Theoretical Research on Cultural Evolution
by Means of Computer Simulations and Statistical Modeling

Project Leader
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Faculty Members Involved in this Project
No other faculty members are involved.

1. Objective
This project is aimed at:
Investigating cultural evolution in contemporary, historical, or archaic human populations through mathematical modeling, computer simulations, and statistical analyses of existing datasets. I have been developing mathematical and simulation models to describe cultural evolution in human populations as part of a MEXT Grant-in-Aid project "Cultural History of PaleoAsia: Integrative Research on the Formative Processes of Modern Human Cultures in Asia" (2016-2020). This SSP research project aims at extending those models further by taking into account various complicating aspects of real human populations that are yet to be incorporated, and also developing statistical frameworks for fitting the models to existing cultural datasets to estimate parameter values.

2. Project Outline
To that end, the project will consist of the following phases:
(a) The development of new mathematical or simulation models of human cultural evolution
(b) The development of statistical methods to fit the models developed in phase (a) to cultural datasets
(c) Statistical analyses of existing cultural datasets using the methods developed in phase (b)

3. Expected Performance
In this project, the successful candidate would be expected to:
(a) Complete the above three phases successfully under the supervision of the project leader
(b) Provide supervision for undergraduate students in terms of statistics and programming skills
(c) Perform routine work in terms of the maintenance of Linux computers
(d) Assist the project leader in terms of data preprocessing and implementing simulations

4. Required Skills and Knowledge
The successful candidate for this project will have the following knowledge and skills:
(a) Understanding of the modern theory of biological evolution
(b) Understanding of the basics of applied mathematics related to dynamical systems and stochastic processes
(c) Understanding of the basics of statistical methods related to Bayesian inference
(d) More than two years of experience in computer programming
(e)Experience in Linux/Unix and multiple programming languages including those for fast-speed computation such as C/Julia and those for data processing such as R/Python

References

(1) Kobayashi et al: "Evolution of cumulative culture for niche construction", J. Theor. Biol. 472 (2019) pp. 67-76.

(2) Kobayashi et al: "Genealogies and ages of cultural traits: An application of the theory of duality to the research on cultural evolution", Theor. Popul. Biol., 123 (2018) pp.18-27.

(3) Aoki: "On the absence of a correlation between population size and "toolkit size" in ethnographic hunter-gatherers. Phil. Trans. Roy. Soc. B, 373 (2018) 20170061 (https://doi.org/10.1098/rstb.2017.0061)
See also related references listed in the URLs below.

(4) Kobayashi et al: Population size vs. social connectedness — A gene-culture coevolutionary approach to cumulative cultural evolution. Theor. Popul. Biol. 111 (2016) pp.87-95.

(5) Kobayashi and Aoki: "Innovativeness, population size and cumulative cultural evolution", Theor. Popul. Biol. 82 (2012) pp. 38-47.

See also related references listed in the following URLs.

The web page of the related Grant-in-Aid project:

http://paleoasia.jp/en/

The URL of the web page of team B02, to which the project leader belongs:

http://paleoasia.jp/en/research_projects/b02/

See my webpage:

https://www.researchgate.net/profile/Yutaka_Kobayashi4

See our admission guidelines:

https://www.kochi-tech.ac.jp/english/admission/ssp_aft19oct/ssp_application_guideline.html

Contact

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