



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Dennis J. Shim	Project Number 33747
Project Title Beating Google: Development of the Novel Web Page Ranking Algorithm WordRank in a Search Engine	
Objectives/Goals To develop a new algorithm that will more effectively rank web pages so that a search engine can return more meaningful results, especially for specific queries. Abstract Methods/Materials A search engine with a crawler and a lookup function was created in Python. A novel page ranking algorithm named WordRank, which ranks pages based on user inputted keywords and a page's content, was designed and implemented. For a comparative study, the two well-known ranking algorithms HITS and PageRank were also implemented in the search engine. The results from each of these algorithms and different combinations of algorithms were compared using the number of relevant links and quality scores. Results A comparative analysis of PageRank, HITS, and WordRank was performed. It was observed that the search results from HITS were of lower quality than those from PageRank. PageRank was thus used in conjunction with WordRank. When a combination strategy was applied to the PageRank and WordRank scores, it was determined that the results from a PageRank to WordRank ratio of 50:50 were generally more relevant and had higher quality scores than 25:75 and 0:100 ratios. This 50:50 ratio was then compared to pure PageRank. It was found that the combination returned better results overall, but returned especially relevant results for specific queries. Conclusions/Discussion To create a viable search engine with a better page ranking algorithm than PageRank or HITS, the novel WordRank algorithm was successfully designed and implemented in Python. A 50:50 ratio of PageRank to WordRank returned the best search results, especially for specific queries. This combination has large potential use in a research search engine for users looking for specialized results.	
Summary Statement In this project, I developed the novel page ranking algorithm WordRank to return high quality results to specific queries for use in a search engine.	
Help Received Dr. James Li helped me with programming questions that I had.	