Customer Story

NVIDIA

Challenge

Many employees in the technology sector have extensive engineering backgrounds with somewhat limited experience in advanced data analytics. However, there is growing demand for statistical thinking among the world's industry-leading employers.

A new way with statistics for seasoned professionals

How one manager helped up-skill the workforce at world-leading graphics developer NVIDIA by integrating a free statistical analysis online learning resource

The gaming industry is a coveted destination for many engineering and computer science professionals, not just for its unconventional career opportunities but also for the chance to innovate. Over the past three decades, significant real-world innovations – from AI to robotics – were born, at least in part, from advancement in the gaming industry.

Founded in 1994 with the mission to transform computer graphics for video games, NVIDIA's meteoric rise in the industry was fueled by massive growth in the gaming market and the near-insatiable demand for better 3D graphics. Today, NVIDIA's graphics cards are the global standard in performance, transforming machines at the intersection of virtual reality, high-performance computing and artificial intelligence.

NVIDIA has grown beyond the gaming industry, too, providing essential tools for the film visual effects industry, AI and more. Eight of the world's top 10 supercomputers now use NVIDIA GPUs, InfiniBand networking or both – including Summit, the fastest supercomputer in the US, as well as the fastest systems in Europe and China. NVIDIA powers 333 of the overall TOP500 systems on the latest list. NVIDIA products are found in everything from mobile devices to entertainment systems to self-driving cars and beyond.

Predictive analytics powers innovation

For over a decade, Pete Cannon has helped proliferate the use of statistical methods within NVIDIA as Product Quality Engineering and Quality Management Systems Senior Director, a position from which he works with teams in Santa Clara, CA; Hong Kong; and Shenzhen, China.

"Continuous improvement initiatives are one of our primary responsibilities," he explains. Using statistical analysis, Cannon and his team have detailed key performance indicators in place to assess product performance using inline production quality monitors and customer feedback. With cross-functional team support, he uses JMP capabilities to analyze and prioritize improvement opportunities.

This type of predictive and continuous learning powers the innovation that has defined NVIDIA since its inception. NVIDIA engineers invented the GPU in 1999, making real-time programmable shading possible and giving artists an infinite palette for expression. In May 2020, NVIDIA introduced its Ampere architecture, designed for the age of elastic computing, delivering the next giant leap by providing unmatched acceleration at every scale, enabling innovators to do their life's work.

Over a decade advocating statistical know-how

Cannon has long relied on analytics to transform data into information in quality management. Early in his career, Cannon began to refine these skills while on the job, and soon reached a point where his work was limited by the software at his disposal.

Like many engineers, Cannon had been using Excel to tackle even the thorniest of analytical challenges. But with its limited capacity to handle analyses that have now become ubiquitous in quality engineering – and the static nature of its graphics, which limits data exploration – Excel was coming up short.

"Excel was not able to solve the problems that I was dealing with, and I had heard of JMP previously," he remembers. Twelve years earlier, Cannon had attended a three-day JMP® workshop in San Francisco. "I was able to solve a problem the first night after taking a data exploration class – we'd gone over JMP data partitioning tools …. and I realized very quickly that I needed to stop using Excel for analytics and switch over to JMP. I've been using JMP on a daily basis ever since."

The software's interactive data visualization features in particular not only help to translate abstract statistical concepts into useful applications, they are also invaluable in helping Cannon quickly translate raw data into insights that can be swiftly acted on. He frequently uses the tool for data visualization (Graph Builder), exploration (Analyze – Distribution), assessing distribution shifts and variation over time (Trended Box & Bubble Plots), creating advanced data summaries (Analyze – Tabulate), data manipulation (stack and split), performing one-way analyses to compare parametric distributions across categories and identify differences (Fit Y by X), identifying best fit reliability models (Reliability – Life Distribution), creating correlation matrices (Multivariate Methods), finding the optimal number of experimental runs and corresponding settings (DOE Custom Design), exploring manufacturing out-of-control events (Control Chart Builder), regression analysis (Fit Model), and creating bootstrap forests and partition analyses (Predictive Modeling), among other platforms.

jmp
Statistical Discovery.™ From SAS.

I highly recommend STIPS for any organization that wants to enhance and expand their use of statistical tools in solving problems.

–Pete Cannon, Senior Director of Product Quality Engineering & Quality Management Systems

Recognizing a need – and an opportunity

Soon after adopting JMP himself, Cannon began to realize that many of his colleagues were using other tools for analytics when he knew there was a more efficient way to work. "My manager from early in my career would always say that the first step in data analysis is to plot the data," he recalls. "In the ensuing years, I saw many people make that mistake. Instead, some go straight to the tables and miss out or delay the insights that can be quickly identified from Graph Builder. Anytime I see raw data spreadsheets in meetings, I ask for the file and am able to generate insightful analyses in a matter of seconds."

As Cannon says to those in training programs, "If you are spending more than five minutes per month using Excel for data visualization, you are wasting your time by not using JMP." To illustrate, he challenged his colleagues to replicate box-plot yield-trended X/Y trellis wafer maps in Excel. "I haven't created a graph in Excel since 2009," he laughs.

Here was a need for new software and an opportunity to scale the advantages that he himself had achieved. For Cannon, that meant equipping his team with the gold standard statistical tool that opened so many doors for him over a decade ago. So he put together a JMP training course for NVIDIA's operations team.

"I went through how I've tailored JMP to give the output that I think is most beneficial to engineers who are analyzing data and covered the statistical analysis platforms that are most commonly used," he explains. "Graph builder is an extremely useful tool in my daily work. Being able to quickly import data and create insightful data visualizations with labels for outliers accelerates decision making. These are all very powerful tools that provide a distinct advantage over competing tools – in both timeliness and content."

Not everyone arrives at NVIDIA with the type of statistical knowledge that such work demands. Cannon has observed how quickly engineers that are new to JMP are able to start using the tool and advance their analytic skillsets. That is part of the reason why Cannon has taken it upon himself, with the full backing of senior management, to expand the range of continuing education and on-the-job training available to the company's engineers.

A self-paced crash course, direct from industry experts

Biannual JMP Days organized by Cannon are a prime example of NVIDIA's emphasis on up-skilling its workforce. At these typically three-hour events, technical experts from JMP provide on-site training and Q&A support. NVIDIA engineers may share presentations or software tips.

But in line with NVIDIA's philosophy of building an organizational culture of analytics, training opportunities do not stop there. In 2019, Cannon added Statistical Thinking for Industrial Problem Solving (STIPS), a free online course from JMP, as a recommended training supplement. "I knew that STIPS was an outstanding opportunity to further promote statistical thinking within NVIDIA," he says, emphasizing the need not just for basic concepts but for developing data-driven problem-solving skills.

Though STIPS is sponsored by JMP, its more than 25 hours of content were written and created by a team of experts with industry experience. Examples cited in the course come from real-world cases and are designed to inspire statistical thinking in the face of industry challenges.

NVIDIA now offers staff two options for completing the program: self-paced study or via weekly one-hour WebEx meetings where attendees go through the material together. These weekly sessions (led by Iris Shen, an engineer in the quality group), were attended by employees from over 10 divisions within the organization with participants ranging from those who have used JMP at an advanced level for many years to those who have never used any statistical tool other than Excel.

"STIPS is excellent in balancing statistical theory and the practical hands-on use of JMP to solve common problems that many organizations deal with on a routine basis," says Cannon. "It was positively received by everyone I spoke with, and we are in discussions on rolling it out again this year. The best testament to the value of this training is when I go to meetings and see the methods being put to use."

His advice for others looking to promote analytics? "I highly recommend STIPS for any organization that wants to enhance and expand their use of statistical tools in solving problems."

Solution

Provide experienced engineers and computer scientists with on-the-job training in applied statistical analysis. NVIDIA Management incorporated a free online statistics course, Statistical Thinking for Industrial Problem Solving (STIPS) into their in-work learning programs. STIPS not only offers an interactive, self-paced study format, it familiarizes them with JMP, an industry-standard software.

Results

Says NVIDIA Product Quality Engineering & Quality Management Systems Senior Director Pete Cannon, "STIPS is excellent in balancing statistical theory and practical hands-on use of JMP to solve common problems that many organizations deal with on a routine basis."

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