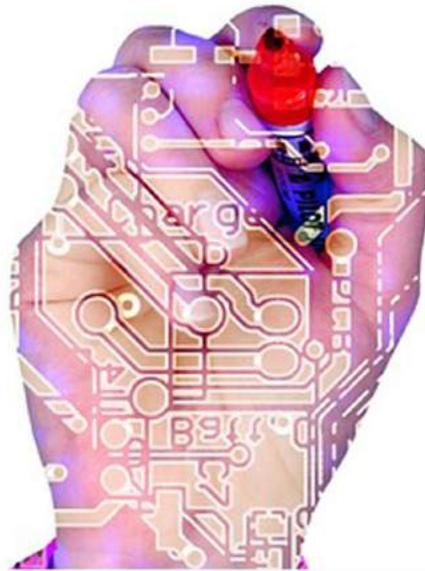


AI/BIG DATA

Talent Assessment - US West Coast



TALENTSPECTRA BY

AVANCE CONSULTING

April, 2019

Table of Contents

I Section I: Employer Profiles

II Section II: Global Talent Demand & Supply Dynamics

III Section III: Industry Hiring Trends - Top Employers

IV Section IV: AI/Big Data Talent In The US

V Section V: Location Deep-dive (Bay Area & Seattle)

Methodology

- **Document Purpose:**

- The current document aims to provide a view on the AI/ML and Big Data talent availability in two major talent hot-spots in the United States; SF Bay Area and Seattle.

- **Methodology:**

- Standard desk research methodologies have been used to build the report. This document is built by bringing together available information gleaned from open, public sources with no intention of copyright violation. Due care has been exercised in crediting the original sources of information and/or research, wherever applicable.
- News, points of views, analyses, opinions and numbers from multiple public sources have been put together by analyzing them. We have also analysed publicly available reports published by prominent job boards such as Indeed, professional networking platform LinkedIn, workplace metrics aggregator Glassdoor and other open sources.

- **Disclaimer:**

- Avance Consulting does not claim ownership or accuracy of the data derived from the original sources, presented in this document and takes no responsibility for any/potential loss arising out of using the information for decision-making.

Executive summary

I. Employer Profiles

- Amazon, Google, Facebook are the top employers in the AI/ML space globally and among them have a large concentration of available talent. One of the key characteristics of these companies, being product companies is to on-board top talent in their quest to provide better results on their respective platforms. However, the talent being limited, there is a real competition among these players to hire the best available talent. Apart from recruiting from each other, these companies are a regular feature at the developer conferences being held every year where they are known to make job offers to candidates. Almost all of their recruiting efforts for AI/ML/Big Data talent is spread across locations - the companies are opening research and innovation centers close to where the talent is. In 2019, most of them have strong recruiting plans and are looking to increase their respective talent pools. Universities in the US are also important recruiting places for these companies particularly in the backdrop of companies making job offers to academics and fresh Ph.D scholars in related technologies, apart from lateral hires with experience from the industry.

II. Global Talent Demand & Supply Dynamics

- Almost 50% of the global AI/Big Data positions were vacant in 2018. Where the global demand for AI/Big Data talent is ~1.2mn, the number of resources working globally is ~650K. US has the highest number of people with AI/Big Data skills who are employed at large corporations, Big Tech companies as well as start-ups. ~280K is the AI/Big Data talent pool in the US. However, US also had the highest number of unfilled jobs in 2018 - ~310K. Top recruiters in the US are JP Morgan, Amazon, Google, NVIDIA, Facebook, Intel and Microsoft
- An estimated 450K jobs will be created in this space in 2021, up from 100K in 2018. However, this is also likely to result in unfilled positions due to demand supply mismatch.

III. Industry Hiring Trends - Top Employers

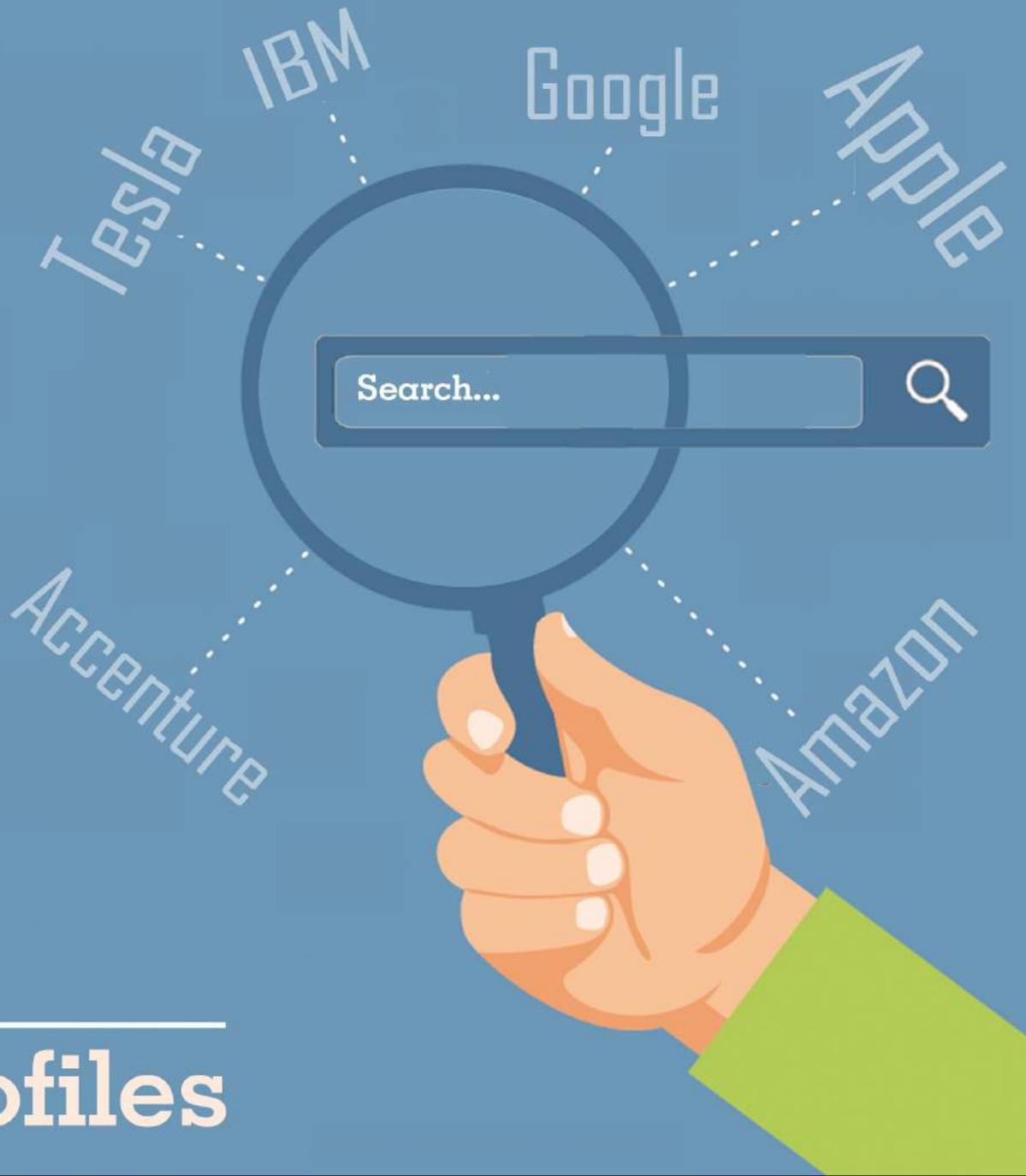
- US companies have invested US\$1.35bn in hiring AI talent between April & September 2017; Microsoft has entered 2019 leading the AI patent race with 697 qualifications and is one of the top AI talent recruiters in the US today
- Companies like Microsoft, Apple, Facebook are paying top dollars to on-board not only University graduates & Ph.Ds but also deep learning academics & scientists to man positions in research in AI labs and Centres of Excellence
- The skill areas the companies are focusing on are Machine Learning, Deep Learning, Neural Networks, Cognitive Learning, Computer Vision and Reinforcement Learning along with a host of software development skills and programming languages notably Python, Java etc.
- While many roles pay top salaries, the average annual salary for a **Deep Learning Architect** can go beyond US\$200K. Majority of the roles command salaries upwards of US\$110K. Analysts feel this is the result of talent shortage and the willingness of the employers to pay higher salaries to add to their AI/ML talent pool. AI Engineer salaries at Uber, WalmartLabs, Facebook and Netflix have topped US\$200K (Uber going above US\$300K in annual salaries)

IV. AI/Big Data Talent in the US

- Recruiters in the US are hiring for talent in deep learning, machine learning, and computer visions skills.
- In 2017, US companies spent US\$650mn in their AI/ML recruitment efforts and the average annual investment in AI talent surpassed US\$33mn.
- San Francisco, San Jose, NYC and Seattle are the AI/ML talent hotspots in the US while emerging hubs include Austin, Dallas, Boston and Atlanta. The Bay Area has ~110K and Seattle has ~63K people working in AI technologies.
- Microsoft and NVIDIA have more than 30% of their tech roles related to AI/ML technologies - the highest in the industry

V. Location Deep-dive

- Google, Apple, Facebook and Uber are the top recruiters in the Bay Area and more than 1/3rd of the roles are for Data Scientists; followed by Data Management Analysts.
- There are ~55K AI resources working in large corporations while the share of start-ups in the area is ~65K.
- San Francisco, San Jose, Mountain View, Santa Clara, Sunnyvale and San Mateo are top locations for talent availability. The median salary in the area is between US\$195-US\$200K.
- Enterprise software, cloud computing, gaming and consumer electronics are the the verticals with the highest concentration of AI/ML talent.
- Seattle is the second city in the US in terms of AI/ML talent availability. The median salary offered in large corporations is ~US\$185K and in start-ups it is ~100K. Microsoft, Amazon, Google and Facebook are the Big Tech companies hiring in this area whereas KenSci, Xnor.ai, Utrip are the start-ups hiring for AI/ML talent.



Section I:

Employer Profiles

Employer Profiles (1/2)

Summaries

Apple

Traditionally Apple has been slow in making its mark in AI as it has neither access to data nor did it have the requisite research talent and resources to approach AI development.

However, it changed its AI/ML strategy by hiring John Giannandrea to lead its AI and Machine Learning efforts in 2018. Also hired Ian Goodfellow as Director of Machine Learning. With 2 high-profile hires from Google, Apple has upped its game to attract top AI talent.

Since 2015, Apple has doubled the number of AI and related professionals on its rolls and has tripled the number of Ph.Ds

Apple's strategy to on-board high-end talent involves recruiting from Amazon and Microsoft, considered to be among the leaders in the global AI/ML space. It also hires professionals from eBay and Yahoo.

According to a research conducted by RS Components, Apple has made it to the list of top 20 companies hiring for AI talent.

Recent moves demonstrate Apple's greater focus on making AI part of its product R&D work.

Amazon

Uses AI to improve search results, offer better product recommendations, and improve its forecasting and inventory management.

Plans to expand AI research and has opened a new R&D centre in Barcelona, Spain and would employ 100 scientists and software engineers. Amazon is looking for AI talent across locations to fuel its products. Similarly, opened another R&D center in Cambridge, England which houses 400 Machine Learning Scientists, Knowledge Engineers, Modelers, and Speech Scientists.

Made an endowment of US\$10mn to the University of Washington that serves both as investment in AI and Machine Learning talent and commercial technologies as well as donation. The University is one of the top sources for AI talent for Amazon. This coincides with its hiring spree for its Alexa Group.

Has recently announced its intention to hire 25,000 tech professionals for each of its two mega offices, called H2Q in NYC and Virginia. This is on the back of its decision to deploy 10,000 professionals on its voice-activated digital system - Alexa.

Google

Google has acquired Kaggle - a crowdsourcing platform for predictive modeling and machine learning competitions. This enables Google to access 6,00,000 data scientists in a very talent-strapped market. This acquisition helps Google to further its efforts in natural language processing, predictive analytics, and machine learning tools.

Investing in education and training: Has recently invested \$4.5mn in the Montreal Institute for Learning Algorithms, a research lab at the University of Montreal. This doubles down its efforts to be a part of the training ecosystem which is a source for potential talent.

Google (DeepMind) has stiff competition with Facebook for AI talent which the former acquired for US\$400mn

Has been using AI to power its internal talent deployment platform that sits at the centre of gTech, the company's support and operations division.

In Jan, 2019 Google launched a new office in Berlin, Germany for a new set of artificial intelligence researchers and engineers. They are working on basic research and deep learning technologies

Employer Profiles (2/2)

Summaries

Tesla

Tesla is working to build its own hardware. Tesla's AI will build the algorithm for its 'Autopilot' software

Faces competition for talent from Apple and Google for electric and autonomous vehicle talent. Tesla and Apple have been hiring from each other's ranks.

Tesla has grown its AI talent organically unlike some of its competitors

Has hired Andrej Karpathy, from OpenAI, as the new Director for Artificial Intelligence

IBM

IBM aims to rope in developers across domains to expand its work on its platforms and services, particularly Watson-based AI services.

Participates in Developer Conferences (Index Developer Conference, San Francisco) to scout for talent.

Along with MIT, IBM launched 48 projects in 2018 to tackle AI challenges - its 10-year US\$240mn program 'MIT-IBM Watson AI Lab' has 100 scientists working on different projects. 60 scientists are from MIT and 40 are from IBM. The idea of the collaboration is to incubate AI talent to address talent gaps and shortages. The four areas of research include: advanced algorithms, specialized hardware for AI, industry uses of AI technologies such as healthcare and security and AI for social and economic use.

IBM started building its Data Science Elite Team two years back - now headed by Seth Dobrin. The team work with clients in 6-12 weeks engagements to collaborate on data science and AI projects. The team consists of 60 data scientists, machine learning experts - the team is planning to hire 30 new data scientists this year (2019)

Accenture

Accenture has in 2017 filled 500 positions in the UK in areas such as Robotics, Artificial Intelligence and Virtual Reality.

Accelerating its AI R&D across its global network of Accenture Technology Labs.

Opened a new centre in Dublin 'Centre for Innovation' to further its efforts in analytics, cognitive computing and machine learning systems. Its Technology Labs in San Jose and Arlington hire AI/ML talent.

In April, 2019, Accenture launched Accenture Federal Services (AFS) at San Antonio, Texas - which employs a team of inter-disciplinary experts including in AI-based cyber-intelligence. The Cyber Centre is part of larger AFS expansion in San Antonio which will witness new investments of US\$5mn and add 500 jobs over the next 2-3 years.

In 2018, Accenture acquired Kogentix which added to its Applied Intelligence's talent bench of more than 6,000 data and AI professionals. In 2017, it acquired Search Technologies and on-boarded 200 Big Data engineers and search experts in to its Applied Intelligence practice.

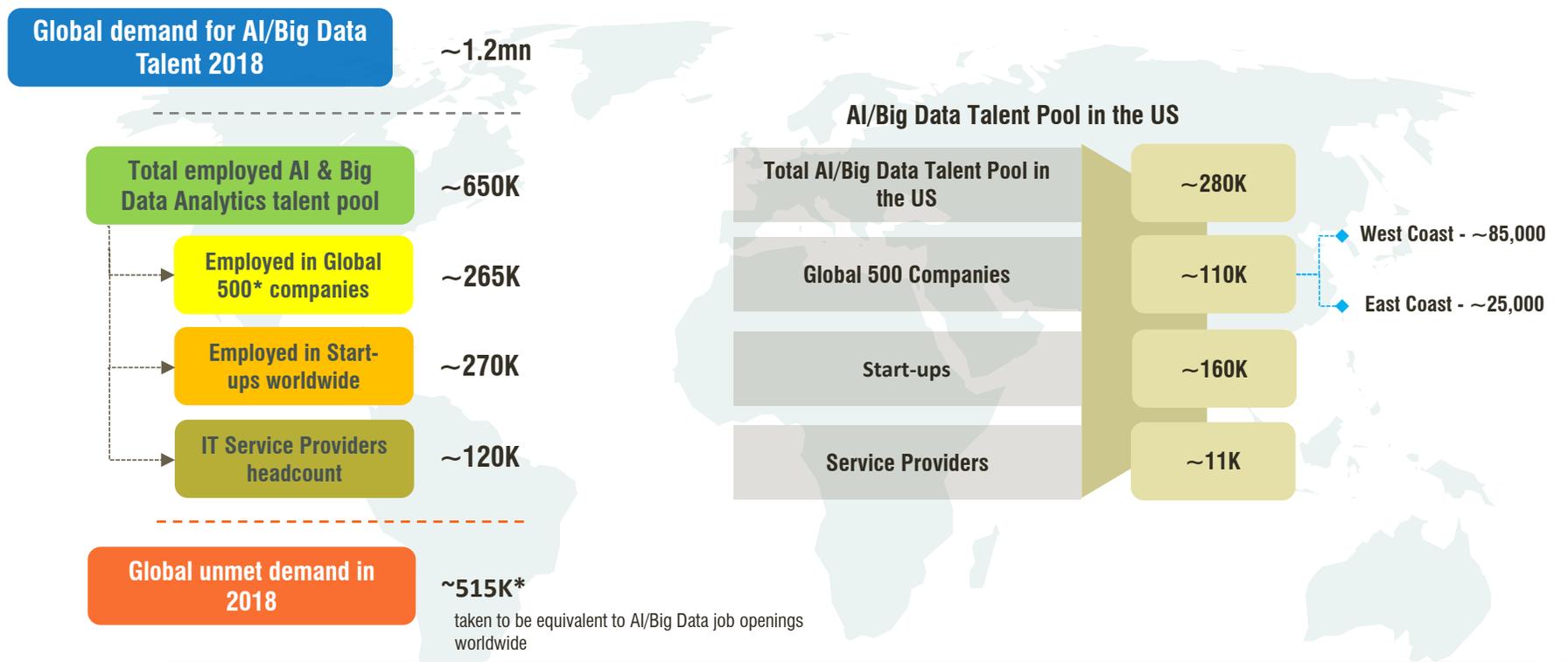


Section II:

Global & US Talent Demand & Supply Dynamics

Global AI/Big Data demand & supply

Almost 50% of global AI/Big Data positions were vacant as of 2018 indicating demand for talent outstrips supply; US has the highest concentration of AI/Big Data talent at ~280K



- AI/ML talent in the US is predominantly placed within large corporations including Big Tech companies and start-ups. Companies such as Google, Amazon, Facebook, Microsoft and IBM have large installed talent pools. Smaller tech-focused companies who are at the forefront of hiring AI/ML talent are Splunk, Cloudera and MongoDB
- To fill positions, companies are initiating large-scale talent development programs such as skill development through in-house academies and course modules. In the future, successful recruiters will be able to meet the demand by directly collaborating with basecamps, universities and other educational and training organizations.

Global AI/Big Data Job Projection

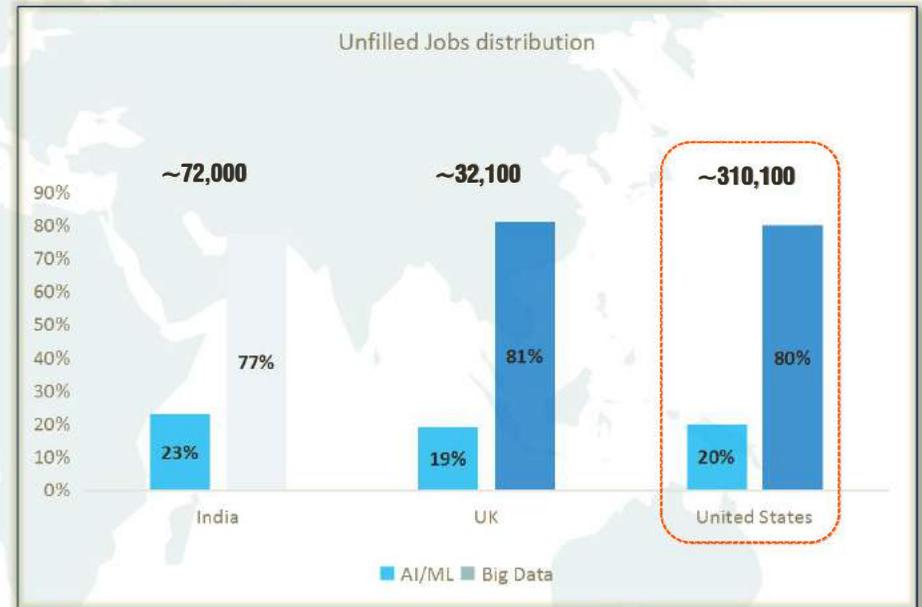
According to a research by Indeed, demand for AI talent have more than doubled in the past 3 years, the three most sought-after job roles on the market are Data Scientist, Software Engineer, and Machine Learning Engineer

New job creation in AI will reach 450K in 2021, but will also create unfilled positions...

Growth in AI/Big Data Jobs



Unfilled positions - 2018 (total 515K worldwide)



Top Recruiters

- Flipkart, Amazon, Accenture, Intel, HP, HSBC
- Amazon, Microsoft, Barclays, Hitachi, Expedia Group
- JP Morgan, Intel, Amazon, Google, NVIDIA, Facebook

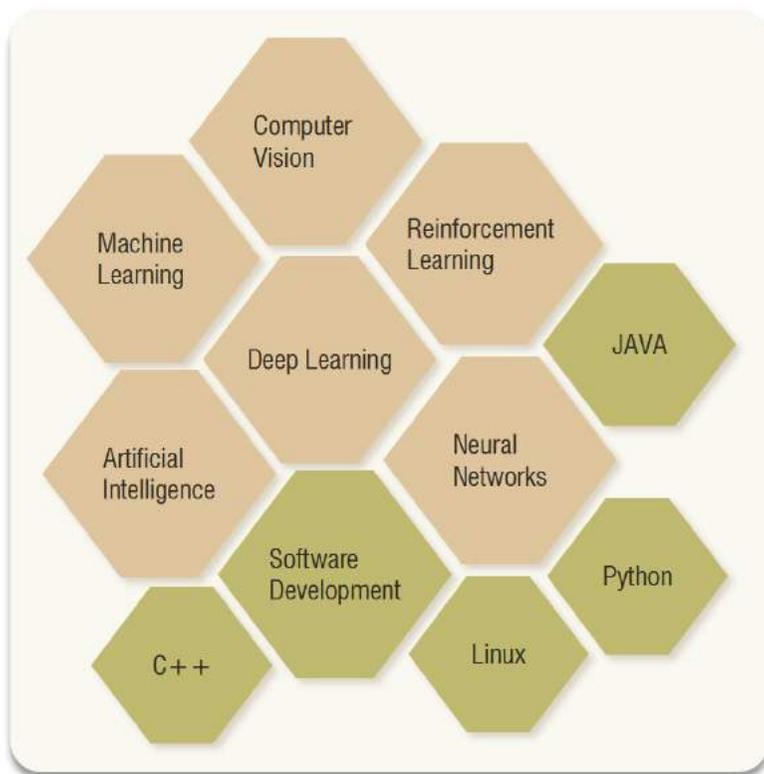
Job Roles

- Data Scientist, Revolution Analytics, Scientist - Computer Vision
- Senior Data Scientist, Full-stack Web Developer, Robotics Engineer
- Software Engineer, Applied Scientist, Algorithm Engineer, Data Architect

Skills Overview

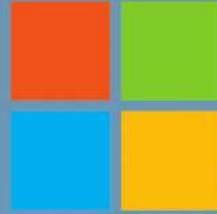
Software Engineering skills are in demand mostly for AI/ML developer roles; candidates with niche skills such as NLP, Deep Learning and Computer Vision draw the highest average salaries

Top Skills in demand



- Programming Languages/Skills
- Core AI/ML Skills

Role	Average Annual Salary		Role	Average Annual Salary	
	Overall	Seattle		Overall	Seattle
AI Specialist	US\$105,918	US\$119,743	NLP Scientist R&D	US\$74,697	NA
AI Analyst	US\$82,568	NA	NLP Engineer	US\$92,634	NA
AI Developer	US\$72,283	NA	NLP Developer	US\$83,724	NA
AI Software Engineer	US\$123,495	US\$153,844	NLP Researcher Lead	US\$138,493	NA
AI Leader	US\$104,353	NA	NLP Application Engineer	US\$131,877	NA
Machine Learning Engineer	US\$94,510	US\$99,799	Deep Learning Engineer	US\$84,388	NA
ML Scientist	US\$107,062	US\$145,140	Deep Learning - Architect	US\$213,690	NA
ML Researcher	US\$79,646	NA	NLP Research Engineer	US\$88,633	NA
ML Developer	US\$75,465	NA	Research Scientist	US\$86,776	NA
ML Lead Scientist	US\$132,539	US\$110,447	Deep Learning Specialist	US\$84,950	NA
ML Scientist/Deep Learning	US\$128,961	US\$126,161	Robotics Vision Scientist	US\$127,370	NA
Computer Vision Engineer	US\$90,151	US\$95,083	Robotics Vision Engineer	US\$90,770	NA
Computer Vision - Algorithm Engg.	US\$161,501	NA	Reinforcement Learning Research	US\$83,559	NA
Computer Vision - R&D Scientist	US\$98,429	NA	Computer Vision Researcher	US\$81,777	NA
Computer Vision - Ph.D Graduate	US\$48,189	NA	---	----	---



Deloitte.

JPMorganChase 

Booz | Allen | Hamilton



Section III:

Industry Hiring Trends
Top Employers

Industry Overview - top investments in hiring AI talent in the US

US companies have invested US\$1.35bn in hiring AI talent between April & September 2017; Microsoft has entered 2019 leading the AI patent race with 697 qualifications and is one of the top AI talent recruiters in the US today

Big Tech



- **Investment*:** US\$305mn
- One of the global leaders in AI/ML, powers most of Amazon.com. Uses AI as the foundation of its customer recommendations, logistics capabilities, smart speakers
- Plans to hire 100 scientists for its new AI hub in Barcelona, Spain. Expanded its R&D centre in Cambridge, UK by adding 400 Machine Learning scientists, knowledge engineers, data scientists, mathematical modellers, and software engineers



- **Investment:** US\$124mn
- Another top employer hiring AI talent worldwide, Microsoft is scouting for skilled people at conferences it participates in and also through sponsoring tech education at universities. Hosted an AI conference (NIPS) in LA from which it had hired AI professionals. Works with major US universities to fuel the talent pipeline - it is a major sponsor of Master's Programme at Cambridge - has funded 200 Ph.D scholars at the University
- Has set up an internal AI University to train its resources



- **Investment:** US\$105mn
- Apple has recently hired Google's AI scientist [Ian Goodfellow](#) (Generative Adversarial Networks fame) to lead its Machine Learning practice, part of the 'special projects' group. Earlier it had hired John Giannandrea to lead AI/ML strategy. Made 3 AI-related acquisitions in 2018 - Laserlike, Silk Labs, Asaii
- In 2017, Apple had more than 600 people who are specialized in Machine Learning, Computer Vision, and NLP

Financial Services



- **Investment:** US\$15.4mn
- 40% of the bank's US\$10.8bn is spent on new initiatives - AI, RPA & Blockchain for building platforms. New Palo Alto facility will house 1,000 engineers and AI experts. Held AI Open Hiring event in California (Feb, 2019)
- Hired Apoorv Saxena, Google's former head of product for [cloud-based AI](#), will head the bank's AI/ML services; also hired the Head of Carnegie Mellon's Machine Learning Department, Manuela Veloso



- **Investment:** US\$14.6mn
- Has unveiled a new [Tech incubator](#) on the University of Maryland campus, as a part of its strategy to invest in ML and other technologies in the Greater Washington region. Developing its chatbot, Eno. Opened the 'Centre for Machine Learning, which is part of the company-wide effort to recruit AI talent
- Since 2017, it has been training its employees on technologies including ML. The talent program is called '[Tech College](#)'. 350 employees has signed up for the six-month programme on ML.



- **Investment:** US\$9.9mn
- Created a new artificial intelligence enterprise solution team earlier in 2018 to better leverage data and customize the services; also launched mobile banking app - Greenhouse that uses AI tech
- The group is now using AI and biometric authentication tools in collaboration to fight money laundering situations
- The bank's AI Enterprise Solutions Group is led by Chuck Monroe

Consulting



- **Investment:** US\$21.8mn
- Won a US\$885mn 5-year AI contract with the US [Department of Defense](#) to "rapidly employ artificial intelligence, neural and deep-neural networks". Currently running ~60 new projects in deep learning, machine learning, and AI across US Federal government.
- Building a new 'Tech Hub' in Dayton, Ohio creating 60 new jobs in data science, cybersecurity, AI, data analytics. Teamed up with NVIDIA to offer a series of courses on AI



- **Investment:** US\$4.6mn
- Deloitte has recently acquired the AI business of New York-based Magnetic Media Online, signaling the importance of investments in AI, ML and audience data analytics. The acqui-hire resulted in the joining of Magnetic's product & engineering employees in Deloitte's Digital Experiences Services Group.
- Has invested more than US\$1bn worldwide to build advanced audit quality which includes Omnia, Deloitte's cloud-based AI platform

Industry Overview - other top players

Companies like Microsoft, Apple, Facebook are paying top dollars to onboard not only University graduates & Ph.Ds but also deep learning academics & scientists to man positions in research in AI labs and Centres of Excellence

Technology



- **Investment*:** US\$12.2mn
- Started a massive training push within IBM, being executed by its in-house AI Skills Academy. It is also investing a big chunk of its US\$500mn annual training budget in AI. Reskilling programs are a top priority at IBM to deal with AI talent shortage
- IBM is focusing on hiring more developers, particularly for its Watson-based AI services. Has tied-up with Unity Technologies, a game development platform provider to extend its AI services to the developer communities to integrate cloud Watson



- **Investment:** NA
- To double the team size at Facebook Artificial Intelligence Research (FAIR) from the current 180-200 to about 400 people by 2020. Has AI research staff in Menlo Park, New York, Seattle and Pittsburgh. Hired Luke Zettlemoyer from University of Washington
- Hiring specialists who can search image libraries, process varying languages, and analyze human motion
- Led by global expansion, Facebook is a regular at top universities and other places where researchers & academics work



- **Investment:** US\$22.3
- NVIDIA runs a program at the San Jose State University to impart training in AI to graduate students, working with 20 top global universities to nurture and incubate AI talent. It also has the Deep Learning Institute to train software developers
- Has invested US\$40mn in AI start-up H2O.ai for global expansion and innovation of 'Driverless AI'
- Building an AI ecosystem of partners, companies and developers. It trained 100,000 people in AI 2017 onwards

Others



- **Investment:** US\$7.2mn
- Since incorporating AI in to its products and operations, Salesforce has predominantly built its talent through acqui-hires (through a string of acquisitions) - BeyondCore, Implitis Insights, MinHash, Demandware & Krux
- New research center in Singapore to train 100 post-graduate resources in AI including in deep learning and natural language processing. Salesforce had earlier crowdsourced efforts to build AI applications on its platform through a [US\\$50mn](#) fund (2017)



- **Investment:** US\$28.3mn
- Has chosen AWS as its standard for Machine Learning, and AI workloads.
- Intuit has a large requirement for Java professionals and is one of the basic requirements on the resume of a potential candidate. Plans to build a pipeline of talent for future needs; looking to hire Art graduates too and establishing outreach to universities
- 40 AI/ML features pack Intuit's products and will use AWS to further develop and deploy its capabilities at scale

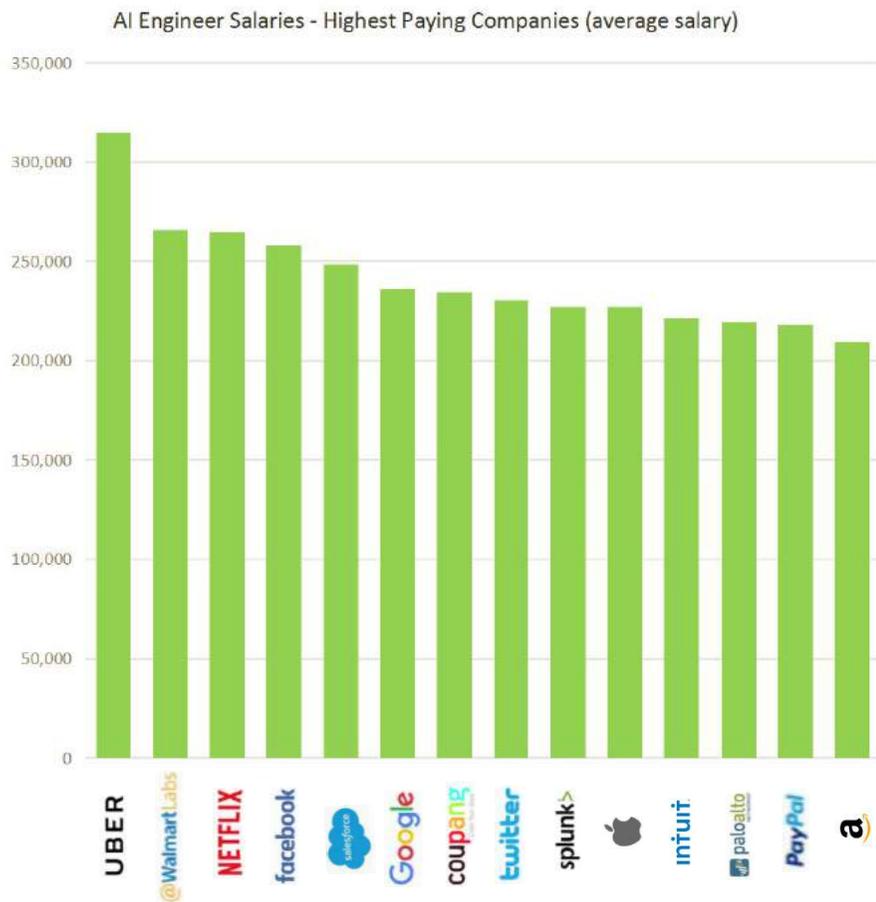


- **Investment:** US\$6.6mn
- Zoubin Ghahramani heads Uber's inhouse AI research arm. Acquired Geometric Intelligence, an AI start-up. 15 people came on-board at Uber.
- Has AI talent needs for its Advanced Technologies Centre, home to Uber's self-driving car research. Earlier, in 2015 it had hired 50 researchers from Carnegie Mellon's AI program

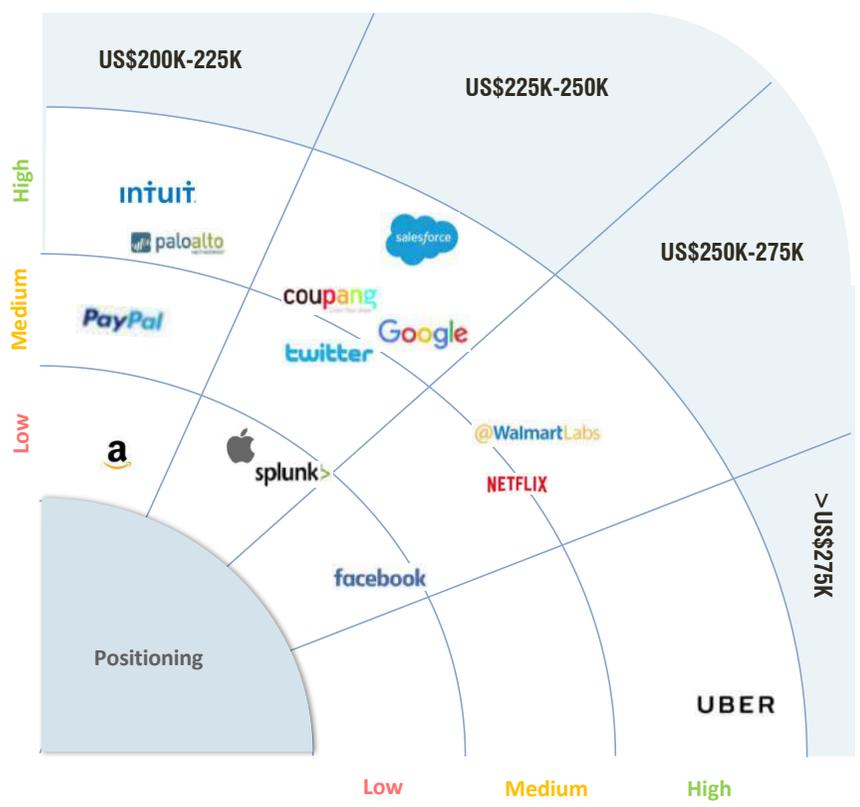
Salary trends - top employers

While the highest salaries are paid by product majors/big-tech firms, mature platform start-ups with cross industry focus have also been able to successfully attract top AI talent - particularly on the West Coast

As per Payscale.com, a career service and salary insights provider, the average annual salary of an AI Engineer works out to be US\$241,145; wide variations also exist as shown below....



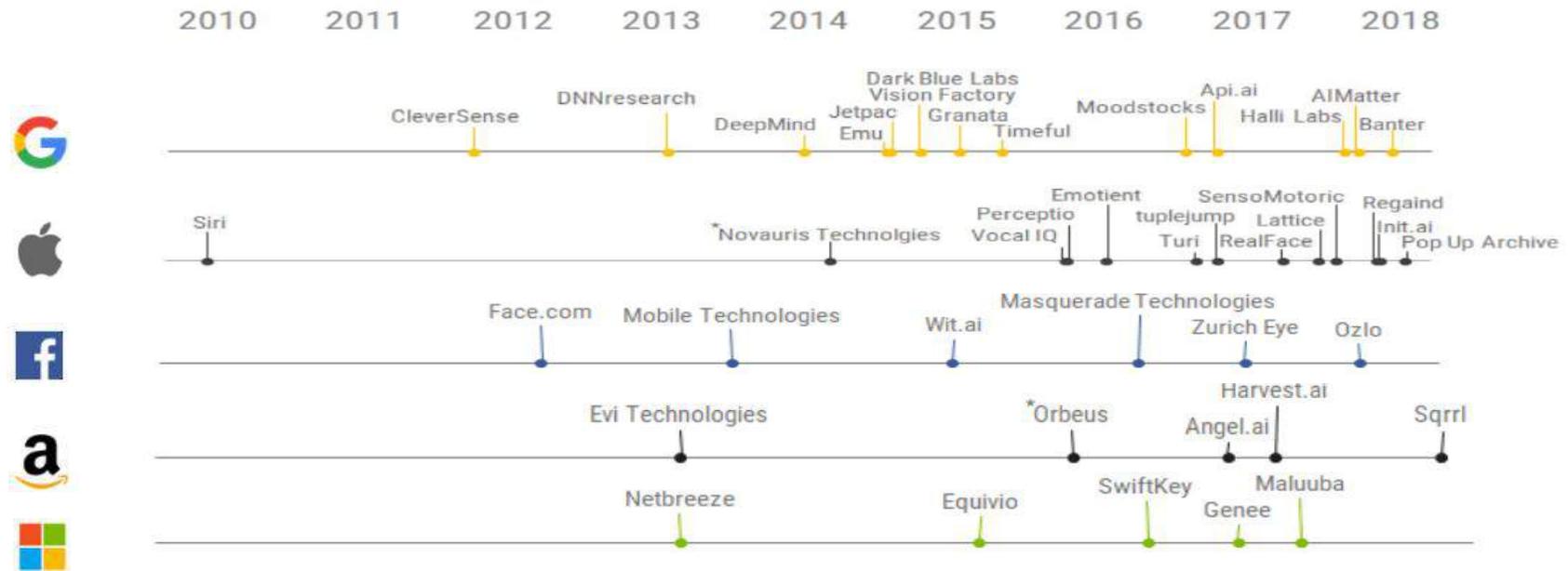
AI Engineer salary distribution chart (based on average salaries)



Acqui-hires

Of the 120 AI start-ups exited in 2017, 115 were acquired, indicating a growing competition for AI talent; FAANG - Facebook, Apple, Amazon and Google lead the global AI talent acquisition race

Acqui-hire provides an opportunity for the acquiring companies to quickly shore up capabilities, add new features to their products and strengthen their AI talent pool...



- Acqui-hires have emerged as a strong alternative to traditional modes of hiring - job boards, employee references, or campus hires. The trend has been picked up by almost all Big-Techs around the world. This involves shoring up the product portfolio of the acquiring company and also integrating the people resources working in the acquired entities. Companies like Google, Amazon, Facebook and Apple are the biggest players both in AI as well as in the AI M&A space. They are often quick to snag up vertical or horizontal AI start-ups who can provide incremental value as well as boost the company's tech talent bench
- Google's US\$1bn acquisition of Deep Mind in 2014 and Api.ai in 2017 were among the biggest acquisitions in the AI space. Apple made a US\$200 acquisition of Seattle-based start-up, Turi that helps developers and universities use machine learning for data analysis. In 2016, Twitter paid US\$150mn for a 14-people start-up Magic Pony, a UK-based AI Visual Search company. At US\$10mn/employee this has been one of the most expensive acqui-hires in recent times
- Some of the biggest advantages of onboarding talent through acquisitions is they are less likely to need training and are already working on cutting-edge projects and technologies and are familiar with frameworks and stacks



Section IV:

AI/Big Data Talent In The US

US - AI and Big Data Talent Overview

Big Data Analytics & AI talent in the United States is mostly concentrated within the US-based tech giants - typically led by Facebook, Google, Amazon, Microsoft and IBM

US has multiple Tier 1 locations both in terms of job and talent availability; Bay Area is the biggest hub

US Big Data & AI Talent Pool (By Employer Type)

Total talent pool >280,000¹

~110K in Global Top 500*, ~160K in Tech start-ups and ~10K-15K at SIs/providers

Evolving market

While the major chunk of resources are employed at Big Techs, new mid-market players are also hiring top talent - MongoDB, Cloudera, Splunk

In the US, tech-giants alone account for ~44% of the global talent pool (Top 500 spenders)

Located in Tier-1 US cities, Seattle (~27,000), Bay Area (~56,000), Boston (~5,000) & New York (10,000)

The US has >5,750 Big Data & AI start-ups

employing ~120K people in Western US and ~40K in Eastern US

US AI Talent Hotspots



Talent acquisition efforts (market makers)

In 2017³, US companies funneled

US\$650mn in investments to fuel the talent acquisition race

Western US leads the race

in investments in tech talent as well as in average annual salaries

Average annual investment in AI talent in 2017

was US\$33.3mn³ (in the US)

Over 60%¹ of the talent demand

is distributed across Enterprise Software, Consumer Electronics and BFSI (including FinTech)

Regional View: Investments in AI Tech Talent & Salaries (US, 2017)

West

Average Salary: US\$157,335
Total Investment: US\$1.1bn

Mid West

Average Salary: US\$102,861
Total Investment: US\$12.65m

South

Average Salary: US\$103,610
Total Investment: US\$84.4mn

North East

Average Salary: US\$116,008
Total Investment: US\$289.45mn

Top AI skills in demand and use cases

Deep Learning

Advertising, Disease Detection, Speech Recognition,

Machine Learning

Online Sales, Google Brain

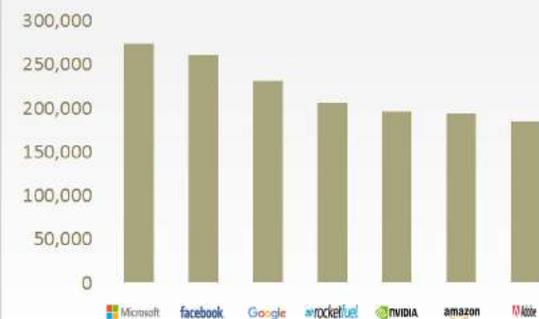
Computer Vision

Maps, handwriting recognition, Autonomous Vehicles

Neural Networks

Advertising, Customer Service, Robotic Advisors

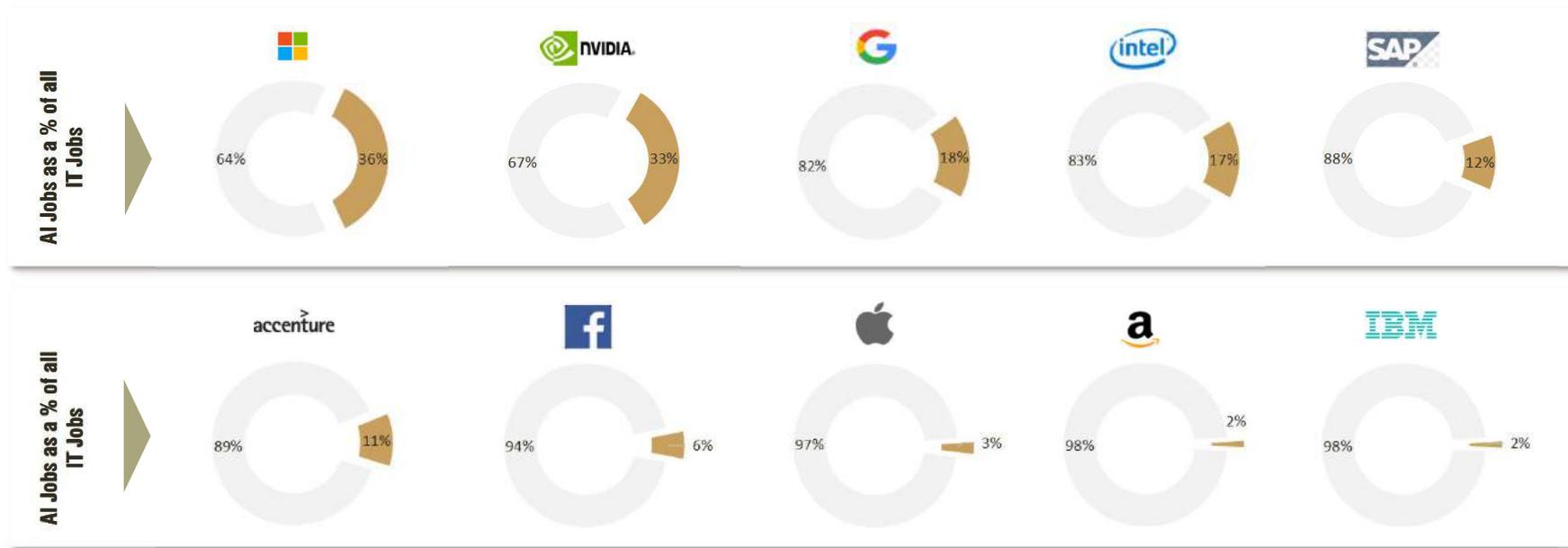
Top AI Employers (average net salary, Apr 2017)



Share in the Pie: AI positions Vs. Overall Tech Positions

The share of AI jobs is rising steadily owing to large-scale adoption & assimilation of new technologies within product lines; Microsoft is looking to hire ~2,000 AI resources globally, AI jobs constitute a 3rd of NVIDIA's total job adverts

Demand for AI talent has rapidly increased; AI-related roles have doubled in the past 3 years. Job postings with AI requirements has also increased as a percentage of overall jobs...



AI Jobs as a % of total IT jobs

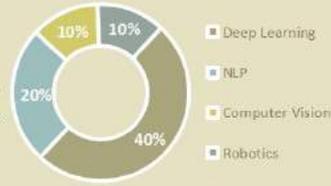
Key Takeaways

- The above illustrates the incidence of AI jobs at each company, based on a research conducted by RS Components in 2018-2019.
- According to the research, Microsoft is at the top of the AI talent hunt globally looking to fill upwards of 2,000 dedicated AI positions. Almost 36% of all IT jobs (5,440) listed at Microsoft are AI jobs. This is also corroborated by the fact that beginning 2019, Microsoft leads the pack with 697 world-class AI patents
- Closely following is graphics chip developer - NVIDIA. 1 in every 3 tech jobs at the company is an AI job totaling 369
- Other large players closely associated with hiring top AI talent globally are Google, Facebook, Apple, IBM etc
- Apple has [more than doubled its AI headcount since 2014](#) and has grown 3 times in terms of the number of Ph.D holders on its payroll. Within the tech sector, both Amazon and Microsoft are Apple's top hiring sources. While it hires upwards of 21% of its AI talent from the government sector or academics, 10.1% of its AI talent comes from acquisitions. The majority however, comes from the competition

AI and Big Data talent concentration in the US - by entities

In the race to net AI talent, large tech companies are paying top salaries to academics, researchers and Ph.Ds from select local universities

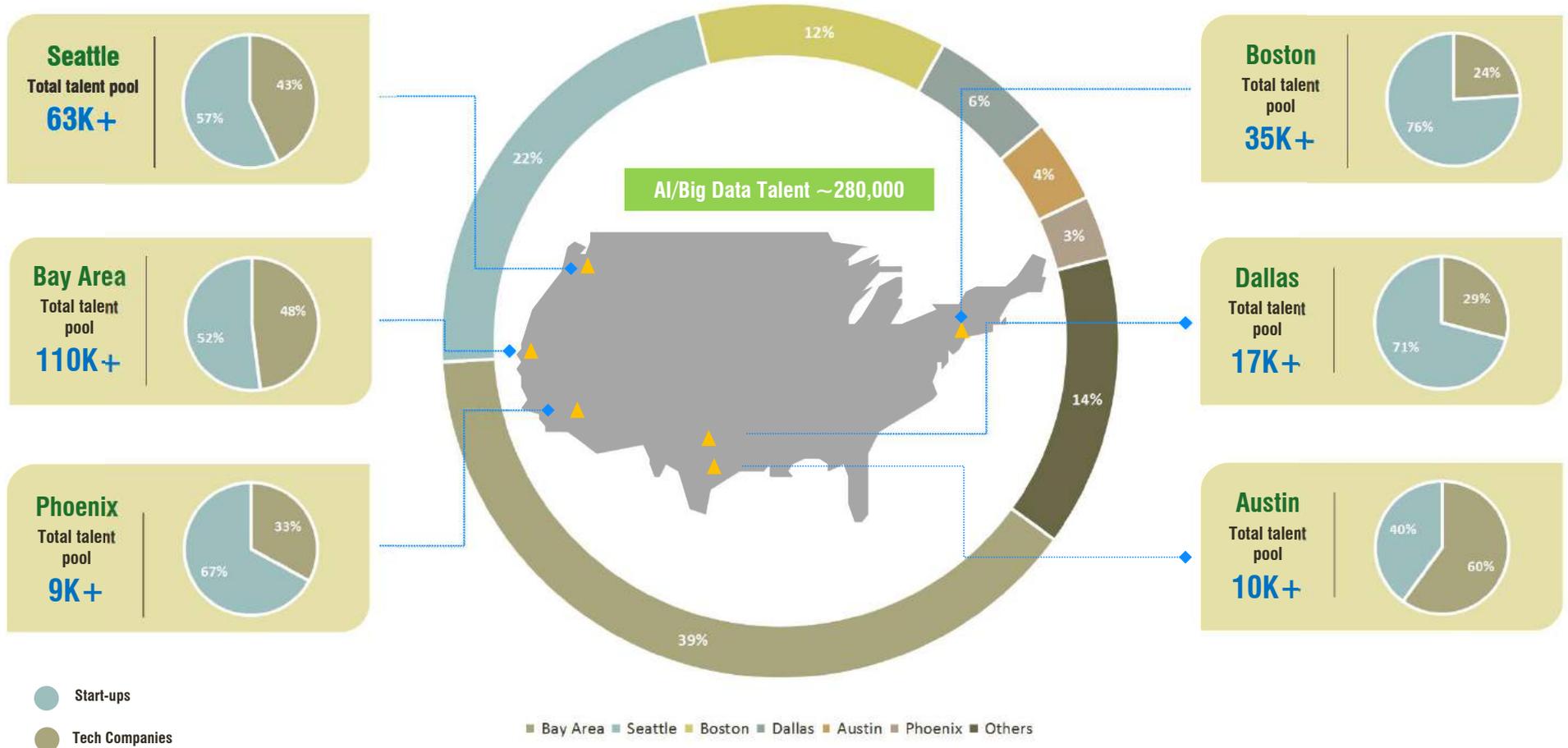
AI/Data Science talent spread across tech companies, Start-ups and University departments....

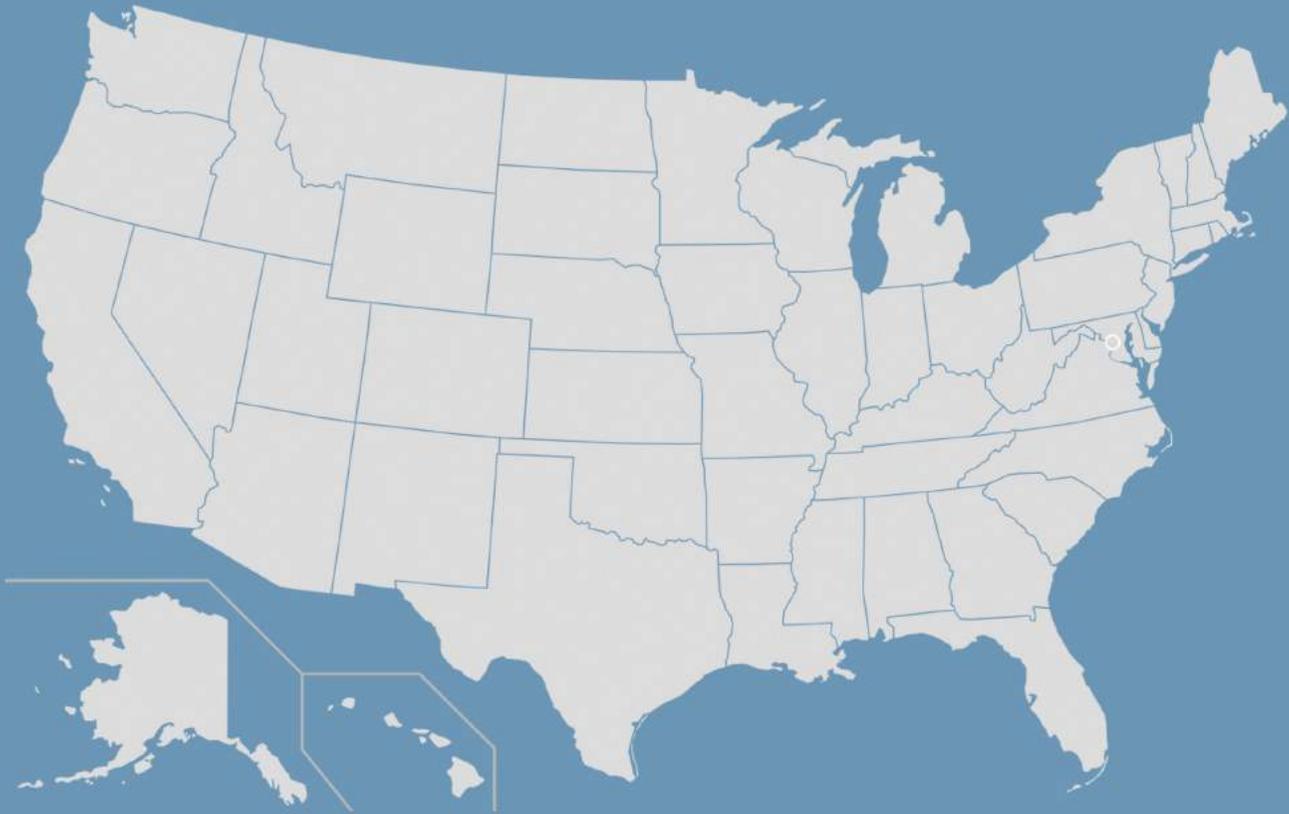
Entity type	Key takeaway	Companies/Univ.	Market Highlights	
Big Technology companies - mostly US headquartered	Typically large spenders in AI and related technologies. Employ large-scale AI/Big Data talent concentrated in Tier-1 locations across the country. Invariably pay the top salaries in the market		<p>~25,000 AI/BD engineers employed</p>	<p>US\$25bn AI/BD spend annually</p> <p>100+ acquisitions made globally</p>
Mature start-ups in the AI space	Mature platform start-ups with investments upwards of US\$100mn catering to a wide variety of industries - retail, healthcare, cybersecurity, FinTech		<p>AI start-ups with capabilities around Core AI, Computer Vision, Natural Language Processing and Data Science have sizable AI talent pool. US has more than ~1,500 AI start-ups in the Bay Area and ~120 in Seattle area. While the start-ups have hired heavily from enterprise software giants, Amazon & Microsoft in turn have hired mid-level AI talent from service providers - TCS, IBM and Accenture</p>	 <ul style="list-style-type: none"> Deep Learning NLP Computer Vision Robotics
Top Universities (scholars + academics)	MIT, NYU, and Stanford University are the favorite hunting ground for employers of AI talent. Individually these universities produce ~2,500 AI/ML talent every year. Other universities include Caltech, University of Waterloo and UCB		<p>20+ Tier-1 Universities running AI and ML courses at various levels</p>	<p>Recent hires</p> <p>Rob Fergus (NYU) - Facebook Uber hired 40 researchers from Carnegie Mellon's AI program in 2015 which dealt with self-driving cars Facebook hired Yann LeCun from NYU' currently Director of AI Research at Facebook Fei-Fei Li hired by Google (from Stanford University)</p>

AI and Big Data talent concentration in the US - by regions

Both tech companies and start-ups have large pools of AI & Big Data talent on the West Coast, in the southern and eastern regions the concentration of talent is higher within start-ups

There are regional variations in terms of the concentration of mature AI talent; Bay Area and Seattle together account for more than 61% of US' Big Data and AI talent....





Section V:

Location Deep-dive

Location Analysis - Bay Area

In the Bay Area both big technology companies and well-funded start-ups vie for AI talent; median salaries have topped US\$195K-200K; Data Science is one of common roles with emphasis on building cross-industry AI platforms

More than 65,000 resources work in ~1,500 start-ups operating in the Bay Area; enterprise software, cloud computing, semi-conductor, gaming and consumer electronics are the key verticals

Bay Area - AI/Big Data Talent

Total available talent
~110K-120K

Talent pool:
In large companies ~55K
In start-ups ~65K

Median Salary
US\$195K-US\$200K



Talent Hubs	Tech Companies	Start-ups
San Francisco	Uber	Sentient, Anki, Vicarious, Figure Eight
Palo Alto	Tesla, SAP, SalesforceIQ	Pr3vent, Conversica, Autolab AI
Mountain View	Google	Datavisor Inc., Nuro
Santa Clara	Apple (Cupertino)	SoundHound Inc.
Sunnyvale	Yahoo Inc.	CrowdStrike
San Jose	Adobe, MapR	Pony.ai, AppZen
San Mateo	Facebook (Menlo Park)	Brain Corp.

Recruitment dynamics in the region

Key employers in the region

- Corporations, Big Techs, AI-focused start-ups. Strong competition for top AI talent between large companies and start-ups

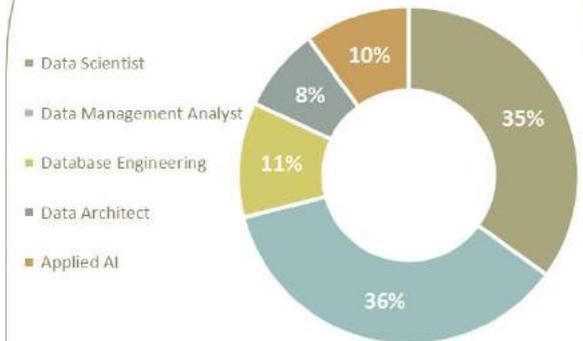
Start-ups

- Approximately 1,500 AI start-ups operate from Bay Area and are one of the lucrative destinations for AI talent. Operating in 4 key technology areas within AI - Core AI, Computer Vision, NLP and Data Science. Platform start-ups with strong VC backing are hiring laterally from tech giants like Adobe, Google, and Microsoft

Universities

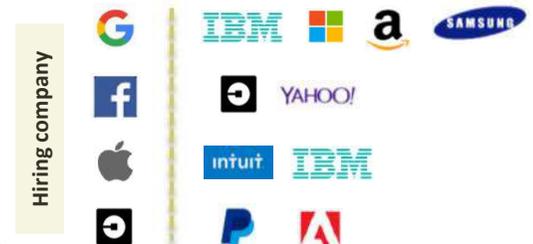
- There are 10 universities in the region which churn out sizable number of potential recruits both at a graduate as well as doctoral level
- Top universities include Stanford University, University of California - Berkeley, California Institute of Technology, Carnegie Mellon

Headcount by skills



Ex-employee analysis

Past experience



Top 5 employers of AI/Big Data - Bay Area

Google and Facebook have hired experienced engineers from peer tech companies many of whom are graduates of Tier 1 US universities; Apple and Uber have hired from Microsoft as well as from Google

Top 5 large tech companies hiring AI talent in the Bay Area have close to 12,000 people working on various projects....

Top 5 Roles

Top 5 Employers	Headcount: 12K	Data Scientist	Database Engineer	Applied AI	Data Architect	Data Management	Key Takeaways
	~4,600	~3,036	~736	~138	~184	~506	<ul style="list-style-type: none"> Google runs AI-based product development across major business units - TensorFlow, Waymo, DeepMind, Android, Youtube, Chrome and Maps. Has recently allocated US\$25mn for AI research targeted in the social sector. Facebook's key AI product priorities across DeepText, facial recognition, Oculus Advanced Development Group, Instagram and Whatsapp are based out of the Bay Area. Hired Jerome Pesenti as VP of AI. Competes for talent with tech giants such as Amazon and Google's DeepMind. Apple's headquarters in the region employs 80% of its R&D talent. Core ML teams from Siri, Developer's platform, iOS, iCloud etc. are also based out of this centre. Working to discard the laggard tag in terms of investments in AI/ML with new hires to lead AI/ML research.
	~2,000	~1,280	~500	~40	~80	~100	
	~3,000	~1,680	~480	~180	~180	~480	
	~1,200	~936	~180	~12	~24	~48	
	~1,000	~210	~100	~10	~100	~580	

Location Analysis - Seattle

Has the second largest concentration of AI talent after the Bay Area; majority of the talent are in Data Management & Data Scientist roles in large global corporations including tech companies as well as in industry/vertical-specific start-ups

While Seattle has been the area of competition for major cloud providers such as Microsoft and Amazon, it has turned in to an AI/ML hub....

Seattle - AI/Big Data Talent

Total available talent
~63K-65K

Talent pool:
In large companies ~27K
In start-ups ~36K

Median Salary
US\$185K (Big Tech)
US\$100K (Start-ups)



Talent Hubs	Tech Companies	Start-ups
Seattle	Microsoft	KenSci, Utrip
Belle Vue	Amazon	Mighty AI
	Facebook	XNOR.AI
	Google	Signal

Recruitment dynamics in the region

Key employers in the region

- Microsoft Azure ML Lab, Facebook Deep Learning, and Amazon Core NLP teams are based out of Seattle and have high concentration of Data Scientists. Tencent has opened an AI research center at Belle Vue with 20 specialists. Baidu also opened a center after acquiring Kitt.ai.
- Amazon continues to invest in Alexa while Microsoft has been making newer investments in AI.

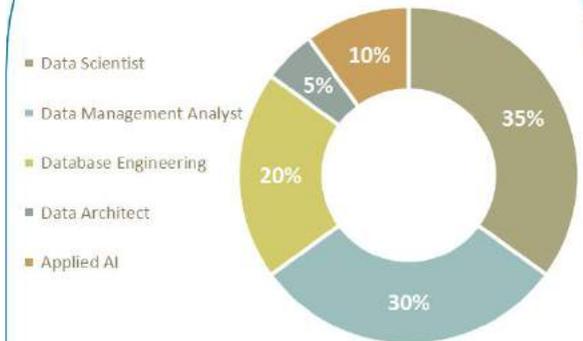
Start-ups

- There are an estimated ~120-150 AI start-ups operating in Seattle region. Vibrant and growing ecosystem - new NLP start-ups such as Textio, DefinedCrowd, Mighty AI, VettD

Universities

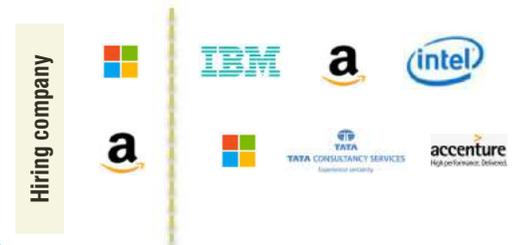
- Dan Weld, from the University of Washington has been hired by The Allen Institute for Artificial Intelligence.

Headcount by skills



Ex-employee analysis

Past experience



TALENTSPECTRA BY AVANCE CONSULTING

TALENTSPECTRA is the advisory and insights team of **Avance Consulting**, a world-class provider of innovative talent acquisition solutions and Executive search services. With a global presence in the UK, US and India, it brings together a decade-long experience in recruitment best practices matched by a strong service delivery ethos.

Continuous evolution of Digital business models has disrupted the existing norms; new roles are being created while old ones are becoming redundant. Hiring methodologies are changing and re-skilling initiatives have taken the centre stage. Automation, Cloud & Cybersecurity, IoT and Immersive Technologies are driving the next round of change. Businesses are becoming more customer-centric and decision-making being driven by Data.

Amidst this transformation, we aim to partner with our customers and stakeholders in their recruiting journey by providing them with information and analyses pertaining to talent acquisition; combining the dimensions of Business, Technology and Skills.

Backed by a strong understanding of Digital Technologies and global IT landscape, **TALENTSPECTRA** is the right partner to assist you in your day-to-day decision-making.



www.avanceservices.com



www.facebook.com/avanceatpar



instagram.com/avanceconsultingservices



twitter.com/Avance2007



www.linkedin.com/company/avance-services