U.S. Demand for AI-Related Talent Part II: Degree Majors and Skill Assessment

CSET Data Brief

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Introduction

In our previous brief, "U.S. Demand for AI-Related Talent,"[1] we found wide-ranging demand for a workforce capable not only of creating, but also of integrating and applying the incredible potential of artificial intelligence. Our analysis of job postings in the United States from 2010 to 2019 highlighted the geographic spread, degree level requirements, and sectoral application of AI-related jobs.[2] Notably, the majority of AI-related job postings—roughly 80 percent—required a bachelor's degree at minimum, regardless of the year, location, or sector. The consistency of degree requirements led to more detailed questions about the specific majors requested in job postings, as well as the skills accompanying them.

Given the steady growth and diversification of AI-related jobs across the United States,[3] identifying the degree majors and skills sought by employers is important for individuals looking to fill these positions. A 2019 Gartner report cited the lack of skills for AI-related talent as a major concern of employers looking to implement more AI solutions in their organizations.[4] Because AI-related jobs do not fall under one specific category or definition,[5] acquiring the necessary skills in addition to holding a four-year degree improves a job candidate's chance of being hired.

In this brief, we dive deeper into Burning Glass job posting data,[6] using the predefined categories of core AI and AI-adjacent to distinguish between jobs directly implementing AI and those that are AI-enabled (see Appendix). Our motivation for using these categories and associated caveats are found in our first brief.

Findings

For this analysis, we select U.S. job postings from 2010 to 2019 that specify a minimum degree requirement of a bachelor's degree and that list at most 10 degree majors of interest.[1] The majority of job postings list more than one major, with 28 percent of job postings listing one degree major only. We separate job postings into core AI and adjacent AI to understand the differences between the degree majors and skills employers seek depending on the type of position and role for which they need AI talent.

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[1] Job postings with a high count of degree majors reflect mass calls of open positions.

Figure 1 provides a breakdown of the top five degree majors and skills from 2010–2019. We analyzed the top five degree majors and skills for each year respectively, and found minimal changes over time. For core AI job postings, the degree majors in the top five do not change at all, while for adjacent AI job postings, the degree major in fifth place minimally changes, with Electrical Engineering replacing Management Information Systems and Finance.[2]

Core AI

Degree Majors
- Computer Science
- Statistics
- Business Admin/Management
- Engineering
- Mathematics

Skills
- Data Science
- Python
- Machine Learning
- SQL
- Communication

Adjacent AI

Degree Majors
- Computer Science
- Engineering
- Business Admin/Management
- Economics
- Electrical Engineering

Skills
- Communication
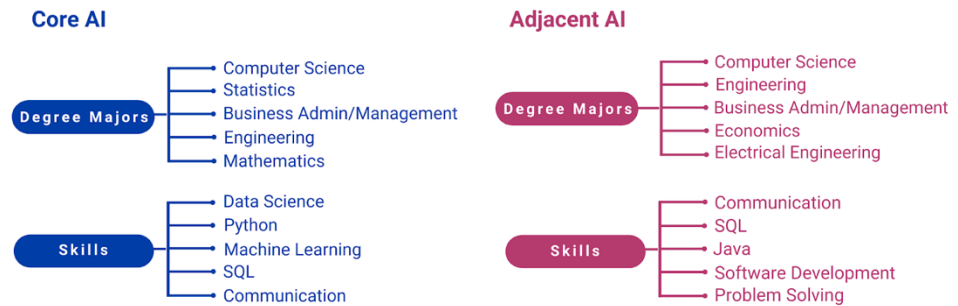- SQL
- Java
- Software Development
- Problem Solving

Figure 1: Provides the top five degree majors and the top five skills listed in the job postings with the top 25 job titles for core AI and adjacent AI, respectively.

In order to identify the leading five skills, we select job postings from the top 25 job titles for core AI and adjacent AI, respectively. These job titles account for 20 percent of the core AI job postings and 13 percent of the adjacent AI postings. The top 25 job titles are also relatively stable over time, with only core AI shifting in 2014. From 2010 to 2013, software engineering-related positions led in the top five, but in 2014, data science and data engineering-related positions took precedence.[3] We use the top 25 as a representation of the most common AI-related positions employers advertise. Within these postings, over the full 10-year period, the top five skills do not change for either core or adjacent AI. Communication appears in both top five skills lists and problem solving appears in adjacent AI's top five skill list, with the remaining skills falling under technical and hard skills.

Takeaways

While AI jobs have increased with the growth in AI-enabled solutions implemented across sectors, AI-related job requirements have remained stable over time. This trend is significant for those interested in pursuing—or transitioning to—a career in AI. While this analysis does not provide specific

[2] Finance is in fifth place in 2011, 2013, 2018, and 2019, and Management Information Systems is in fifth place in 2010 and 2012.
[3] This shift to data-focused job titles remains consistent through 2019.

on-the-job skill requirements, it does inform job candidates of the best access points for AI-related positions. Additionally, this market stability suggests that even in a domain seen as rapidly changing, foundational education and skills remain worth the investment of time and money—both by students and employers. Furthermore, the national security community can target training programs for both incoming employees and transitioning veterans that provide broad value to the overall American R&D ecosystem.

When it comes to AI jobs, many believe a degree in Computer Science is necessary for success. Yet our analysis suggests that while Computer Science is the most commonly listed major for both core AI and adjacent AI, it is not actually a requirement for the majority of postings. Core AI degree majors focus more on direct implementation of AI, with additional majors sought in areas such as Statistics and Mathematics; on the other hand, adjacent AI degree majors tend to focus on AI-enabled solutions, with majors like Economics and Electrical Engineering in demand. Interestingly, Business Administration/Management appears in both top five lists. The majority of job postings list more than one degree major, signaling that AI talent is not expected to have one specific major to meet job requirements. Top skills, however, are consistent, indicating that a four-year degree in addition to the main skill set is critical.

Finally, the most common AI-related jobs highlight the importance of Python, Java, and SQL as programming skills. Notably, communication and problem solving are in high demand as well. This finding suggests that certifications or online coding bootcamps may want to broaden beyond rote coding lessons to maximize an individual's marketable skills and qualifications.

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Endnotes

[1] Autumn Toney and Melissa Flagg, "U.S. Demand for AI-Related Talent," August 2020. https://cset.georgetown.edu/research/u-s-demand-for-ai-related-talent/.

[2] Toney and Flagg, "U.S. Demand for AI-Related Talent."

[3] Gartner TalentNeuron™, "Future-Proof Your Talent Strategy," 2018. https://www.gartner.com/en/human-resources/research/talentneuron/future-proof-your-talent-strategy.

[4] Gartner Press Release, "Gartner Survey Reveals Leading Organizations Expect to Double the Number of AI Projects In Place Within the Next Year," July 2019. https://www.gartner.com/en/newsroom/press-releases/2019-07-15-gartner-survey-reveals-leading-organizations-expect-t.

[5] Albert Christopher, "How To Start a Career In Artificial Intelligence IN 2020? A Step by Step Guide," March 2019. https://medium.com/@albertchristopherr/how-to-start-a-career-in-artificial-intelligence-in-2019-a-step-by-step-guide-b18ad32d1b1f.

[6] Burning Glass Technologies, 2020. https://www.burning-glass.com/about.