600092113. Epub 2016 Mar 21. Erratum in: *Proc Natl Acad Sci U S A*. 2017 Jun 27;114(26):E5278. PMID: 27001826; PMCID: PMC4833238.