How Machine Learning Skills Can Advance Careers

The five W's of building machine learning skills

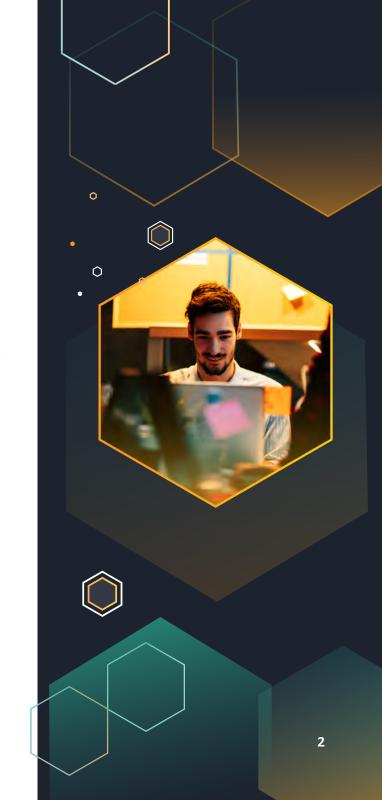# **Why** is building machine learning skills a golden opportunity for developers and data scientists?

By improving their machine learning skills, developers and current or aspiring data scientists can accelerate or expand their careers, provide more value to their organizations, and increase their teams' standing. Much of this can be achieved by transforming the growing IT skills gap—the separation between the capabilities of advanced technologies and the abilities of internal teams to fully capitalize on them—into an opportunity.

Understanding how developers and data scientists can leverage the IT skills gap to benefit their careers first requires an overview of the severity of the gap and its implications. According to the Global Knowledge 2019 IT Skills and Salary Report, 79% of IT decision-makers say their teams lack necessary skills—up from just

31% in 2016. These decision-makers are highly motivated to solve this issue quickly, with 76% saying that skills gaps pose a high or medium risk to business objectives.[1] Further, IDC projects that worldwide losses due to IT skills gaps will soon total $390 billion annually.[2]

How does this translate into an opportunity for developers and data scientists? The Global Knowledge report found that organizations are increasingly valuing the capabilities and job satisfaction of their IT teams. When asked to cite the impacts of IT skills gaps on their businesses, the #1 most common response was "increased stress on existing employees"—ranking well ahead of more bottom-line concerns like "decreased ability to meet business objectives" (#4) and "increased operating costs" (#8).

While the study doesn't detail what (if anything) organizations are doing to relieve increased employee stress, it does show that businesses are paying IT professionals more. The 2019 report found that worldwide salaries for IT workers went up by an average of $5,000. It's unclear how much of that money can be attributed to skills gaps, but respondents who said they received a raise because they "added new skills" reported an average salary increase of nearly $12,000—more than twice the overall average—indicating that, in today's climate, IT skills improvement can translate into higher earnings.

Learning new skills appears to pay off, but what specific skills should developers and data scientists study in order to maximize the benefits? That question can be answered in a lot of ways, but one viable approach would be to look for skills that are both 1) in high demand and 2) rare among other cloud practitioners.

By that measure, building machine learning skills should be a top priority for developers and data scientists. Demand is high—in the Global Knowledge report, 38% of IT decision-makers cited "AI, cognitive computing, and machine learning" as a key investment area for 2019. According to Grand View Research, the worldwide machine learning market was valued at $6.9 billion in 2018 and is projected to expand at a 43.8% compound annual growth rate (CAGR), reaching $96.7 billion by 2025.[3]

The supply of machine learning skills is low. Returning to the Global Knowledge report, "artificial intelligence and machine learning" was identified as a top 10 challenge area for finding qualified talent. More than half of surveyed IT professionals said their "AI, cognitive computing, and machine learning" skills were "somewhat low" or "low." Only 22% assessed their abilities as "somewhat high" or better—and just 9% described their skills as "high."

With skills both highly desirable and rare, machine learning is an area developers and data scientists should strongly consider to help them transform the IT skills gap into a golden opportunity for their careers and their organizations. Deciding to take this route is only the first step in a larger journey, however. The next step is finding the right training resource.

Where is the best place to develop machine learning skills?
AWS Training and Certification

AWS Training and Certification is the best resource for developers and data scientists who want to quickly and comprehensively build their machine learning skills. Learners of all experience levels will find the most efficient, effective path toward mastering machine learning and capturing the benefits detailed in the previous section. That's because AWS Training and Certification for Machine Learning offers:

- **Real-world, hands-on training:** Courses and materials go far beyond theory to address real-world tasks and contexts. Participants learn use cases that are relevant to their roles, complete projects designed to create measurable business value, and practice and experiment in risk-free sandbox environments.

- **The flexibility for users to learn in their own ways:** AWS offers machine learning training through more than 65 courses that cover every skill level. Training is delivered in a variety of modes: free digital, self-paced learning; virtual and in-person instructor-led courses; and private, in-house training. Users can freely mix and match these modes, enabling them to learn what, how, and when they want. They can select curated learning paths that build machine learning skills step by step, jump straight (in most cases) to the courses that interest them, or choose any combination of either approach.

- **Expert curriculum straight from the source:** Tens of thousands of businesses currently build, train, deploy, and run machine learning models on AWS, and more machine learning happens on AWS than anywhere else. Choosing AWS Training and Certification enables developers and data scientists to learn machine learning skills from experts with firsthand, up-to-date knowledge—not just for machine learning in general but also how to deploy it using AWS. Users will have access to training based on the same curriculum leveraged by Amazon's own machine learning developers and data scientists.

That covers **why** developers and data scientists should improve their machine learning skills and **where** they should go for training. The next section turns to the **"what"**—listing the specific abilities that must be developed in order to fully leverage machine learning models and systems.

What skills do developers and data scientists need for machine learning?

Maximizing machine learning abilities and capitalizing on the opportunity of the skills gap requires the development of expertise in specific disciplines. Developers and data scientists can use these checklists to identify the machine learning building blocks they have yet to master and keep track of progress as they learn.*

Developer	Data scientist
☑ Machine learning terminology	☑ Basic linear algebra, statistics, and probability
☑ CRISP-DM methodology and framework	☑ Problem formulation
☑ Problem formulation	☑ Exploratory data analysis
☑ Data preparation and cleaning	☑ Data preparation and cleaning
☑ Feature engineering	☑ Feature engineering
☑ Model training	☑ Model training
☑ Model tuning and debugging	☑ Model tuning and debugging
☑ Model evaluation	☑ Model evaluation
☑ Model deployment/productionizing	☑ Model deployment/productionizing
☑ WS AI/machine learning stack	☑ AWS identity and access management
☑ Amazon SageMaker	☑ Amazon SageMaker

*While this list is not exhaustive, it focuses on some of the most critical machine learning skills as well as key skills for deploying machine learning on AWS.

Who are the Machine Learning Heroes?

The AWS Machine Learning Heroes program highlights developers and academics who are proficient with deep learning frameworks and are passionate enthusiasts of emerging AWS machine learning technologies. They demonstrate the benefit of a machine learning curriculum built on the same one leveraged by Amazon's own developers and data scientists.

The Heroes enjoy helping learners of all proficiencies develop and apply machine learning skills—at speed and scale—through Hero blog posts, videos, and technical sessions, as well as direct engagement.

Meet the AWS Machine Learning Heroes >

Kesha Williams
Software Engineer and Training Architect and
AWS Machine Learning Hero

Mastering machine learning—at work and at home

"With (AWS Training and Certification), it all fits together and allows you to go from beginner all the way up to actually producing stuff. I think it's a great path for getting your developers up to speed."

Alex Schultz
Senior Software Engineer and AWS Machine Learning Hero since 2019

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Alex Schultz decided to improve his machine learning skills for a number of reasons—but mostly because he was craving a challenge.

"I think there's so many problems that…you can't solve using traditional programming," Alex said. "But machine learning kind of opens the gate to a whole set of resources or new ways of solving these problems…it's huge. It's transforming everything right now."

Recognizing the importance of the technology to his career—and the opportunity to play with machine learning in his spare time—Alex decided to get his AWS Certified Machine Learning – Specialty certification. He was initially drawn to the AWS Training and Certification platform to prepare for the exam, but he soon discovered a number of other benefits.

"There's a lot of information on there that isn't elsewhere. It's been a great resource to help as stuff comes up day to day," Alex said.

Alex was impressed by the organization of courses, the curated learning paths, the ease of finding answers to specific questions, and the platform's intuitive interface.

"(AWS Training and Certification) allows you to go from beginner all the way up to actually producing stuff. I think it's a great path for getting your developers up to speed," Alex said.

A fervent learner and frequent reader of academic textbooks, Alex plans to continue exploring the possibilities of machine learning through AWS training—at work and at home.

"My wife has like a million photos from our family. So, in my own free time, I'm trying to build an image organizer/tagger program, which uses deep learning and computer vision to go through a photo album and…organize the photos," Alex said.

Connect with Alex >

Discovering a wealth of knowledge and resources

Joshua Arvin Lat—Arvs to his friends—is a big fan of AWS Training and Certification.

"If I were to rate it, it's probably going to lie between 9.5 to 10 over 10," Arvs said. "I think it's one of the best—if not the best—learning libraries ever."

Arvs said he enjoys the layout and structure, the convenience of curated learning paths for specific skills, and the ability to easily filter courses by topic, role, and other categories.

"I like the ability to build on top of what I learned from a previous reference inside the same learning library. Things are explained properly and there were no assumptions being made (about) the technical capabilities of the audience," Arvs said.

Arvs uses AWS Training and Certification to study a variety of topics, but most of them fall within the discliplines of data science and machine learning. He's developed skills essential to his job, including security and penetration testing, anomaly detection, and forecasting. Training from AWS helps Arvs complete development and data science tasks faster—giving him more time to focus on his managerial duties and leadership role.

Arvs has also discovered an unexpected benefit of developing his machine learning skills: getting a long-awaited return on a critical investment.

"In college, all we did was study math and statistics," Arvs said. "After college, we would joke, 'Did we ever use any of the things we learned?' But when I had to deep dive into machine learning, I realized, 'Oh, that's where it's applied!' I was finally able to get some value out of my college tuition."

Connect with Arvs >

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Joshua Arvin Lat
CTO and AWS Machine Learning
Hero since 2020

When should developers and data scientists get started?

The best time for developers and data scientists to start improving their machine learning skills is **right now**. With so many free digital courses and materials available from AWS Training and Certification, there's no need to wait.

AWS has designed specific learning paths for developers and data scientists to help them build machine learning skills as efficiently and comprehensively as possible:

Explore the developer machine learning path >

Explore the data scientist machine learning path >

Users are free to jump on and off the learning paths at will, exploring other courses and resources that interest them.

Not ready to commit to a path?

AWS Training and Certification does not require any commitment, long-term or otherwise, to any of its learning paths. Developers and data scientists who are still in the early stages of their machine learning journeys can test the waters with a single introductory course.

For **developers**, AWS recommends: *Machine Learning Building Blocks: Services and Terminology* (40 minutes, self-paced digital course, free).

For **current or aspiring data scientists**, AWS recommends: *Data Science Capstone: Real World Machine Learning Decisions* (50 minutes, self-paced digital course, free).

More information can be found on the AWS Training and Certification page.

Learn more >

Recap

For developers and data scientists, this guide covered the five W's of building machine learning skills:

Why: Accelerate career, provide more value, increase standing

Where: AWS Training and Certification

What: Checklist of machine learning building-block skills

Who: Machine Learning Heroes validate success

When: Best time to start—right now

Browse courses and learn more >

Start training* >

*Free Amazon/AWS account required.

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Sources:
1. https://www.globalknowledge.com/us-en/content/salary-report/it-skills-and-salary-report/
2. https://www.idc.com/getdoc.jsp?containerId=US44842319
3. https://www.grandviewresearch.com/industry-analysis/machine-learning-market