

An Analysis of Gender, Race, and Salary Among Tenure-track Faculty at the Georgia Institute of Technology

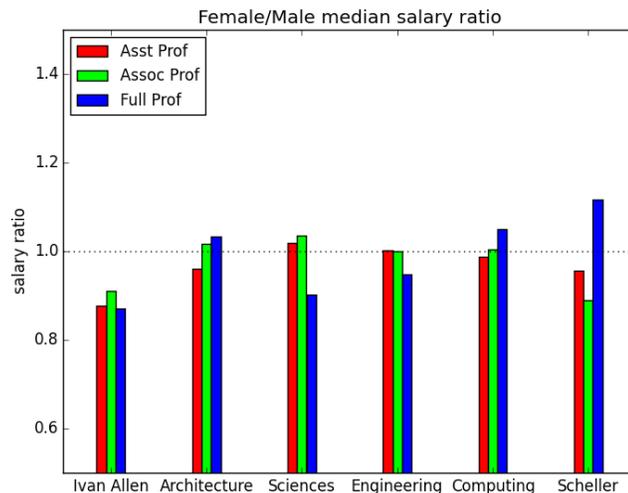
June 14, 2016

Summary

We assessed the demographics of 841 Georgia Tech tenure-track faculty in terms of race, gender, college affiliation and salary. Our objective was to identify any potential biases. In our review of this data, the following statistics have become apparent:

- In most cases, there is no statistically significant “gender pay gap” between men and women within each college at the same rank.
- Hispanics and blacks are significantly underrepresented in all colleges.
- Asians are significantly overrepresented in all colleges.
- Georgia Tech’s faculty structure is “top heavy.” In some colleges more than 50% of the faculty are Full Professors.

The “gender pay gap” is a hot topic in the news. In April 2016 for instance, CNN reported that women generally earn 79 cents for every dollar men earn. We wanted to see if such a pay gap exists at Georgia Tech. Accordingly, one aspect of our study was to assess this gap for Georgia Tech faculty. The result of that analysis, broken out by college and faculty rank is summarized in the figure on the right. Pay parity (i.e., 100 cents on the dollar) is indicated by the horizontal line at 1.0. As you can see, for most colleges and ranks, the ratio is close to 1.0.



For the most part the data indicate parity with regard to gender: Salary differences are much more strongly related to college affiliation and rank than to gender. Depending on their rank and college, women earn from 87% to 112% of the salary of their male counterparts. On average, at the Assistant and Associate Professor ranks, women earn 97% and 98% of the salary of men respectively. For Full Professors, women earn 99% of the salary of their male counterparts.

There are two cases where the difference between mens' and womens' salaries is statistically significant: In the College of Sciences, Associate Professor women are paid more in statistically significant numbers; In the Ivan Allen College, Full Professor men are paid more in statistically significant numbers. These disparities are not *prima facie* evidence of an inappropriate bias. The differences in salary may be due to factors other than gender that are not accounted for in this study.

Due to the small number of faculty in certain race categories, we did not analyze salary differences by race; we focused on potential differences by gender.

The data

This study is based on data acquired through a Georgia Open Records Act request from the Georgia Institute of Technology. We requested the following information as of January 2016 for employees with titles Assistant Professor, Associate Professor, Professor, and Regents Professor:

- gender,
- race,
- title,
- college,
- school,
- 9 month salary

Faculty with administrative titles are excluded from this study. In the statistics reported below we group the ranks Professor and Regents Professor together.

Distribution of faculty by gender

The numbers of male and female faculty are listed by gender, rank and college in the table below. The proportion of female faculty by rank and college is also illustrated graphically in the figure.

	Assistant Prof			Assoc Prof			Full Prof			Total
	M	F	% F	M	F	% F	M	F	% F	
Ivan Allen	22	10	31%	27	22	45%	25	16	39%	122
Architecture	7	5	42%	17	3	15%	12	1	8%	45
Sciences	29	14	33%	54	13	19%	48	18	27%	176
Engineering	48	18	27%	88	24	21%	167	24	13%	369
Computing	11	5	31%	8	4	33%	22	5	19%	55
Scheller	16	8	33%	22	2	8%	22	4	15%	74
Total	133	60	31%	216	68	24%	296	68	19%	841

Table: Number of faculty by gender, rank and college.

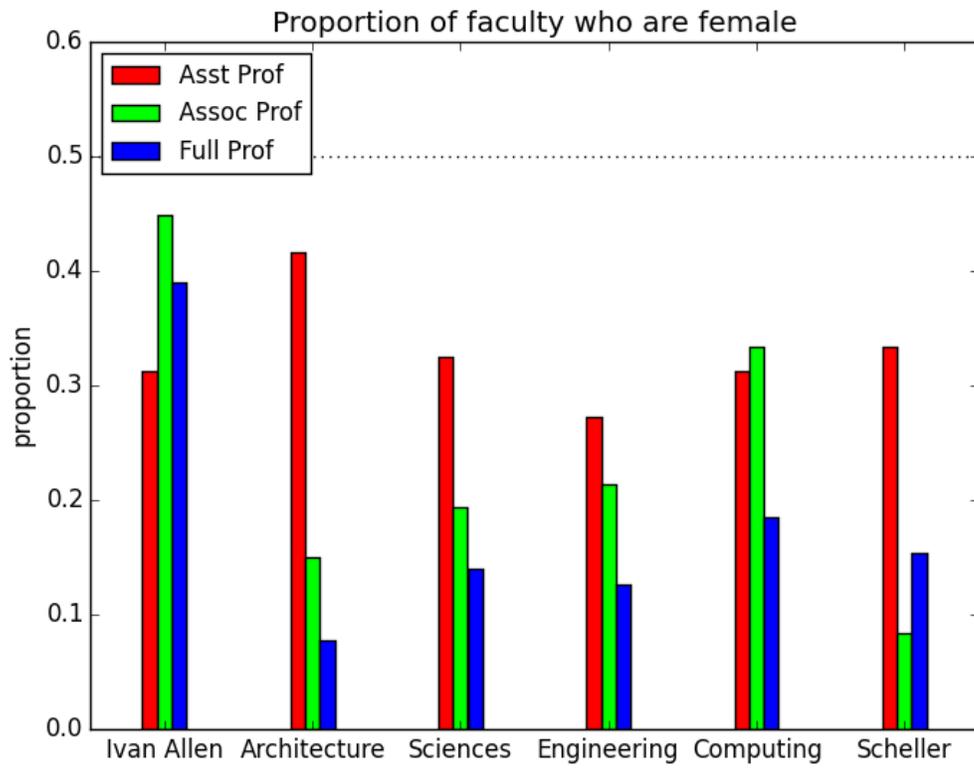


Figure: Proportion of female faculty by rank and college.

Distribution of faculty by race/ethnicity

Georgia Tech identifies faculty by race/ethnicity in the following categories:

- White
- Asian
- Hispanic/Latino
- Black/African American
- Not Applicable

The proportion of faculty identifying with each race are listed by college in the table and chart below. The two Institute faculty members listed as “Not Applicable” were not included in these statistics.

	White	Asian	Hispanic	Black
Ivan Allen	77.05%	13.11%	5.74%	4.09%
Architecture	80.00%	15.56%	4.44%	0.00%
Sciences	75.51%	18.88%	3.06%	2.04%
Engineering	62.87%	29.27%	3.79%	3.79%
Computing	61.81%	38.18%	0.00%	0.00%
Scheller	58.11%	39.19%	1.35%	1.35%

Table: Number of faculty by gender, rank and college.

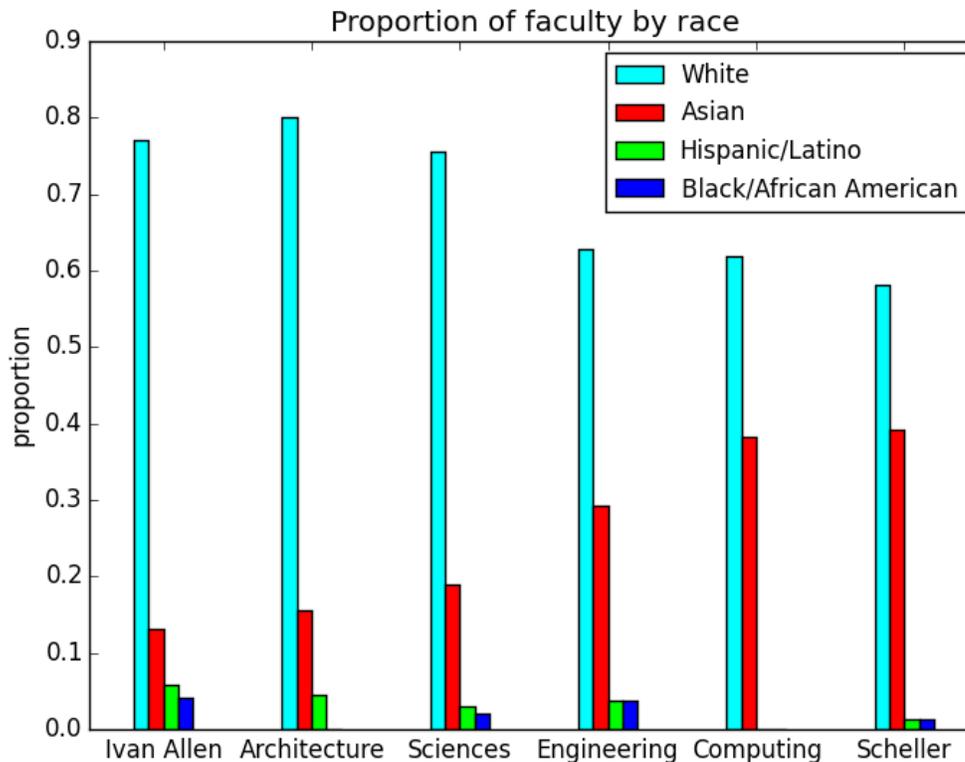


Figure: Proportion of faculty by race and college.

Median salary by rank, gender, and college

We computed the median salary for faculty according to their gender and college. We also computed the ratio of median female to male salary. This ratio is sometimes referred to as the “cents on the dollar” earned by women compared to men. That data is reported in the table and graph below.

	Assistant Prof			Assoc Prof			Full Prof			Mean
	M	F	Ratio	M	F	Ratio	M	F	Ratio	
Ivan Allen	\$83,556	\$73,280	88%	\$91,482	\$83,277	91%	\$134,600	\$117,115	87%	\$97,218
Architecture	\$76,829	\$73,800	96%	\$90,281	\$91,791	102%	\$XXX,XXX	\$XXX,XXX	103%	\$99,233
Sciences	\$85,425	\$87,049	102%	\$94,431	\$97,840	104%	\$131,714	\$118,931	90%	\$102,565
Engineering	\$97,713	\$98,000	100%	\$105,246	\$105,208	100%	\$141,044	\$133,646	95%	\$113,476
Computing	\$102,118	\$100,900	99%	\$118,750	\$119,302	100%	\$157,224	\$165,000	105%	\$127,216
Scheller	\$156,542	\$149,566	96%	\$177,900	\$158,328	89%	\$218,310	\$243,631	112%	\$184,046
Mean	\$100,364	\$97,099	97%	\$113,015	\$109,291	98%	\$152,017	\$151,968	99%	\$120,626

Table: Median salary by rank, gender and college.

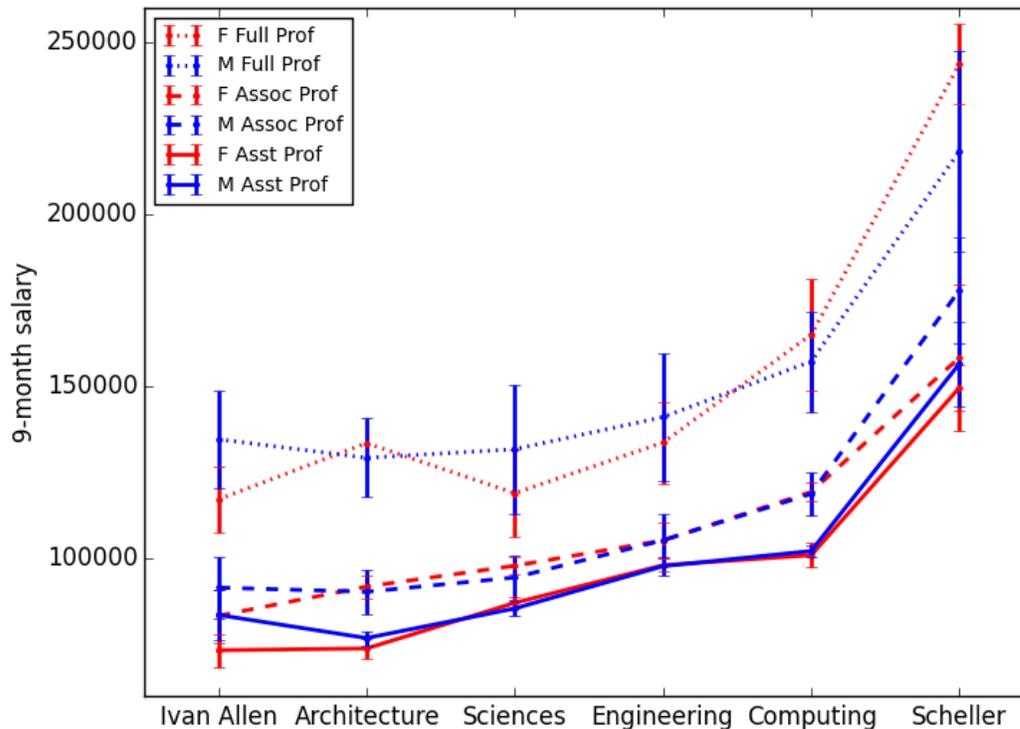


Figure: Median salary by rank, gender and college. Error bars indicate 1/2 standard deviations.

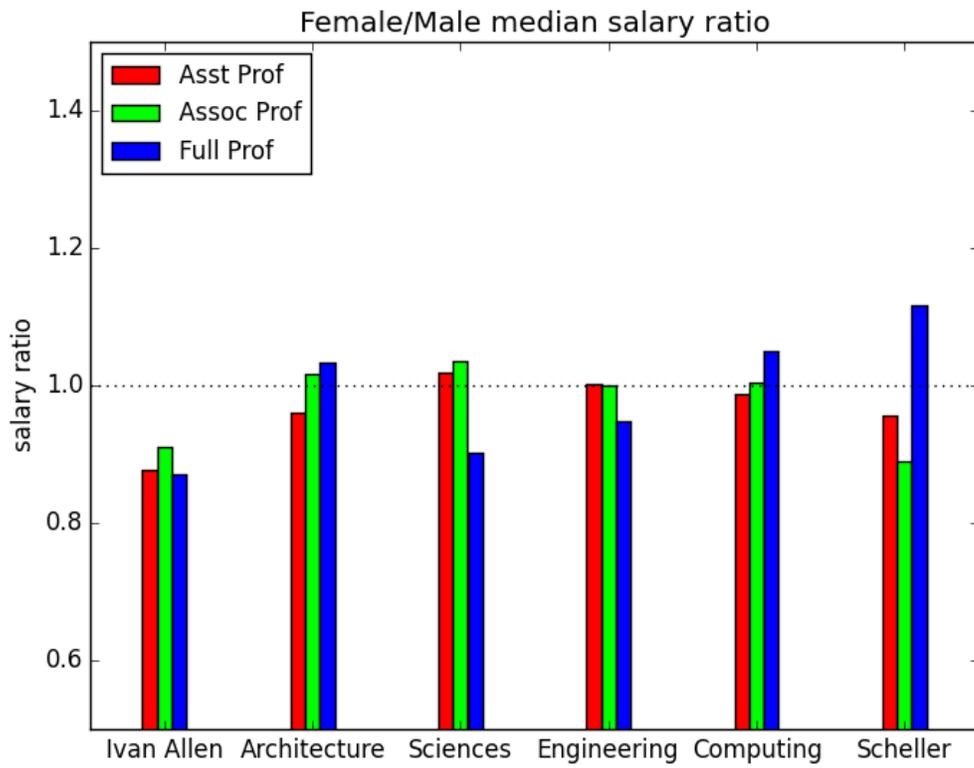


Figure: “Cents on the dollar” chart indicating the ratio of women’s salaries to men’s. A value of 1.0 indicates parity.

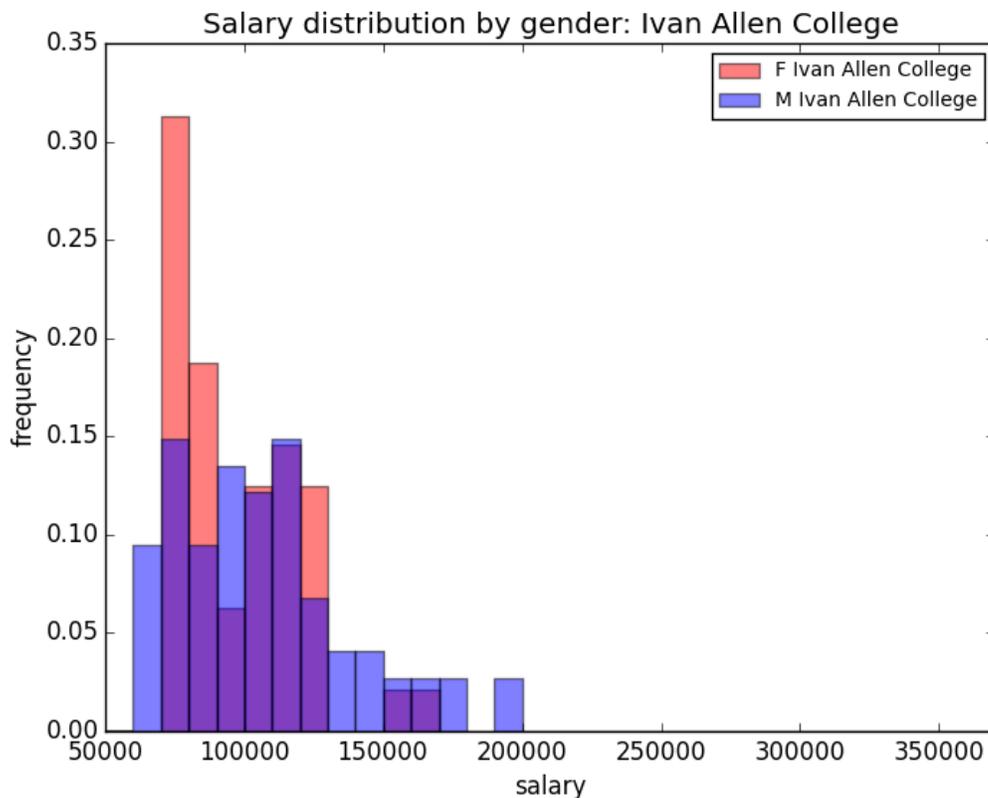
Salary distribution by college and gender

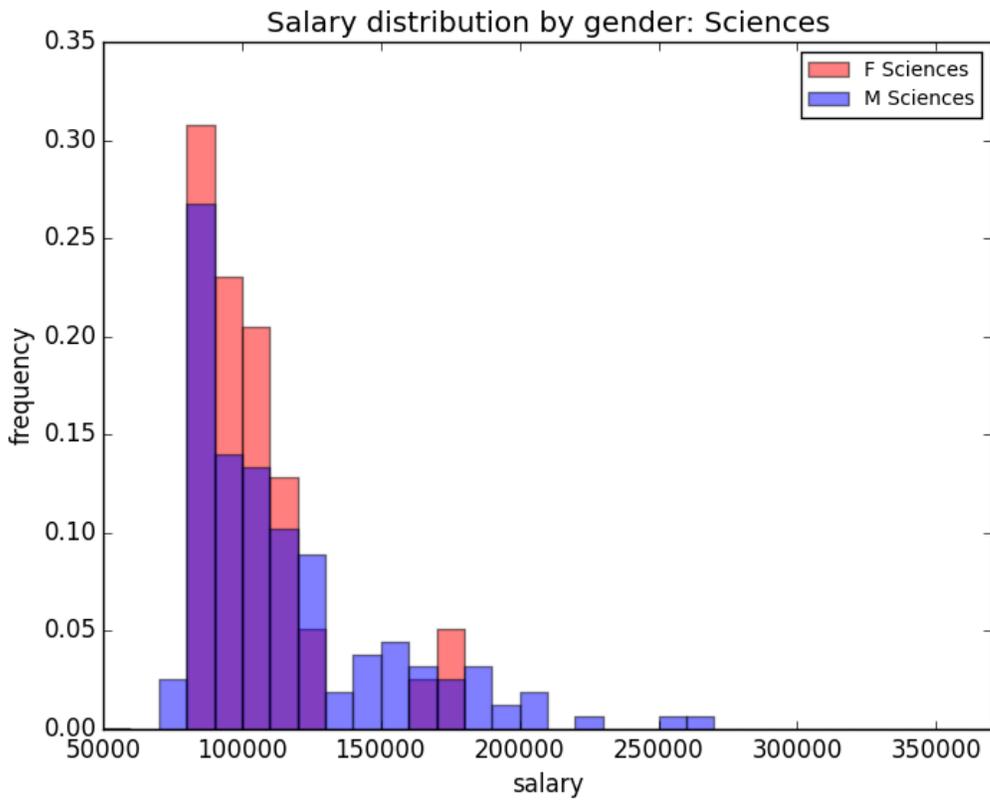
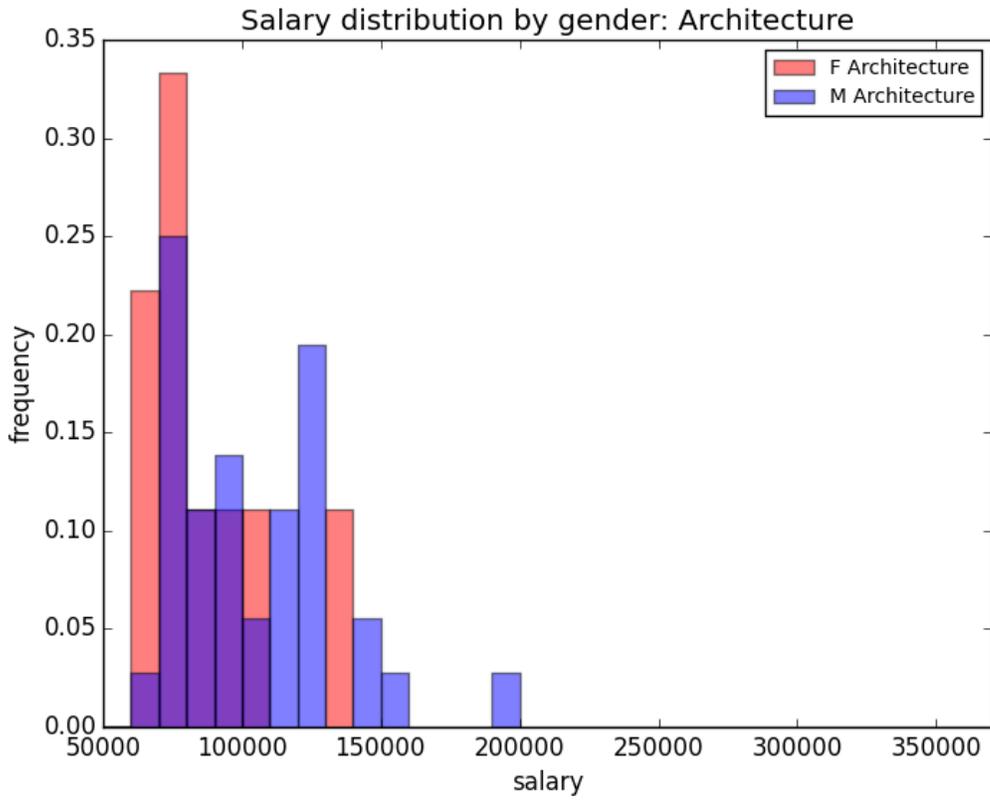
In order to assist the reader to visualize salary distributions, we created histograms indicating the proportion of faculty compensated at different salary levels. Bins for the histograms are centered at increments of \$10,000.

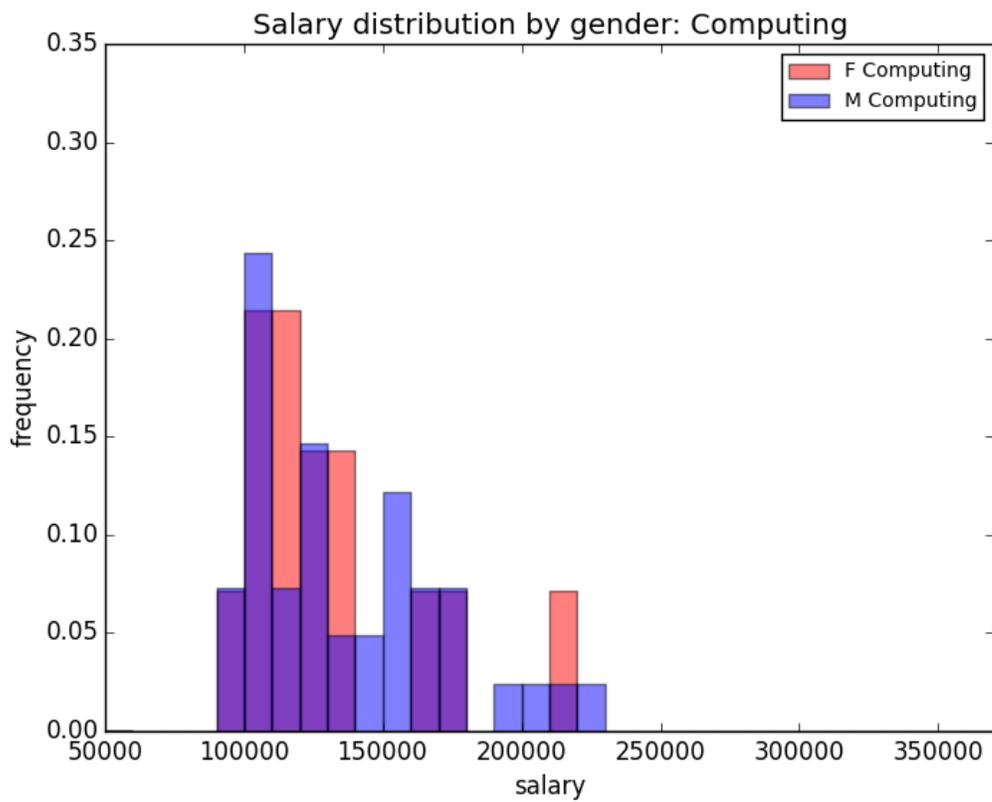
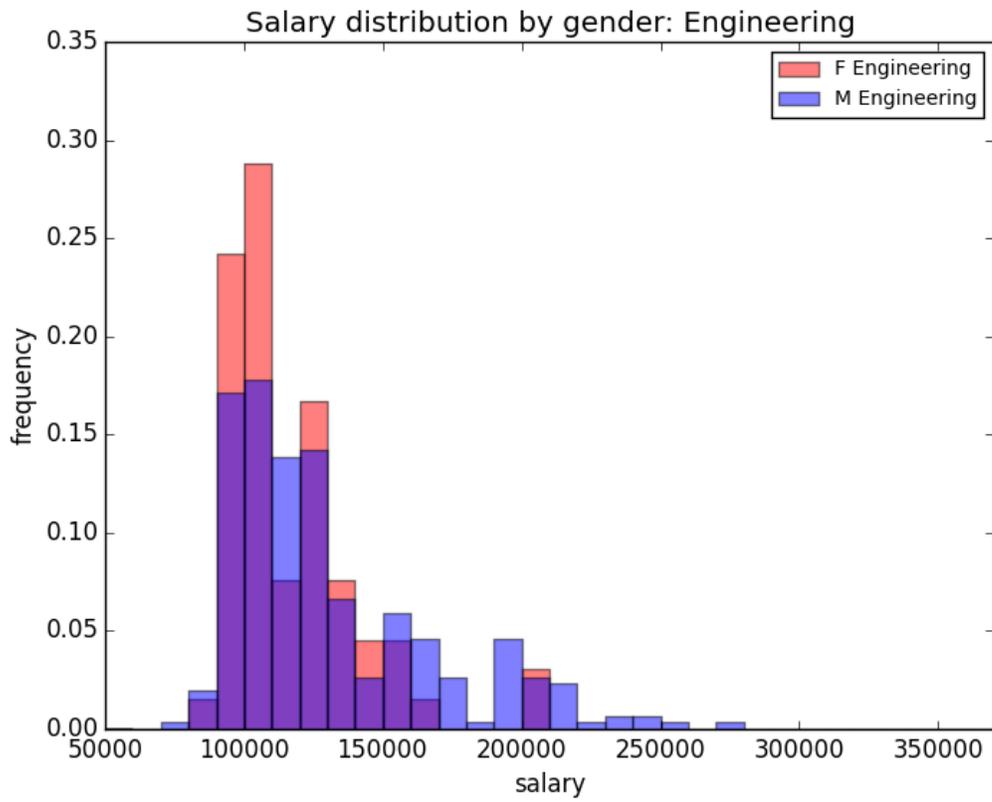
It was not feasible to break this analysis further into groups by faculty rank because there is not enough data to support a statistically significant result for some colleges at certain ranks. Accordingly, we group all faculty together for each college, but we provide a separate histogram for each gender.

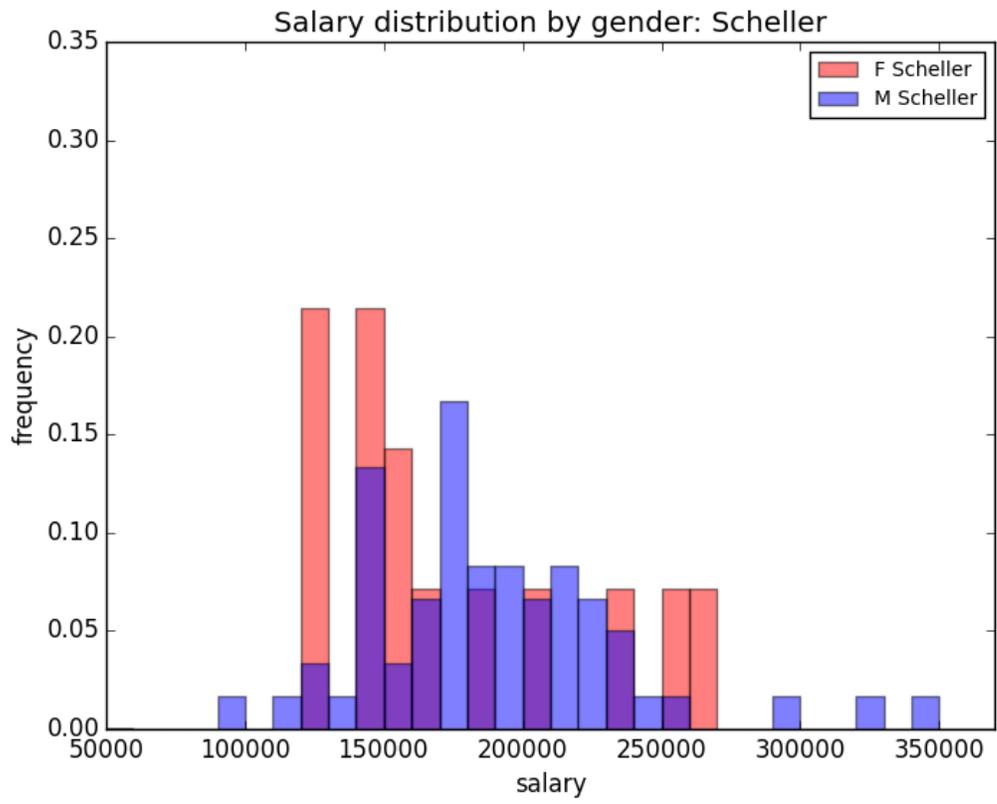
Note that apparent disparities between the distributions of male and female salaries may be influenced by the distribution of gender across rank. As an example, 63% of the women in the College of Architecture are Assistant Professors, and their salaries will accordingly bias the distribution towards lower levels for women. This bias is because of distribution of gender across rank.

Histograms for each college are provided in the figures below:









Are gender-related salary differences statistically significant?

As one can see from the data reported above, there are cases where women are paid less than men at the same rank in the same college, and vice versa. In order to assess the statistical significance of these differences we applied the Kolmogorov-Smirnov, or KS, test.

The KS test evaluates the null hypothesis that two sets of samples are drawn from the same underlying distribution. In our case the samples are the salaries of individual faculty and the null hypothesis is that the salaries of male and female faculty are drawn from the same distribution. Note that the KS test accounts for the number of samples so it may not reject the null hypothesis if there are only a handful of samples.

We focus on the *p-value* reported by the KS test. A *p-value* less than 5% indicates that the null hypothesis can be rejected. Namely, in our application, a *p-value* less than 5% suggests that male and female salaries are not drawn from the same distribution. We report *p-values* for the KS test applied to the distribution of male and female salaries by rank and college in the table below:

	Asst Prof	Assoc Prof	Full Prof
Ivan Allen	0.12	0.59	0.02
Architecture	0.19	0.91	0.55
Engineering	0.83	0.42	0.08
Sciences	0.89	0.05	0.24
Computing	0.41	0.99	0.95
Scheller	0.19	0.81	0.31

Table: Results of the Kolmogorov-Smirnov test comparing the distribution of salaries of men and women at Georgia Tech. Lower numbers indicate a higher probability that salaries are drawn from different distributions. Results at or below the 5% level are indicated in **bold**.

Acknowledgements

The author thanks the several other faculty members who assisted in a review of this document and provided helpful suggestions.

Please feel free to contract the author, Tucker Balch, with any questions. He can be reached via email at trbalch@gmail.com.