



Bass Connections Project Proposal Template for 2018-2019 Projects

1 PROJECT DESCRIPTION [1 - 1.5 PAGES]

Project title: Gerrymandering and the Extent of Democracy in America

Brief background/context: Gerrymandering has been increasingly used to undermine the Democratic process. Although there remains no standard to detect partisan gerrymandering, we have begun to develop promising and potentially justiciable techniques. These techniques expose the natural geographical structure of a region, and understanding this structure can be used to identify political and racial gerrymandering.

Project goals and objectives: We wish to test the hypothesis that bi/non-partisan redistricting committees will not gerrymander: to this end we will compare districting plans across U.S. states with and without non-partisan redistricting committees. In addition to such policy questions, we plan to analyze the effectiveness of a number of simple statistical tests currently used to detect gerrymandering; our techniques provide fine-scale details which can be used to critique and test the simple tests, so that they are not misapplied by the courts. We expect the first hypothesis to lead to one publication, and the examination of simple statistical tests to lead to another.

We also plan to develop tools to be released publicly that will facilitate the free exploration of redistricting plans by both political parties, the public, and the press, and contribute to public understanding of the extent and impact of gerrymandering. This may include sponsoring map-drawing contests in which students and members of the general public create maps which are then evaluated using our statistical tests.

We will also finish analyzing the extent of gerrymandering in the North Carolina General Assembly – there are many open challenges in this process that includes developing county clustering algorithms and analyzing the space of redistricting plans within each cluster. We expect this work to lead to either one or two publications, dependent on the complexity and challenges of the county clustering algorithm.

In addition to the academic publications, all of our results will be reported publicly.

Anticipated outcomes: Publications; affidavits for court cases dealing with Gerrymandering; publicly available software/APIs to employ our methodologies; website for educational purposes; a grant to continue the work beyond Bass connections

Project's relevance to the selected Bass Connections theme(s) and special funding opportunities selected (disregard if applying to open channel): We are applying to the "Information, Society & Culture," theme. Because gerrymandering undermines representative democracy, continuing to develop detection tools promises to have a large impact on government, and therefore society and culture. We expect to link with a 2018 Data+ project.

Connection to team leaders' other projects: This proposal has grown out of a 2014 PRUV summer project in the Mathematics department. The project continued with two Data+ projects over the summers of 2015 and 2016. So far, our group has produced three public reports on partisan gerrymandering which analyze the North Carolina US House congressional districts and the Wisconsin General Assembly legislative districts [1,2,3]. Report [2] was discussed in a Nature News article [4], and is central to the litigation Common Cause v. Rucho. Report [3] was heavily cited in the recent amicus brief submitted to the US Supreme Court by Eric Lander concerning Whitford v. Gill. In addition to the reports, we have submitted an affidavit to Common Cause on a preliminary study of the new North Carolina State Senate redistricting plan.

It also connects to the gerrymandering work of POLIS (The Center for Political Leadership, Innovation, and Service), which has been led by former UNC system president and current Sanford Fellow Tom Ross, as well as student projects conducted as part of Professor Mayer's Democracy Lab course, in which students have produced maps and educational materials on gerrymandering.

There are many additional directions we wish to explore and discover and we hope that Bass Connections will provide us an avenue to do so.

2 TEAM LEADERS AND CONTRIBUTORS [COMPLETE TABLE BELOW]

Identify the team leader(s) and contributor(s), listing the primary contact. Graduate students, postdocs, and trainees/fellows may propose projects, but at least one of the team leaders must be a faculty member. Projects with multiple team leaders from different disciplines will receive preference.

- **Team leaders** are actively engaged in the project and regularly attend team meetings (most teams have 2-3 co-leaders). (Note: a given faculty member may propose more than one project, but should not serve as a team leader on more than one project per year. If a faculty member submits two proposals as a team leader, those proposals should have at least three team leaders, since if both are selected, she/he will need to step back into a team contributor role for one of those teams.)
- **Team contributors** support the team as needed and occasionally attend team meetings. If you have already identified a project manager (such as a graduate student or postdoc), please note that person here as well).

<i>Name</i>	<i>Title/Rank</i>	<i>Team Leader or Contributor?</i>	<i>Department(s)</i>	<i>Led a Bass Connections team before (if yes, how many)?</i>
<i>Jonathan Mattingly [primary]</i>	<i>Professor</i>	<i>Leader</i>	<i>Mathematics</i>	<i>No</i>
<i>Frederick Mayer</i>	<i>Professor</i>	<i>Leader</i>	<i>Public Policy</i>	<i>No</i>
<i>Gregory Herschlag</i>	<i>Visiting Assistant Professor</i>	<i>Leader</i>	<i>Mathematics and Biomedical Engineering</i>	<i>No</i>

[Insert additional rows as needed]

3 PROJECT APPROACH AND TEAM COMPOSITION [1 PAGE]

Project approach: The research group will meet regularly. Once a week, selected team members will lecture on individual topics that consist of either research discoveries or challenges, or fundamental skills needed to further the research. In addition to the weekly meetings, team leaders and contributors (consisting of graduate student mentors) will regularly meet with selected undergraduates for mentorship and collaboration.

Team composition: The ideal composition of our team would consist of 12-16 undergraduates, 2-4 graduate students, and the previously listed team leaders. The undergraduates would be roughly divided into several interacting subgroups that would include a group focused on algorithm/API development, a group focused on investigating and analyzing gerrymandering in real world district plans, a group focused on geographical information sciences (GIS), and a group focused on public policy research. Each group would be comprised of between 2-4 undergraduate students. Students focusing on algorithm/API development would ideally be Computer Science and Mathematics majors, and would have expertise in numerical analysis, programming, algorithms, and software development; students focusing on analyzing individual maps would ideally be Statistical Science and Mathematics majors, and have expertise in data analysis, statistics, and visualization tools; students focusing on GIS could come from a variety of majors but would ideally have some experience with GIS tools – Public Policy, Political Science and Sociology majors would be ideal; finally, students focusing on the public policy research will ideally be Public Policy Studies or Political Science majors and have experience in public policy research and reading legal documents. Ideally, all undergraduates would have some background or understanding of probability, however it is not necessary for the entire team to begin with this background.

Each subgroup will work closely together; for example, the public policy group will inform the algorithms and analysis groups as to which policy considerations must be accounted for and the analysis group will inform the algorithms group about issues and challenges with redistricting strategies. Loosely, the groups would be managed by the individual team leaders and graduate students: Jonathan Mattingly, Greg Herschlag, and one recruited graduate student would oversee the first two groups, Greg Herschlag and a recruited graduate student would oversee the GIS group, and Frederick Mayer would manage the group focused on public policy.

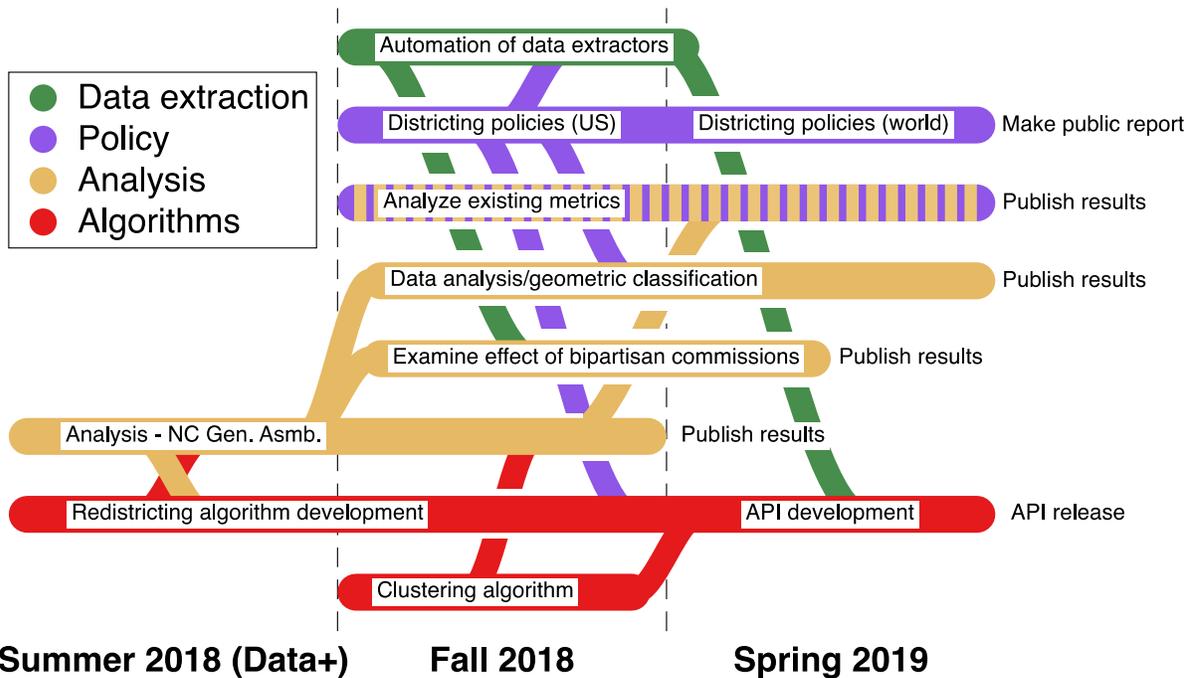
In terms of external organizations, we are currently engaged with Common Cause and North Carolinians for Redistricting Reform. Common Cause is interested in filing more law suits as well as continuing to analyze gerrymandering; we plan on communicating with this group throughout this project. North Carolinians for Redistricting Reform is a newly formed bipartisan group co-chaired by Tom Ross and Chuck McGrady, a Republican state legislator in North Carolina. In addition, we will have interactions with Guy-Uriel Charles (Duke Law) and Andrew Chin (UNC Law) to help make our analysis and techniques justiciable.

Student opportunities: Students can expect to be involved with preparing publications, to develop skills relevant to their respective subgroups, to become involved pressing and immediate issues of government by becoming key contributors to law suits and/or publicly available redistricting tools. Undergraduate students will work directly with team leaders on researching their projects. Graduate students will be given the opportunity to manage undergraduate students which will allow them to grow as future mentors.

Plan to evaluate team progress and performance: Students will be evaluated and graded for course credit. Evaluations will be based on their progress on chosen projects, however ample consideration will be given to unforeseen challenges.

4 TIMELINE AND MILESTONES [A FEW SENTENCES, OR A CHART]

Students will start in the summer with Data+ and continue through the spring. The timeline for student projects is visualized below. Links between projects display how, and roughly when, subprojects will inform one another. We stress that the sub-division between projects is loose and that there will be constant interaction between them.



5 BUDGET ESTIMATE [COMPLETE TABLE BELOW]

The budget template below includes common expenses, but you may also add categories. Budgets should not include support for faculty time.

Budgets typically range from \$5,000 to \$25,000. Generally speaking, projects that involve summer funding for student work, graduate student support for project management roles, international travel, and/or special research materials/equipment tend toward the higher range.

Bass Connections Project Budget Template

Cost Category	Bass Connections Project Funding Request for 2018-2019	Notes (e.g., name of personnel, activities supported)
Payroll-allowable Categories		

Cost Category	Bass Connections Project Funding Request for 2018-2019	Notes (e.g., name of personnel, activities supported)
GRADUATE OR RESEARCH ASSISTANTSHIP (PHD) (suggested range: \$15-18/hour; note: RAships for students in the Graduate School should include costs for tuition remission and fees)	\$ 2,000	The person is to be determined, but they lead, or help lead, one of the student projects (which student project will depend on the graduate students background and interest)
RESEARCH ASSISTANTSHIP (Masters/Professional) (suggested range: \$12-15/hour)	\$	
INSTRUCTION (Teaching) - PHD STUDENT	\$	
POST-DOCTORAL OR STAFF EFFORT	\$ 18,000	Postdoc support
UNDERGRADUATE STUDENT STIPEND OR WORK STUDY (suggested range: \$11-14/hour)	\$ 5,000	For one Data+ student
Supplies & Materials		
INSTRUCTIONAL, RESEARCH OR OFFICE SUPPLIES	\$	
COMPUTERS AND MINOR EQUIPMENT	\$	
Travel Expenses		
TRAVEL – DOMESTIC	\$	
TRAVEL – INTERNATIONAL	\$	
General Operating & Other Costs		
ADVERTISING AND PUBLICITY	\$	
CONTRACT WORK	\$	
PUBLIC RELATIONS	\$	
MEETINGS – BUSINESS	\$	
OTHER – MISC.	\$	
TOTAL Bass Connections Request	\$25,000	

Cost Category	Bass Connections Project Funding Request for 2018-2019	Notes (e.g., name of personnel, activities supported)
<p>Other Sources of Project Funds (Projects that leverage or match funds are strongly encouraged and these funds —both awarded and currently proposed —should be noted so that we understand the comprehensive outlay for the project)</p>		
<p>[Source #1] X department and other funds will put in up to \$12,500 plus fringe costs for postdoc, another \$5,000 to support a second Data+ student, and an additional \$5,000 to further support the hired graduate student.</p>		
<p>[Source #2] (add more lines as needed)</p>		
<p>Your Unit/Business Manager who could administer funds for project, if requested:</p>		