Final research project

Project proposal due on Dec 18 (noon)

Final project write-up due on Jan 22.

Project defense and feedback: Jan 16-Jan 18.

This course has introduced a general problem – autism – and has highlighted different approaches and challenges related to this problem. Each assignment along the way was designed as a “teaser” to get you thinking about a particular issue, and to allow you to practice pooling your skills so as to tackle and understand problems together.

For the final project, your task is to build on this experience to conduct, write up, and defend your own research project. The scope and direction of your project should be defined independently by your team, but should satisfy the following criteria.

1. Your project should follow the general direction of using genetic data to better understand autism. Use the questions and approaches discussed in class as a starting point to formulate a clear and specific question which can be feasibly addressed by your group within the time-frame of the course (see timeline below). The goal is not to solve the entire problem of autism or generate ‘significant’ results, but rather to narrow down the scope into something rational, tractable and coherent that you can all contribute to. You will receive feedback on your project proposals early on, and we can also help you to find appropriate additional data sets if necessary.

2. The approach you choose is up to you, and could consist of any combination of the approaches diagrammed at the start of the class (see figure below). Importantly, your approach should leverage the skills available in your team and leave no one behind—each team member should make a clearly defined contribution to the end product. Include a section titled “author contributions” which clearly spells out what each person did.

3. Your project should be written up clearly so that other scientists can understand and replicate it. It should be structured as a research paper for a broad scientific audience (i.e. your classmates), and include the following sections: title, abstract, introduction, methods, results, discussion, author contributions, acknowledgements, references, and supplementary material (see full information on format at the end of this document). How you divide the responsibility for putting together the paper is up to you, but your team should submit one coherent research paper.
Timeline

December 7th (Thu, in class): Brainstorm project ideas
Brainstorm project ideas, talk to TAs about suitability

December 18th (Monday, noon): Preliminary project proposal due
Submit project proposal (up to 2 pages per group). Your proposal should include the following elements in sufficient detail so that we can give you feedback: 1) a clearly formulated question 2) a description of the dataset you plan to use to address the question 3) an explanation of your planned approach / methods 4) what each of the team members will contribute.

The proposal should be written in clear prose, so that you can get feedback on your writing, as well as the content.

December 21st (Thu, in class): Feedback and planning
Receive feedback on proposal, work out practical aspects (data-sets, division of responsibilities, timeline to completion, team internal deadlines, etc.). Note that 12th December onwards, all class-time will be dedicated to working on the project in your groups.

You are encouraged to show us a first draft of the project on which we will provide feedback. This should be in the week of January 8th.

January 22nd (Mon): Final project write-up due

January 16-18: Project defense and feedback
Each team will present and defend their proposal in front of an evaluation panel consisting of classmates and instructors. You should plan to give a 15 minute presentation and leave 20 minutes for questions / project defense. You will also be asked to give feedback to other teams.

Format
Your research article should be typed, double-spaced, and no more than 3000 words long. It should include the following sections: (adapted from author guidelines for Cell Press)

Title
The title should capture the conceptual significance for a broad audience. As a general guideline, the most effective titles are no more than 10-12 words and should readily give readers an overall view of the paper's significance rather than the detailed contents of the paper, which can be elaborated upon in the Abstract.

Abstract
The Abstract consists of a single paragraph of fewer than 150 words. We recommend that effective abstracts include the following elements: (1) a brief background of the question (2) a description of the results and approaches/model systems framed in the context of their conceptual interest; and (3) an indication of the broader significance of the work. The description and interpretation of findings should be able to convey the study's interest and importance. References should not be cited in the Abstract.

Introduction
The Introduction should be succinct, with no subheadings, and should present the background information necessary to provide a biological context for the results.

Methods
Please report your methods with sufficient detail so readers do not need to refer to other papers to understand how procedures were performed. Citations of previous publications are allowed but should not be used as a substitute for providing the details of a procedure.
Subheadings may be used to specify the types of experiments, modeling, or analysis that were performed. You may refer to data-sets or analysis scripts provided in the supplementary materials section (see below).

**Results**
This section should be divided with subheadings and refer to figures or tables. Each figure or table should include a legend with a brief title that describes the entire figure or table without citing specific panels, followed by a description of each panel.

**Discussion**
The Discussion should explain the significance of the results and place them into a broader context. It should not be redundant with the Results section. This section may contain subheadings and can in some cases be combined with the Results section.

**Author contributions**
All of the authors listed on the paper should be mentioned in this section at least once.

**Acknowledgements**
This section may acknowledge contributions from non-authors and/or list funding sources, and it should include a statement of any conflicts of interest.

**References**
Please refer to citations throughout your article (rather than just listing all references at the end of the article). In-text citations should be written in Harvard style and not numbered, e.g., "Smith et al., 2015; Smith and Jones, 2015." For in-text citations, "et al." should be used for articles with three or more authors.

Please use the style shown below for the references section. Note that "et al." should only be used after ten authors.

**Article in a periodical:**

**Article in a book:**

**An entire book:**

**Supplementary material**
As is now standard practice, you should submit data-sets and analysis scripts, sufficient for others to reproduce your results.