

Societies and institutions that exhibited a diversity of people and cultures have consistently enjoyed an invigoration of many facets of life, most notably science and discovery. Promoting diversity and inclusion in computer science is important for the sustained growth and advancement of the discipline. More importantly, a noble endeavor such as a scientific discipline must not contribute to societal and institutional discrimination. Rather, scientific communities must champion the fight against discrimination and lead society to be diverse and inclusive. The experiences of those who are close to me as well as my own experiences have made me deeply invested in the topics of diversity and inclusion. Of course, these topics touch many communities and groups of people beyond my personal experience, and I continue to educate myself about the broad topic of diversity. In the following, I write about my aspirations to contribute to the mission of diversity and inclusion in computer science.

Approach 1: Promoting Inclusion and Diversity by Scaling Undergraduate Research Mentoring

Some of the challenges that face students from underrepresented groups may be addressed by providing effective mentorship and inclusion in group and extracurricular activities in the university. For this reason, one of my priorities is to reach out to students from underrepresented groups and invite them to work in my lab with graduate students on research projects. However, one-on-one mentorship cannot scale beyond a handful of students.

To increase the potential of these mentorship activities and impact on students from underrepresented groups, I started pursuing a more scalable approach of undergraduate student mentorship. Rather than mentoring undergraduate students individually, I lay down a big project vision and organize students to work on it. The project vision we started with is a simple edge-cloud database. We divided this project into smaller pieces. Then, we divide students into groups—each group taking care of one piece. Each group is assigned a captain. A captain is elected by the team members, and is typically the team member with more experience (*i.e.*, a student who have worked on the project before) or more time investment (*i.e.*, a student doing their thesis on this project).

I have tested the Project Team idea in two quarters, Winter and Spring of 2019. I was delighted to observe the success of the project team idea in terms of exposing students from underrepresented groups to research and providing them with a small community of other students with shared experiences. The success in the last two quarters with the Project Team motivates me to continue this idea and explore approaches to expand it. In particular, I am interested in two directions:

- *Further engagement of students from underrepresented groups:* I believe that one of the benefits of the Project Team environment is that students are working as a part of a bigger team. This helps them observe and learn from each other, as well as building a sense of a community and belonging. These are especially beneficial to students from underrepresented groups who may struggle with imposter syndrome and similar challenges. UC campuses are uniquely situated for this goal—for example, UC Santa Cruz is a minority-serving institution (26.7% of UCSC students are Chicano/Latino as of 2018 [3]) and has a significant percentage of low-income and first-generation students (34.7% of UCSC students were in the Educational Opportunity Programs in 2018 [1]). My plan to engage underrepresented students is by advertising in relevant student clubs and reaching out to university centers and counselors.
- *Beyond the UC campuses:* A longer-term goal is to engage students outside of UC, specifically from high-schools with a large percentage of students from underrepresented groups. The organization of the Project Team allows handing off some components for remote collaboration. I aim to establish relationships with nearby schools and after-school programs to foster such collaborations.

Current Progress and Evaluation Plan. We have currently completed two quarters (Winter and Spring 2019) of the Team Project Team—mentoring around 20 students who built a prototype of an edge-cloud database. We will evaluate this task via two main metrics: (1) Scalability: this metric is about how large can the Project Team be while maintaining a meaningful research experience for most students. Our target is to double the number of students to 40 students per year. To get their and preserve the research experience, I plan to engage other faculty members and their undergraduate students. To evaluate that the research experience is preserved, I will engage teaching and mentorship centers in UC campuses such as The Center for Innovations in Teaching and Learning (CITL) [2] (2) Representation: this metric is about trying to engage students from underrepresented groups. To evaluate this metric, I will conduct a survey each quarter to learn the percentages of students from various underrepresented groups. My first target is to match the campus-wide percentages (*e.g.*, if 26.7% of students are Chicano/Latino, I will target matching the same percentage in the Project Team). The longer-term target is to focus on one or two underrepresented groups and aim to have the percentage of these underrepresented groups in the Project Team surpass the campus-wide percentages.

Approach 2: Creating an Inclusive Culture With Diverse Teams in The Classroom

One of the main challenges facing diversity and inclusion in computer science is that the computer science education and work culture is skewed to a specific group, which is alienating underrepresented groups in STEM. Although this culture problem is manifested in both the classroom and the workplace, I believe that solutions in the classroom have the potential of transforming the computer science culture to be more diverse and inclusive. I plan on promoting a diverse and inclusive computer science culture by encouraging and facilitating *diverse teams* in the classroom. Although this method has been suggested by social studies, implementing diverse teams in classrooms with already skewed representation is infeasible. Another challenge is that for this method to work, diverse team need to form organically—rather than being forced which can lead to further alienate underrepresented groups.

Inspired from recent similar efforts, my plan to overcome these challenges is to create projects that pair students at different departments and institutions. To encourage a more inclusive culture to *women and underrepresented groups by gender identity and sexual orientation*, pairing can be done with students at different departments that exhibit a better diversity in their student body. Computing is relevant to many other sciences and fields, and creating projects that are relevant to both computer science students and students of another discipline is feasible. Projects of introductory courses in addition to capstone projects are possible options to explore projects that tie computer science to other disciplines where students from both disciplines work together. Promoting an inclusive culture to some other underrepresented group may require forming teams of students at different institutions, possibly at distant locations. For example, to create a more inclusive culture to groups that are traditionally underrepresented by *race, ethnicity, and socioeconomic status*, I plan to pursue collaborating with regional Minority-Serving Institutions. Likewise, I plan to promote inclusion to *religious and ethnic differences* by collaborating with foreign institutions. My strong ties to institutions in the Middle East and North Africa will facilitate such efforts that can extend to other regions in the long term.

Current progress and next steps. In UC Santa Cruz, I had the opportunity to start pursuing these opportunities. I have started building collaborations with researchers in the Films and Media Department and the Environmental Studies Department. In one of these projects, I paired students from the Computer Science Department with students in the Environmental Studies department who exhibited more diverse backgrounds. Also, I have also started a collaboration aimed at pairing undergraduate students from UC Santa Cruz with undergraduate students at a university in the Middle East. I have also started building relations with colleges in California, including CSU Monterey Bay and CalPoly, San Luis Obispo with the goal of pairing students from these colleges with UC Santa Cruz students.

References

- [1] Enrolled Student Characteristics. <https://iraps.ucsc.edu/student-statistics/all-students.html>. Accessed: July 2019.
- [2] The Center for Innovations in Teaching and Learning (CITL) at UC Santa Cruz. <https://citl.ucsc.edu/>.
- [3] UC Santa Cruz Statistics. <https://admissions.ucsc.edu/why-ucsc/facts.html>. Accessed: July 2019.