



Testimony of David Lopez
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Commerce of the U.S. House Committee on Energy and Commerce

“Inclusion in Tech: How Diversity Benefits All Americans”
(Revised)

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Introduction

Good morning. Thank you for this opportunity to address this committee on the very critical issue relating to the direction and path of our economic development - diversity in the tech sector and the emergence of data analytics and artificial intelligence.

My name is David Lopez and I am currently the Co-Dean of Rutgers Law School-Newark. I also remain Of Counsel to Outten and Golden LLP, the nation’s largest plaintiff-side employment firm.

From 2010 to 2016, I was the longest-serving General Counsel of the U.S. Equal Employment Opportunity Commission (“EEOC”) after being twice nominated by President Barack Obama and confirmed by the U.S. Senate. I was the first Latino selected for that position. As General Counsel of the EEOC, I led the litigation program for the nation’s primary administrative agency charged with enforcing federal anti-discrimination employment laws, including Title VII of the Civil Rights Act, the Age Discrimination in Employment Act, and the Americans with Disabilities Act. Specifically, I oversaw the litigation programs in 15 regional offices nationwide and collaborated with a wide range of internal and external stakeholders on the enforcement of the workplace anti-discrimination statutes. Before serving as the General Counsel of the EEOC, I spent many years as an EEOC trial attorney enforcing the rights of workers who had been subjected to discrimination.

Prior to joining the EEOC, I was senior trial attorney with the Civil Rights Division Employment Litigation Section of the U.S. Department of Justice in Washington D.C. I have had the opportunity to teach anti-discrimination law at Harvard Law School and the Georgetown University Law Center.

Throughout my career, I have been blessed with the opportunity to exchange ideas with hundreds of people nationwide, the so-called “experts” but also the entrepreneurs and workers on the front line, about these deep concepts of opportunity, equality, and fairness in the workplace. Some of this, to be true, has been in the context of litigating against companies, including tech companies, we believed ran afoul of the law, but most has been part of a greater national conversation about how to live up to our nation’s finest ideals.

Over the last 100 years, Rutgers Law School has stood as an exemplary model of an institution that both welcomes and promotes diversity and leverages the law to achieve equality of opportunity in the public, private, and nonprofit sectors. As the largest public law school in the Northeast and one of the largest in the nation, Rutgers Law School is proud to be considered one of the most inclusive and diverse law schools in terms of its students’ race, ethnicity, as well as economic and social background. Rutgers also prides itself in affording opportunity and social mobility to a substantial number of first-generation undergraduate and graduate level students.

When I was selected as Co-Dean in 2018, I was honored to contribute my extensive experience in civil rights work and leadership positions to Rutgers Law School’s formidable legacy of social justice and inclusion, in significant part catalyzed by the disturbances in Newark but over time transforming our campus to a learning environment I believe reflects the beauty of this country better than any other in the nation.

During my time as Co-Dean of Rutgers Law School, I have been privileged to join a special community dedicated to academic distinction and debate, diversity and opportunity, clinical and skills-based education, affordability, collegiality, and principles of justice. The faculty and student-body have welcomed me and together we are working to both address the issues that

concern our institution and take Rutgers Law to the next level. This includes the issues I have been invited to discuss today.

The Central Importance of Tech to Our Daily Lives

During the last thirty years, technology has transformed our economy and changed our daily lives - how we work, how we learn, how we make decisions, and how we play. The tech industry has produced remarkable tools and resources, providing us with social media and new ways to connect with others, as well as instant access to huge amounts of information. This information includes not just access to the internet but detailed information about individuals, their activities, their characteristics, their demographics, and their interactions with certain types of content, as well as their interactions with other people. Vast amounts of this information is collected and stored in giant data sets by websites, advertisers, and other companies who use algorithms, machine learning, and predictive analytics to target their products or services based on user interests, demographics and activities.

As a result of continuous innovation in the tech industry, very large data sets and sophisticated algorithms are being utilized more and more frequently that make observations and predictions about individuals and their likely behaviors, demographics, affiliations and socio-economic status. The predictive analytics and software created by the tech industry is used by businesses and other organizations to make quick and efficient decisions grounded in their ability to make predictions based on large amounts of data. In certain cases, data is based upon actual demographic information—such as age or gender—and in other cases, companies can actually estimate race and other demographic information based on where individuals live, their online activities and other factors. It is clear that there are many outcomes resulting from using these powerful datasets that are influencing our society, including politics, law, medicine, industry, markets for economic opportunity and our personal lives. They have the potential to expand opportunity for all Americans if used responsibly. However, these digital tools present an even greater potential for misuse if they lock in and exacerbate our country's longstanding disparities based on race, gender, and other characteristics. This highlights the need to examine algorithms and big data in the context of their

effects on society and the need to have a framework in place that supports its ethical and just use.

For example, over the past several years, employers have gained access to data, information and tools that enable them to discriminate in advertising, hiring and other employment decisions. In some cases employers have used information provided by third parties on race, age and gender of persons to target their advertising or recruiting efforts in a discriminatory manner. And in other cases, I will discuss further below, employers like Amazon have developed their own proprietary computer programs to rate candidates, only to realize that such programs were biased against women.¹

A recent report by Upturn, a research and advocacy organization dedicated to tech equity, highlights the increasing use of digital technology for recruiting and hiring decisions by employers. Many tools are developed and operated in a black box without transparency. An increase in transparency would permit regulators, employees or others the ability to evaluate whether such tools are enhancing or undermining equal opportunity in order to prevent the potential discriminatory effects of their use.²

The Demographic Profile of the Tech Industry

The tech industry is a sector of the labor market that is rapidly increasing in size and influence and it should provide significant opportunities for students and workers today and in the future. According to the Bureau of Labor Statistics, an agency within the Department of Labor, computer science jobs are projected to grow 19 percent from 2016 to 2026, much faster than the average for all occupations.³ There is a huge demand for talent leading to a remarkable opportunity to expand the ranks of people of color and women in the tech industry. As a result, careers related to data science, machine

¹ Dastin, "Amazon scraps secret AI recruiting tool that showed bias against women," Reuters (Oct. 8, 2018), available at <https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G> (last visited March 3, 2019).

² Bogan, Miranda and Rieke, Aaron, "Help Wanted: An Examination of Hiring Algorithms, Equity, and Bias," Upturn (Dec., 2018), available at <https://www.upturn.org/reports/2018/hiring-algorithms/> (last visited on March 4, 2019).

³ Bureau of Labor Statistics, "Occupational Outlook Handbook," available at <https://www.bls.gov/ooh/computer-and-information-technology/computer-and-information-research-scientists.htm> (last retrieved March 3, 2019).

learning, and artificial intelligence offer some of the best opportunities for students. It is difficult to imagine future career paths that would not benefit from an education in collecting, analyzing, summarizing and applying data using computation.

Yes, the tech industry is transforming all aspects of our daily lives. However, despite the promising outlook of the tech industry for students today, the tech industry is lagging dramatically in diversity compared to the private sector as a whole. For example, the number of African Americans and Latinos combined working in the tech industry is less than 50% of the number of Whites working in the tech industry. Specifically, according to the EEOC:

- The high-tech sector has trended toward employing a larger share of Whites (63.5 percent to 68.5 percent), Asian Americans (5.8 percent to 14 percent) and men (52 percent to 64 percent), and a smaller share of African Americans (14.4 percent to 7.4 percent), Hispanics (13.9 percent to 8 percent), and women (48 percent to 36 percent).
- The lack of diversity is even more apparent at the executive level. In the tech sector nationwide, whites are represented at a higher rate in the Executives category (83.3 percent), which typically encompasses the highest level jobs in the organization. This is roughly over 15 percentage points higher than their representation in the Professionals category (68 percent), which includes jobs such as computer programming. However, other groups are represented at significantly lower rates in the Executives category than in the Professionals category; African Americans (2 percent to 5.3 percent), Hispanics (3.1 percent to 5.3 percent), and Asian Americans (10.6 percent to 19.5 percent).
- Of those in the Executives category in high tech, about 80 percent are men and 20 percent are women. Within the overall private sector, 71 percent of Executive positions are men and about 29 percent are women.⁴

⁴ EEOC, "Special Reports, Diversity in High Tech," available at: <https://www.eeoc.gov/eeoc/statistics/reports/hightech/> (last retrieved March 3, 2019).

Additionally, two of the largest companies dominating the tech industry, Apple and Google, still have very low percentages of employees who are Black or Hispanic, despite their attempts to hire more diverse employees and increase transparency in those efforts. In addition, both companies have persistent gender disparities in leadership and other employment levels.

In 2018, Google reported:

- Tech employees are 50.7% White, 41.1% Asian, 3.6% two or more races, 2.8% Latinx, 1.5% Black, 0.2% Native American
- Leadership is 66.9% White, 26.3% Asian, 2.7% two or more races, 2.0% Black, 1.8% Latinx, 0.4% Native American
- Tech employees are 78.6% male and 21.4% female
- Leadership is 74.5% male and 25.5% female

In 2017, Apple reported:

- Tech employees are 52% White, 31% Asian, 8% Hispanic, 7% Black, 2% multiracial, 1% other
- Leadership is 66% White, 23% Asian, 7% Hispanic, 3% Black, 1% multiracial 0% other.
- Tech employees are 77% male and 23% female
- Leadership is 71% male and 29% female⁵

Further, the large corporations that dominate data science and AI research are few and largely localized to a few, highly affluent areas. The top companies – Google, Facebook, Apple, Amazon, Microsoft, Uber – comprise half of the top companies in the world for market capitalization. Four of these companies have their headquarters within 50 miles of each other.

While these companies provide services on a global scale, their employee perspectives are shaped by a tiny, socio-economic sliver of the United States. These companies' artificial intelligence, data analytics and algorithm-based research is disconnected with most of the population that feels their impact,

⁵ Apple, "Inclusion & Diversity," available at <https://www.apple.com/diversity/> (last retrieved March 3, 2019).

especially with areas with larger percentages of ethnic minorities. With expertise and privilege geographically located, there is the possibility of negative feedback loops excluding de facto opportunities to learn the skills to obtain these positions. This suggests that without intervention the lack of representation in the tech industry and associated problems are unlikely to improve. From a workforce development perspective, it becomes critical to develop ways to bring the technological capabilities that underlie these advances to the broadest group of people.

The Critical Importance of Diverse Teams

Of course, the ideas of living discrimination free and with equal opportunity are bedrock principles in our society central to social mobility and the American Dream. The elimination of arbitrary barriers based on race, sex, national origin, religion, and disability ensure that hard work matters - that investing in your dreams matters. Diversity and inclusiveness takes us out of our bubbles and destroys stereotypes. It is the right thing to do. Diversity and inclusiveness is also good business.

It is well established that racial, gender and other types of diversity in the workplace has a positive influence on teams. Teams that are made up of individuals of diverse backgrounds are more innovative and generally make more error-free decisions. These benefits are particularly relevant in the science, technology, engineering, and mathematics (STEM) fields.⁶ Further, there is convincing evidence that increasing diversity in the workplace leads to both higher revenues and increases in innovation. One important study shows that ethnically diverse companies are 35% more likely to outperform their less ethnically diverse competitors and gender diverse companies are 15% more likely to outperform their less gender diverse competitors. Despite this evidence, white men continue to be overrepresented in the technology industry at greater rates than the private sector as a whole.⁷

⁶ Godsil, Rachel, "Why Race Matters in Physics Class," 64 UCLA L. Rev. Disc. 40 (2016), available at <https://www.uclalawreview.org/race-matters-physics-class/> (last visited March 3, 2019).

⁷ Hunt, Laton and Prince, "Why diversity matters," McKinsey & Company Jan, 2015), available at <https://www.mckinsey.com/business-functions/organization/our-insights/why-diversity-matters> (last visited March 3, 2019).

Despite many large tech companies actively trying to increase the diversity of their workforce, there are still factors at play leading to sub-optimal results that need to be discovered and ameliorated. One of those issues is likely “implicit bias” in the hiring and employment context. The science of implicit bias is recognized as the automatic associations of stereotypes or attitudes about particular groups. In our current society where overt efforts have been made to eliminate more obvious forms of discrimination, implicit bias has emerged in the public discourse to explain more subtle types of discrimination. People can have conscious values that are still betrayed by their implicit biases. Implicit biases are frequently better at predicting discriminatory behavior than people’s conscious values and intentions.⁸ One study demonstrated implicit bias by showing that resumes with more “White” names received requests for interviews 50% more frequently than the same resume with a more “African-American” name.⁹ Continued implicit bias offers one explanation for the continued lack of diversity in many high tech companies despite their attempts to increase diversity.

Another possibility affecting tech companies’ ability to retain diverse employees may be found in a national study that examined why employees voluntarily leave their jobs in tech. Tech employees from all backgrounds said that their perception of unfairness was the most important factor that drove them to leave a position. The perception of unfairness speaks directly to the culture of the organization. Turnover in any workplace affects the bottom-line but turnover due to perceived unfairness in tech costs the industry \$16 billion a year. This factor for leaving a job was even more profound in minorities and women.

- Underrepresented men of color were most likely to leave due to unfairness (40%)

⁸ Godsil, Rachel et. al., ADDRESSING IMPLICIT BIAS, RACIAL ANXIETY, AND STEREOTYPE THREAT IN EDUCATION AND HEALTH CARE, THE SCIENCE OF EQUALITY, VOLUME 1 (Nov. 2014), available at <http://perception.org/wp-content/uploads/2014/11/Science-of-Equality.pdf> (last visited March 3, 2019).

⁹ Bertrand and Mullainathan, “Are Emily and Greg More Employable than Lakisha and Jamal? A Field Experiment on Labor Market Discrimination,” 94 *The American Economic Review* 991 (Sep., 2004), available at https://www2.econ.iastate.edu/classes/econ321/orazem/bertrand_emily.pdf (last visited March 3, 2019).

- Women of all backgrounds experienced and saw considerably more unfair treatment overall than men
- Unfairness is most prominent in the tech industry: employees in tech companies were considerably more likely to leave due to unfairness than technical employees in other industries (42% vs. 32%)¹⁰

There are many examples of unfairness in the workplace that are indirect but will make employees feel unwelcome. A former employee of Google, who is an advocate for the underrepresented, describes her reasons for leaving Google after eleven years as tied into multiple factors of unfairness. She describes a pattern at Google where “Management would overstep, rank and file workers would point out how to avoid harm to users, and we’d have a constructive internal dialogue about how to proceed.”¹¹ In addition, she felt she was not promoted in a way that was consistent with her responsibilities. She also describes an escalation of harassment, doxxing, and hate speech in Google internal communications that were silently tolerated. The event that truly tipped the scales in employee morale was the report of a \$90 million payout to a Google executive credibly accused of sexual harassment of a subordinate.¹²

There are additional possible reasons for the lack of diversity in tech jobs due to the unique nature of tech skills. During the hiring process there may be a demand for specific skills at the time of hiring that are rapidly changing, hiring may occur through networks of personal connections without vetting, and there may be a reward for career paths that have a mixture of self-employment and employment with others. Further, there is a trend in the tech industry towards a general unwillingness to train new hires.¹³

¹⁰ Kapor Center, The 2017 Tech Leavers Study, available at <https://www.kaporcenter.org/the-2017-tech-leavers-study/> (last visited March 3, 2019).

¹¹ Fong-Jones, Liz, “Google Workers Lost a Leader, But the Fight Will Continue,” Medium (Feb. 13, 2019) available at <https://medium.com/s/story/google-workers-lost-a-leader-but-the-fight-will-continue-c487aa5fd2ba> (last retrieved March 4, 2019).

¹² Wakabayashi, Daisuke and Benner, Katie, “How Google Protected Andy Rubin, the ‘Father of Android’,” The New York Times (Oct. 25, 2018) available at <https://www.nytimes.com/2018/10/25/technology/google-sexual-harassment-andy-rubin.html> (last retrieved March 4, 2019).

¹³ Hyde, Alan, *Working in Silicon Valley: Economic and Legal Analysis of a High-Velocity Labor Market*. (2003).

Despite all the evidence that teams that are made up of individuals of diverse backgrounds are more innovative and generate more value for their companies, problems still remain in hiring and retaining diverse employees in the tech industry.¹⁴ Most of the factors identified that help with understanding why this is a continual problem point to the problem of the less conscious type of bias, implicit bias. A number of recent studies suggest that isolation and bias influence women leaving STEM careers. Often, it is not simply the choices that employees make that influence career advancement, but it is the workplace environment that drives access to opportunity. Training and awareness about the role of implicit bias can be an important first step. But more needs to be done. It cannot be a one-off. Efforts to advance diversity cannot be just a check box for legal compliance – equality must be a fundamental value of the organization. To have a tangible impact in expanding opportunity, it takes leadership and a coherent series of actions and systems to drive inclusive behaviors. And we see the most progress when there is leadership diversity as well as a commitment to hiring from a broad range of backgrounds.

The Power of Algorithms and Machine Learning to Bolster or Deprive Opportunity

How do these ongoing challenges to diversity in high tech impact the end product of the work? How do the ongoing challenges to the tech sector in our nation impact the algorithms and machine learning tools that increasingly impact our daily lives?

It is difficult to state with precision. But it is helpful to survey some of the recent technological and algorithmic trends to start to examine this link.

¹⁴ Godsil, Rachel, "Why Race Matters in Physics Class," 64 UCLA L. Rev. Disc. 40 (2016), available at <https://www.uclalawreview.org/race-matters-physics-class/> (last visited March 3, 2019)

Undoubtedly, the long-term ramifications of Data Science and Artificial Intelligence have generated excitement, debate, and consternation. As will be discussed below, there have already been some high-profile mishaps with Artificial Intelligence and Big Data.

I am definitely not here as a neo-Luddite, urging that we put the brakes uncritically on technological and computational advances. Indeed, technology itself has also forced us to look in the mirror at the ongoing reality of virulent forms of overt racism. Not a day passes without the smart phone documenting some other racist rant going viral with the help of social media.

<https://www.youtube.com/watch?v=yKrQnRpB1pY>

Description: White Woman Fired For Racist Rant at Black Neighbor – TIME

<https://twitter.com/davian1lopez/status/1073250524085043200>

Description: Student's Racist Rant About Lynching Black Men and Cross Burning at Southington High School in Connecticut – Law and Crime

<https://www.pbs.org/video/onr-racist-rant-university-oklahoma/>

Description: Racist Rant at University of Oklahoma – PBS

<https://www.youtube.com/watch?v=eWKgsDr8-OM>

Description: Man Berates Landscapers in Rant Caught on Camera – CNN

<https://www.cnn.com/2018/05/17/us/new-york-man-restaurant-ice-threat/index.html>

Description: NYC Attorney (Aaron Schlossberg) in Viral Rant Says He's not a Racist – CNN

<https://globalnews.ca/video/4631073/woman-fired-after-racist-rant-goes-viral>

Description: Women Fired After Racist Rant Goes Viral – Global News CA

<https://nypost.com/video/white-men-built-these-streets-man-goes-on-racist-rant-in-seattle/>

Description: "White Men Built These Streets": Man goes on racist rant in Seattle – NY Post

<https://video.foxnews.com/v/5973734549001/#sp=show-clips>

Description: AZ restaurant patron responds with racist rant after woman asks to sit at adjacent table: 'You will be wiped out' – Fox News

<https://www.cnn.com/videos/us/2018/12/15/woman-nyc-subway-tirade-sot-vpx.hln>

Description: Women Arrested After Racist Tirade on NYC Subway – CNN

<https://www.youtube.com/watch?v=KPuDkz8TApA>

Description: Video Captures Ryanair Passenger's Racist Rant at Black Women – NBC News

Likewise, New York Times columnist Seth Stephens-Davidowitz, in his book *Everybody Lies: Big Data, New Data and What the Internet Can Tell Us About Who We Really Are*,¹⁵ mine big data sets from Google search to discover disheartening patterns about the prevalence of discriminatory attitudes. For instance, the top search in California related to Muslims was “kill Muslims”, that searches for racist “N-jokes” rise 30 percent on Martin Luther King Day, and that racist, anti-African American searches were much more prevalent in upstate New York than in the South and more prevalent east of the Mississippi than west of the Mississippi.

As civil rights practitioners know, this raises questions as to where an act may fall on the spectrum of unconscious bias to overt but unspoken discrimination and stereotypes. These data points open the door for a broader, sometimes difficult, discussion about the critical steps we should take as a society to counter harmful and hateful stereotypes, overt and unconscious.

I believe that our shared goal should be to ensure that broad values such as opportunity, non-discrimination, inclusion, social mobility, privacy and competition are meaningfully protected in an era of dizzying and mind-boggling technological advances.

As a lifelong civil rights lawyer, I am particularly interested in the danger that the use of big data, algorithms, artificial intelligence and predictive analytics poses in denying opportunity and fairness in employment, education, credit, insurance, housing, public accommodations and the criminal justice system. That is why, the question of whether the absence of diversity in tech impedes the ability of the tech sector, including some of its most highly-dominant players, to anticipate and remedy any problems is critical.

¹⁵ Stephens-Davidowitz, *Everybody Lies: Big Data, New Data and What the Internet Can Tell Us About Who We Really Are* (2017).

At the end of the day, it is not the technology or the data sets or the algorithms, but the people who create, apply, analyze, and improve them who are responsible. Bad data inputs lead to bad results¹⁶ and can deepen inequality and discrimination. There is a long tradition in machine learning that algorithm performance can only work in the context of unbiased data. Increasingly, people and algorithms are engaged in interactive processes wherein neither the humans nor the algorithms receive unbiased data.¹⁷ The failure to diligently incorporate values of anti-discrimination and equal opportunity into our technological advances or to develop teams reflecting the richness and beauty of this country is a recipe for compromising these values to the detriment of the public.

Horror stories abound about the failure of big data, algorithms, artificial intelligence and predictive analytics to live up to our ideals of non-discrimination, opportunity, fairness, and privacy abound.

On one hand, the use of big data and predictive analytics may eliminate subjective biases and discrimination, as promised by many in the industry. On the other hand, this turns on the data producing the algorithm and whether it is constructed with an effort to enshrine values of non-discrimination, fairness, and privacy and counteract historical disparities. There have been an alarming number of mishaps with employment screening emanating from the elevation of statistical correlation between some variable, such as a person's zip code with purported job performance, qualifications or qualities.¹⁸ In the public sector, this is even more alarming as algorithmic decision is particularly weighty both because governmental decisions may be especially

¹⁶ Newcombe, "When Bad Data Happens to Good Companies," SAS Best Practices, available at https://www.sas.com/content/dam/SAS/en_us/doc/whitepaper1/bad-data-good-companies-106465.pdf (last visited March 3, 2019).

¹⁷ Nasraoui, O. and Shafto, P., Human-algorithm interaction biases in the big data cycle: A markov chain iterated learning framework, arXiv (Aug. 29, 2016), available at <https://arxiv.org/pdf/1608.07895.pdf> (last visited March 4, 2019).

¹⁸ Kirchner, "When Big Data Becomes Bad Data," ProPublica, available at <https://www.propublica.org/article/when-big-data-becomes-bad-data> (last visited March 3, 2019).

significant, and because democratically-elected governments bear special duties of accountability.¹⁹

Professor Pauline Kim of the Washington University Law School has written extensively about the ongoing pitfalls with big data screening algorithms in the employment context. Often these decisions are based on correlations rather than causal relationships - for instance an interest in Manga comics with coding proficiency. This obscures the basis on which employment decisions are made and further exacerbates inequality because error detection is limited and feedback effects compound the bias.²⁰

Even absent conscious bias, use of these proxy variables can have a profound discriminatory impact in a variety of areas.²¹ Use of big data in the employment context also raises issues with the unlawful disclosure and consideration of disabilities.²² One scholar compared early efforts at screening applicants as having the scientific rigor of the discredited science of phrenology, the practice of determining traits and aptitude by skull size.²³ The use of these new technologies to bolster productivity also implicates privacy concerns.²⁴ Advertisers are being sold on the idea of being able to target highly specific individuals with the right characteristics which has

¹⁹ Brauneis, Robert and Goodman, Ellen, "Algorithmic Transparency for the Smart City," 20 Yale J. of Law & Tech. 103 (2018), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3012499 (last visited March 4, 2019).

²⁰ Kim, Pauline, "Data-Driven Discrimination at Work," 58 Wm. & Mary L. Rev. 857 (2017), available at <https://scholarship.law.wm.edu/wmlr/vol58/iss3/4> (last visited March 3, 2019).

²¹ Barocas, Solon and Selbst, Andrew, "Big Data's Disparate Impact," 104 California Law Review 671 (2016), available at <https://ssrn.com/abstract=2477899> (last visited March 3, 2019).

²² Hoffman, "Big Data Analytics: What Can Go Wrong " 15 Indiana Health Law Review 227 (2018), available at <https://ssrn.com/abstract=3190521> (last visited March 3, 2019).

²³ O'Neill, Cathy, *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*, (2016).

²⁴ Ajunwa, Ifeoma, "Algorithms at Work: Productivity Monitoring Applications and Wearable Technology as the New Data-Centric Research Agenda for Employment and Labor Law" 63 St. Louis U. L.J. (2019, Forthcoming), available at <https://ssrn.com/abstract=3247286> (last visited March 3, 2019).

become possible because of the massive amounts of data collected on people.²⁵

The following examples provide cautionary tales about the failure of predictive analytics to live up to our ideals of non-discrimination, opportunity, and privacy.

- Amazon stopped using its own artificial intelligence hiring tool when it was discovered that it was biased against women.²⁶
- Big data analytics allows your employer to know whether you are pregnant even before you disclose it.²⁷ In one high profile incident, one retailer, drawing on consumer data, knew a young woman was pregnant before her parents did.²⁸
- Several major companies have been sued for using Facebook's micro-targeting tools to limit job advertisements based on age, gender and race in the context of housing, employment, and credit, in violation of the Fair Housing Act, Title VII of the Civil Rights Act, and the Equal Credit Opportunity Act.²⁹

²⁵ Guynn, "Russians used Facebook the way other advertisers do: By tapping into its data-mining machine," USA Today (Nov. 1, 2017), available at <https://www.usatoday.com/story/tech/news/2017/11/01/russians-used-facebook-way-other-advertisers-do-tapping-into-its-data-mining-machine/817826001/> (last visited March 3, 2019).

²⁶ Dastin, "Amazon scraps secret AI recruiting tool that showed bias against women," Reuters (Oct. 8, 2018), available at <https://www.reuters.com/article/us-amazon-com-jobs-automation-insight/amazon-scraps-secret-ai-recruiting-tool-that-showed-bias-against-women-idUSKCN1MK08G> (last visited March 3, 2019).

²⁷ Zarya, "Employers Are Quietly Using Big Data to Track Employee Pregnancies," Fortune (Feb. 17, 2016), available at <http://fortune.com/2016/02/17/castlight-pregnancy-data/> (last visited March 3, 2019).

²⁸ Weisbaum, "Big data knows you're pregnant (and that's not all)," CNBC Markets (Apr. 9, 2014), available at <https://www.cnbc.com/2014/04/09/big-data-knows-youre-pregnant-and-thats-not-all.html> (last visited March 3, 2019).

²⁹ Assistant Secretary for Fair Housing and Equal Opportunity v. Facebook, Inc., Housing Discrimination Complaint (01-18-0323), available at https://www.hud.gov/sites/dfiles/PIH/documents/HUD_01-18-0323_Complaint.pdf (last visited March 4, 2019); Angwin, Scheiber and Tobin, "Facebook Job Ads Raise Concerns About Age Discrimination," New York Times (Dec. 20, 2017), available at <https://www.nytimes.com/2017/12/20/business/facebook-job-ads.html> (last visited March 4, 2019).

- Software used by many police departments across the country to determine likelihood of recidivism has been shown to have a bias against African-Americans.³⁰
- Correctional agencies use “risk assessment” systems to assign restrictions on clients and decide how to enforce them, with little concern about how those devices might affect disparities in race and class.³¹
- Companies are using algorithms to determine who is likely to default on a loan or recommit crimes³² despite the algorithms' tendency to reflect society's biases toward racial minorities.³³
- Although it is likely that insurance companies can already identify individuals by race, gender and ethnic group, without big data, the danger is that the use of algorithms may mask the fact that particular groups are being charged higher prices.³⁴

In other spheres, we have seen an increased scrutiny of outcomes as the prominence of predictive analytics and algorithms in decision-making and other aspects of society increases and is better understood. This includes the tendency of search results themselves to reflect stereotypes and bias. The combination of private interests in promoting certain sites, along with the monopoly status of a relatively small number of Internet search engines, leads to a biased set of search algorithms that privilege whiteness³⁵

³⁰ Angwin, Julia, et al., “Machine Bias,” ProPublica (May 23, 2016), available at <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing> (last visited March 3, 2019).

³¹ *Id.*

³² *Id.*

³³ Lipton, Chouldechova, and McAuley, “Does mitigating ML’s impact disparity require treatment disparity?,” *Advances in Neural Information Processing Systems* 31 (NIPS 2018), available at <http://papers.nips.cc/paper/8035-does-mitigating-mls-impact-disparity-require-treatment-disparity> (last visited March 3, 2019).

³⁴ Swedloff, Rick, “Risk Classification’s Big Data (R)evolution,” 21CONN.INS.L.J. 339(2014) (invited symposium piece) available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2566594 (last visited March 3, 2019).

³⁵ Berlatsky, “Google search algorithms are not impartial,” NBC News (Feb. 21, 2018), available at <https://www.nbcnews.com/think/opinion/google-search-algorithms-are-not-impartial-they-are-biased-just-ncna849886> (last visited March 3, 2019).

Likewise, tech companies in the rapidly developing field of artificial intelligence (AI) have not always provided benefits that are consistent across protected classes of minorities and women. A recent WIRED magazine article contrasted the enormous expectations and promise of artificial intelligence in a broad range of areas from health care, journalism, finance, and policing with the relative dearth of female programmers. The article highlighted the enormous societal stakes and risks involved in this groundbreaking research being conducted by homogeneous work teams with few women and few African-Americans and Asians. “Last year, researchers at the universities of Virginia and Washington showed that two large image collections used in machine learning research, including one backed by Microsoft and Facebook, teach algorithms a skewed view of gender. Images of people shopping and washing are mostly linked to women, for example.”³⁶

The following examples highlight the ways in which artificial intelligence can be used across industries to advance those industries while harming our society by surreptitiously engaging in unlawful and discriminatory acts by using algorithms. These algorithms are not well understood by the general public, even as their use becomes more prevalent. As importantly, use of predictive analytics may not currently be subject to an adequate legal scheme designed to prevent algorithmic discrimination in the areas of housing, employment, criminal justice and more.

- When developing facial recognition software, two widely used aggregate datasets were used that were overwhelmingly male and white. So, the algorithm works exactly as it was trained, that is, for a largely white, male world. As a result, for women and dark-skinned persons, the errors increase considerably (from <1% for a white male to up to 35% for a dark skin-toned woman) when using facial recognition software.³⁷

³⁶ Chin, “AI Is the Future—But Where Are the Women?,” *Wired* (Aug. 17, 2018), available at <https://www.wired.com/story/artificial-intelligence-researchers-gender-imbalance/> (last visited March 3, 2019).

³⁷ Buolamwini, Joy, “Gender shades : intersectional phenotypic and demographic evaluation of face datasets and gender classifiers,” (2017), available at <https://dspace.mit.edu/handle/1721.1/114068> (last visited March 3, 2019).

- Facial recognition software is being used by police departments³⁸ despite the fact that it fails to correctly identify people of color³⁹
- Amazon's proprietary face recognition software used by law enforcement across the country incorrectly matched 28 members of Congress, identifying them as other people who have been arrested for a crime in a test conducted by the ACLU. The false matches were disproportionately of people of color, including six members of the Congressional Black Caucus.⁴⁰
- Microsoft's facial recognition software was found to have an error rate as high as 20.8 percent when identifying the gender of people of color, especially women with darker skin tones was criticized in a research paper earlier this year for its error rate—as high as 20.8 percent—when attempting to identify the gender of people of color, particularly women with darker skin tones.⁴¹ Microsoft states that it has improved the problem but obvious issues remain if this software is used by law enforcement.⁴²
- A study determined that emotion reading facial software is biased against black people. It assigns more negative emotions to black faces

³⁸ Wingfield, "Amazon Pushes Facial Recognition to Police. Critics See Surveillance Risk," *New York Times* (May 22, 2018) available at <https://www.nytimes.com/2018/05/22/technology/amazon-facial-recognition.html> (last visited March 3, 2019).

³⁹ Buolamwini and Gebru, "Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification." 81 *Proceedings of Machine Learning Research* 1 (2018) Conference on Fairness, Accountability, and Transparency, available at <https://www.media.mit.edu/publications/gender-shades-intersectional-accuracy-disparities-in-commercial-gender-classification/> (last visited March 3, 2019).

⁴⁰ Snow, "Amazon's Face Recognition Falsely Matched 28 Members of Congress With Mugshots," *ACLU* (Jul. 26, 2018) available at <https://www.aclu.org/blog/privacy-technology/surveillance-technologies/amazons-face-recognition-falsely-matched-28> (last visited March 3, 2019).

⁴¹ Buolamwini and Gebru, "Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification," 81 *Proceedings in Machine Learning* 1 (2018), available at <http://proceedings.mlr.press/v81/buolamwini18a/buolamwini18a.pdf> (last visited March 3, 2019).

⁴² Austin, "Microsoft 'Improves' Racist Facial Recognition Software," *Gizmodo* (Jun 26, 2018), available at <https://gizmodo.com/microsoft-improves-racist-facial-recognition-software-1827141398> (last retrieved March 3, 2019).

and black faces consistently score as angrier than white faces.⁴³ There are obvious disturbing ramifications to this bias if the facial recognition software is used by law enforcement or in the employment context.

- In 2015 a software engineer noticed that Google Photos classified his black friends as “Gorillas.” Google apologized and said that they would fix the problem. However, they have never fixed the problem other than blocking its algorithm from recognizing anything as a Gorilla and removing Gorilla, along with Chimp, Chimpanzee and Monkey as a possible classification term. It appears that they have been unable to fix the underlying problem with the algorithm.⁴⁴
- An analysis was conducted on two mugshot databases to determine the effects of aging on the accuracy of the facial recognition software. There was a clear turning point after approximately 6 years in which the accuracy of the algorithm started to continually decline. This raises obvious issues of possible bias in face recognition software of older people.⁴⁵

Diversity and the Challenges of Algorithmic Justice and Ethical Coding

All of these recent events highlight the ways in which data and algorithms can be used across industries to advance those industries while harming unwitting members of our community and our society by surreptitiously engaging in unlawful and discriminatory acts by using algorithms. The worrisome implications of tech’s ongoing challenges with gender, racial, ethnic, and age diversity is engendering growing attention.

⁴³ Rhue, “Racial Influence on Automated Perceptions of Emotions,” (Nov. 9, 2018), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3281765 (last visited March 3, 2019).

⁴⁴ Vincent, “Google ‘fixed’ its racist algorithm by removing gorillas from its image-labeling tech,” The Verge (Jan, 12, 2018), available at <https://www.theverge.com/2018/1/12/16882408/google-racist-gorillas-photo-recognition-algorithm-ai> (last visited March 3, 2019).

⁴⁵ Best-Rowden, Lacy and Jain, Anil, “Longitudinal Study of Automatic Face Recognition,” 40 IEEE Transactions on Pattern Analysis and Machine Intelligence 148 (2017), available at <https://ieeexplore.ieee.org/document/7815403> (last visited March 3, 2019).

Indeed, it is not surprising that the benefits of data and computation are not equitably shared in light of the people who are represented, and not represented, in the companies creating these technologies. This problem has many roots to these. First, algorithms are often predicated on data that amplifies rather than reduces the already present biases in society---racial, ethnic, and socio-economic---in part because these issues may not be noticed or a consideration to the people creating the technology.

Second, tech careers are primarily entered from narrow, single-discipline university training, in fields such as computer science, which, even at the most highly-regarded schools, do not demand the kind of interdisciplinary, engaged thinking that would connect developments in computer science to their legal and ethical consequences.

Finally, people who employ these technologies do so without regard to the subtle ways they may interact with the socio-economic and ethnic characteristics of the people they are being applied to. Subjective judgements are made and with those judgements comes the innate biases of the individuals making the decisions. These biases are not always harmful, but when they are they can have serious and in some instances illegal ramifications.

Recommendations

Who will ensure that the opportunities afforded by these technologies and skills are available regardless of race or ethnicity, gender, or means? Who will develop, and educate students who will develop, technologies that are fairer, more equitable, and just? Who will drive the creation of an ethical legal regulatory framework to protect against bias in society?

To be sure, we need greater investments in education and training, and efforts play a critical role in fostering a diverse pipeline and, Rutgers University, as a public university, holds a unique position of responsibility and opportunity in this area.

Rutgers University, with its commitment as an anchor institution and established legacy of diversity and inclusion, holds a unique position in ensuring that all students--regardless of race, ethnicity, gender, or class--have access to the education and experts required to develop future professionals.

It is important to ensure that the very best ideas are produced by organizations, like Rutgers, that serve and answer to and reflect the diversity of our society. To ensure that students have equitable access to the very best opportunities, we seek to invest in educational experiences around creating algorithms and using data to create more equitable and inclusive futures.

As Co-Dean, I am working with an outstanding group of interdisciplinary partners throughout the University to establish Rutgers as a model of engaged research and education around our mission as a public university, emphasizing 21st century skills of programming and Data Science toward decreasing social injustice. To ensure that these developments better our society, we seek to develop a workforce development infrastructure that will spin-out ideas developed in research, and expertise developed in education, into companies and non-profits that improve our society and strengthen our democracy.

Our hope is Rutgers will be able to immerse all students in a culture of data and algorithms and the attendant legal, ethical, and socio-political implications. Regardless of their major, students will have contact with faculty who conduct cutting-edge data and computational research that is relevant to their field and have access to such research opportunities through contact with graduate students, postdocs, and faculty. Students will graduate with an understanding of how computing and data are used in their respective major, the ability to program, analyze and understand data, the legal, social and political contexts, and personal contacts with people that embody how the skills they have learned can be translated into the real world.

Yes, there is much to do on issues of infrastructure to ensure a diverse pipeline into high tech and develop the next generation of tech entrepreneurs, engineers, and employees to tackle amazingly complex work with serious attentiveness to the values of fairness, opportunity, privacy, and competition.

At the same time, the need to develop the pipeline must not be an excuse for companies to ignore the critical need for companies to act now on issues of opportunity and fairness. There are several specific and common-sense steps the tech industry can take immediately to reflect better the beauty of this country and, bolster, the likelihood of good decisions reflecting broadly-shared societal values.

1. First, embedding equality into your core values, means ensuring employment practices, from recruitment to hiring and promotion, reinforce this value. This always starts with leadership at the top. Assess your current obstacles. Often barriers can be subtle, so it is essential to collect and analyze data to see if seemingly neutral policies may disadvantage certain demographic groups. Be willing to rethink how you work to increase flexibility, invest in skill development to ensure pathways to advancement, and create mentoring, sponsorship, and support networks. What leads employees to believe that they can be successful in advancing to the highest levels of an organization? Research shows that it is workplace culture and practices. Does the company authentically value diversity? Does maternity leave undermine advancement? Are different leadership styles embraced? These external factors at a company weigh twice as heavily in a woman's confidence she'll reach top management, compared to individual initiative, such as communicating your own ambitions, asking for promotions, and seeking out opportunities.

The good news is that as leaders in organizations, we can make a huge impact. There are critical steps we can take to create an organizational culture that advances diversity and inclusion. When we create systems for hiring, setting pay, or promotions that focus managers on the job-related skills and behaviors needed for success, we can ensure we don't leave talent on the table.

2. Second, broaden your net in your search for talent. Many top companies now hire from only certain select universities, and are tapping into only 1% of the talent pool. At a recent EEOC meeting, Ben Jealous of Kapor Capital estimated that although there are 2000 educational institutions nationwide, VC firms only fund people who went to ten of those. Yet, as Ben emphasized, "genius is constant in every zip code in this country."

Many students who may not have the “perfect” resume from a top university, have overcome significant obstacles and have the grit and experience to contribute great value. Look also at whether your hiring practices create opportunities for workers with disabilities as well as older workers. Think of how subjective and informal networks create opportunities for hire and advancement, and evaluate whether these networks might work against underrepresented communities without the same access.

3. Third, evaluate whether your benefits appeal to all demographic groups. Perks like free dinner might be appealing for a young single person, but a parent who prioritizes meals at home may place greater emphasis on retirement savings options. Do parental leave policies allow both women and men to take the same amount of time off to bond with a new child? Are leave and telework policies in place to support parents, other caregivers, as well as people with disabilities?

Thank you for your time and attention. I would be happy to answer any questions.