



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Swati Goel	Project Number J1409
Project Title An Efficient Assignment Algorithm, Given Preferences and Capacity Constraints	
Abstract Objectives/Goals The goal of my project is to design an efficient algorithm that creates assignments that maximize overall satisfaction, and to then make software specifically applying the algorithm to scheduling in schools. Methods/Materials I used a laptop computer with a django setup and a sqlite3 database. I tested the algorithm against already existing methods and created a web app to make interaction easier. Results The algorithm I created works in less than a minute when making seven assignments per person for 500 people. It does not guarantee optimality, as the problem it solves is known to be np hard, but it is efficient, running in time that is, in the worst case, a quadratic in the number of people. Conclusions/Discussion I built a heuristic that takes the preferences of many people and then tries to output assignments that will create the highest overall satisfaction level. This is done efficiently using a combination of limited back tracking, random sampling, and pairwise switchings, as opposed to the known optimal but inefficient methods of simply trying all permutations or full back tracking. The algorithm I created can also be used to make better and more efficient decisions in many other aspects of public life.	
Summary Statement I designed an algorithm that takes many people's preferences and then creates assignments that maximize overall satisfaction.	
Help Received I created and coded both the algorithm and the web app by myself. My computer science teacher helped me understand how to use django.	