Artificial Intelligence (AI) in Engineering Practice, Education and Research

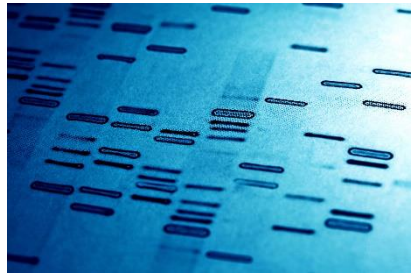
P.J. Boardman, Director of Education
MathWorks

Preparing Students for Industry

Aerospace

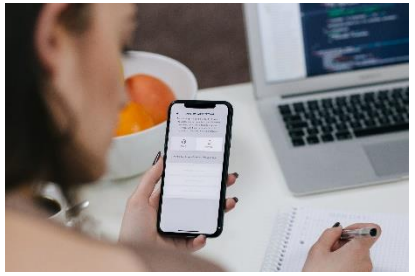
Automotive

Biological Sciences



Biotech and Pharmaceutical

Communications



Electronics

Energy Production

Financial Services

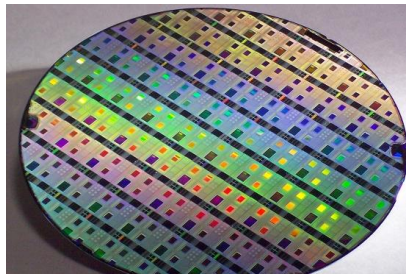
Industrial Machinery

Medical Devices

Metals, Materials, Mining

Neuroscience

Railway Systems



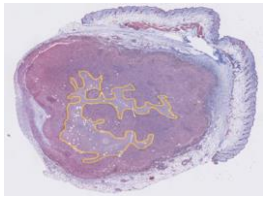
Semiconductors

Software and Internet

Preparing Students for Industry

Industrial Examples of Artificial Intelligence Applications (AI)

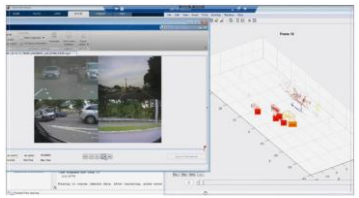
Biotechnology R&D
- Pathology analysis



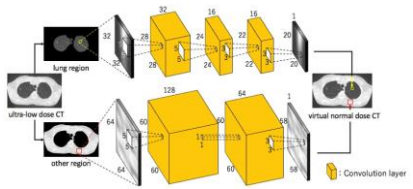
Oil & Gas major
- Machinery identification
- Satellite terrain recognition

Major Auto Parts Supplier
- Detect abnormalities in parts

Auto Technology Provider
- Lidar object detection

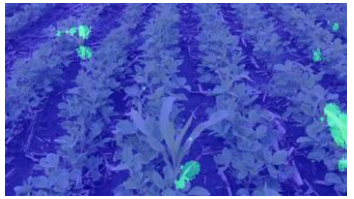


University Research Group
- Reduce exposure in CT imaging



Major aircraft manufacturer
- Quality control and measurement

Agricultural machine manufacturer
- Weed detection for smart spraying



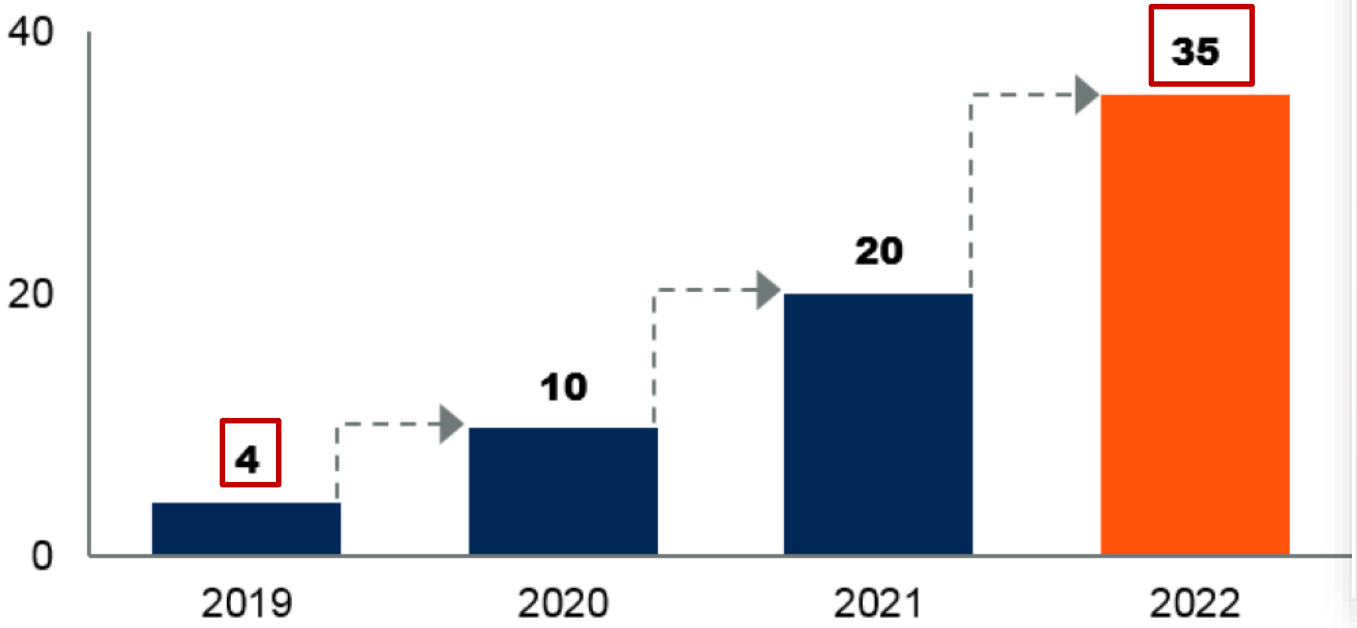
Medical device producer
- Burn diagnosis (medical imaging)

UAS/UAV manufacturer
- Object detection in satellite imagery

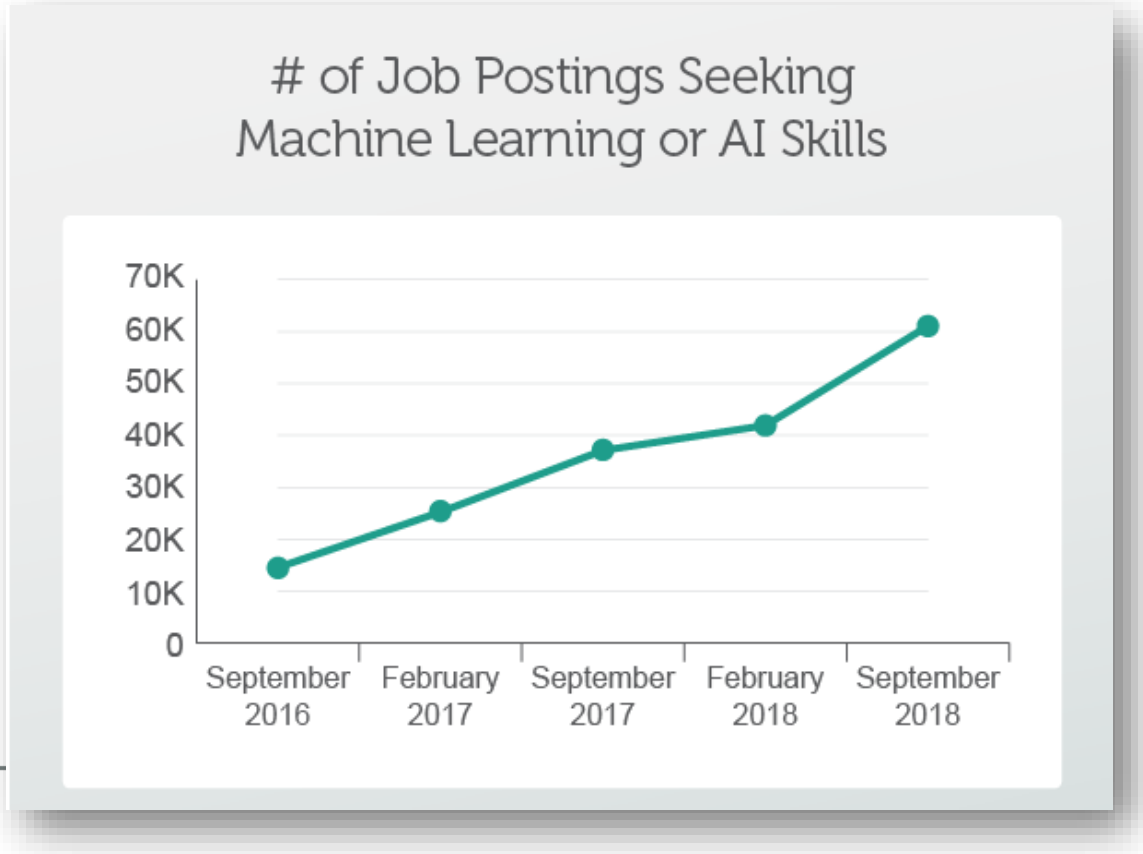
Leading AeroDef prime contractor
- Missile and fire control (target detection)

Integrating AI is a priority for companies today…

Average number of AI projects expected



n = 57 to 63
Gartner Research Circle members with AI/ML projects deployed/in use today, excluding “unsure”
Source: Gartner AI and ML Development Strategies Survey
Q. How many projects are deployed/in use today? How many projects do you estimate in zero
to 12 months, 12 to 24 months, and 24 to 36 months?
ID: 390794



Source: Trovato, J., & Birdwell, C. (2019). From AI to Analytics: Three Program Areas to Watch. Retrieved March 14, 2019, from\ https://encoura.org/from-ai-to-analytics-three-program-areas-to-watch/

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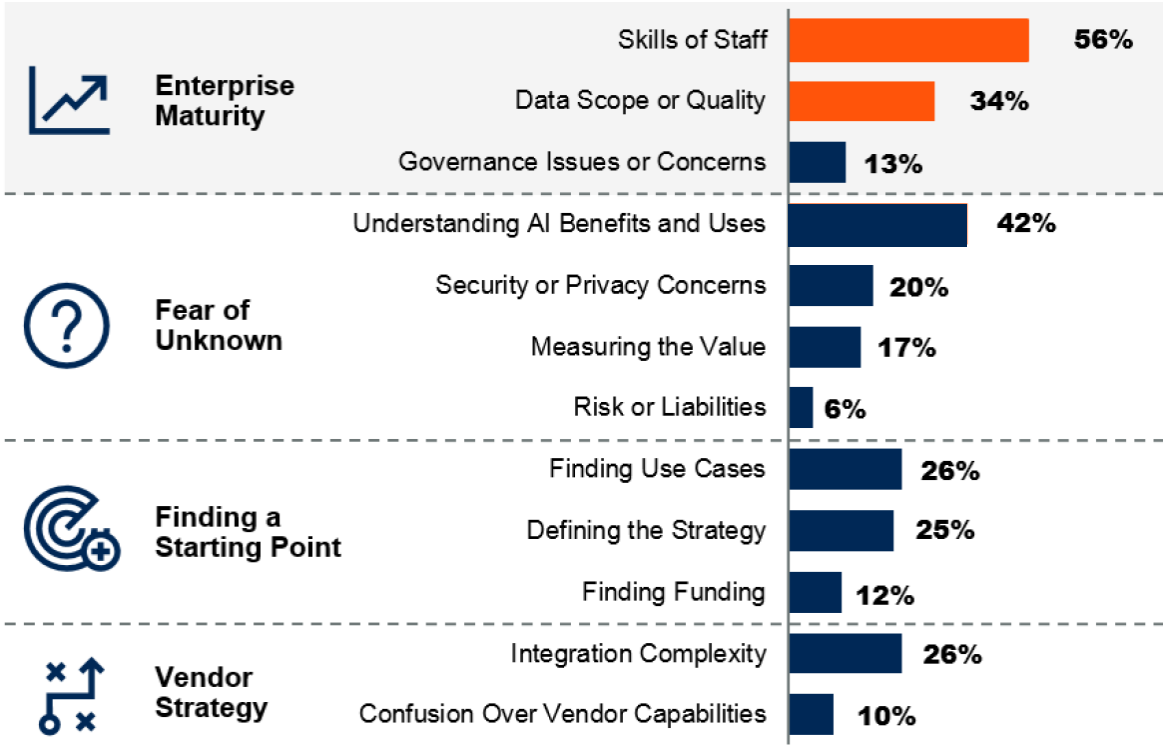
…but AI skills and data quality are major concerns

Top Three Challenges to AI and ML Adoption



n = 106
Gartner Research Circle members, excluding "unsure"
Source: Gartner AI and ML Development Strategies Survey
Q: What are the top three challenges or barriers to the adoption of AI and ML within your organization?
Rank up to three.
ID: 390794

Top barriers to successful adoption of AI

1. Skills of your team
2. Data quality

Source: "AI and ML Development Strategies, Motivators and Adoption Challenges," Gartner Research Note, published 19 June 2019

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Industry and Education Partnerships

To prepare the next generation of engineers to tackle real engineering challenges:

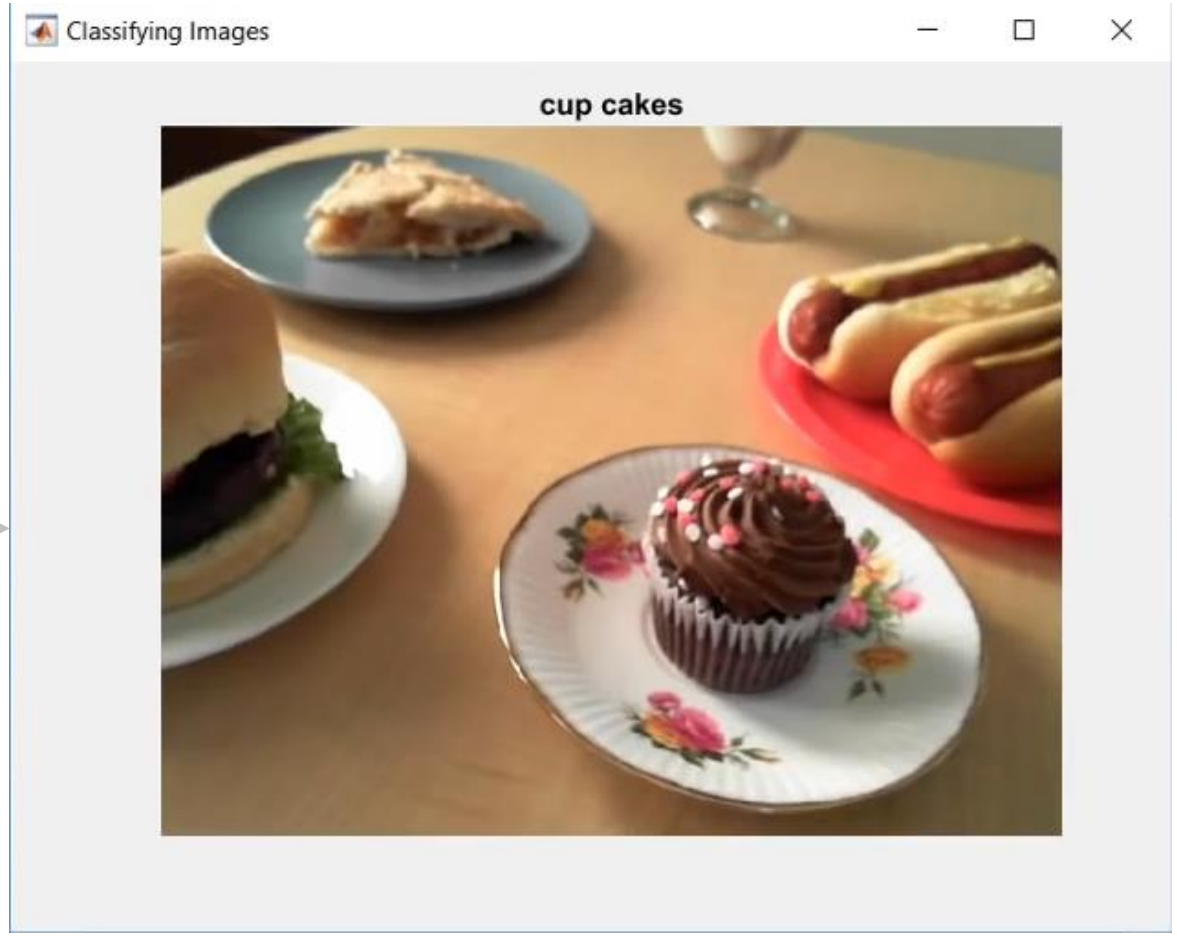
1. Tools Used in Industry
2. Student Competitions
3. Training
4. Internships

Deep Learning in 5 Lines of Code

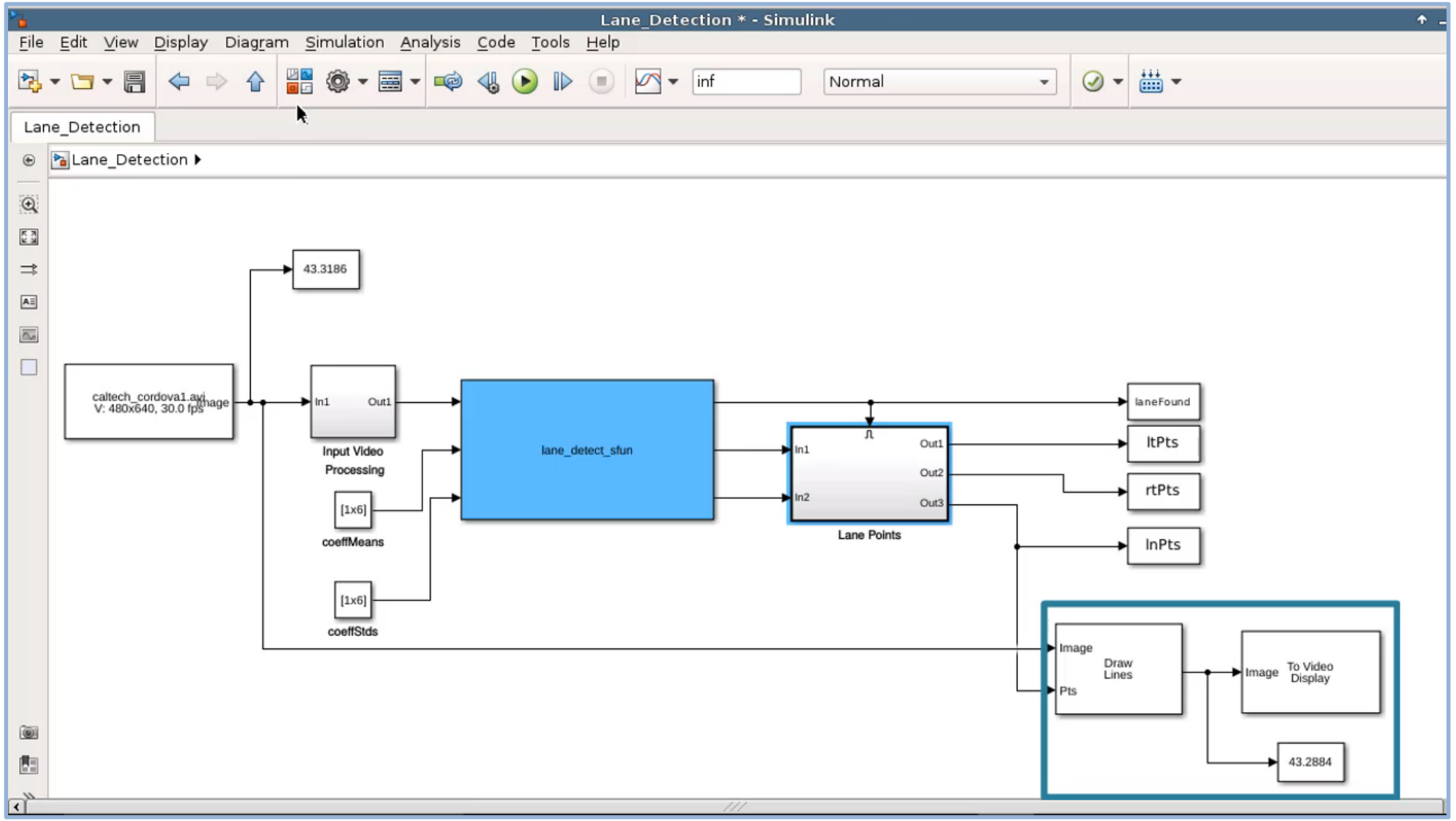
```
nnet = alexnet;

cam = webcam;
picture = snapshot(cam);
picture = imresize(picture,[227 227]);

label = classify(nnet, picture)
```



Integrating AI Models in Simulation



Competitions- Preparing Students for Industry Challenges

"Students are functioning in an environment where they lead teams and have decision-making authority—that makes them mature so quickly."
– Internship manager at GM

Supported over 44 competitions and provided software to more than 2800 teams

Training and Teaching Resources

Machine Learning Onramp

This free, two-hour tutorial provides an interactive introduction to practical machine learning methods for classification problems.

Prerequisites: MATLAB Onramp or basic knowledge of MATLAB

Launch the course

Access to MATLAB through your web browser

Deep Learning Onramp

This free, two-hour deep learning tutorial provides an interactive introduction to practical deep learning methods. You will learn to use deep learning techniques in MATLAB® for image recognition.

Prerequisites: MATLAB Onramp or basic knowledge of MATLAB

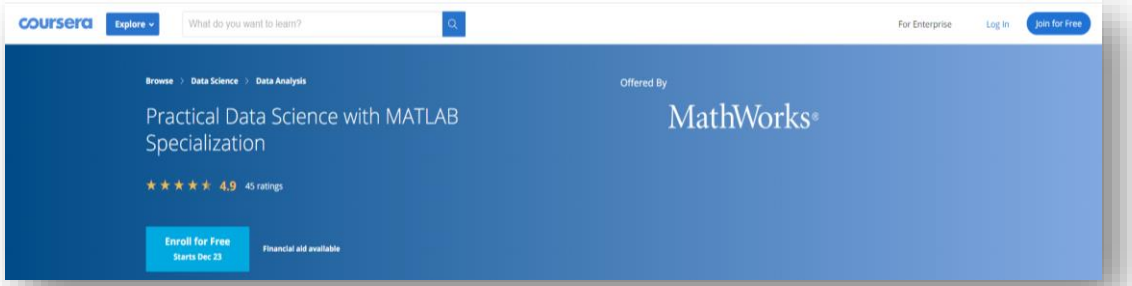
Launch the course

Access to MATLAB through your web browser

Engaging video tutorials

Hands-on exercises with automated assessments and feedback

Lessons available in English and Japanese



Educators teach deep learning with MATLAB by drawing on available course modules, onramp tutorials, and code examples. With domain-specific toolboxes and apps, MATLAB makes it easy for students to learn and perform domain-specific deep learning tasks involving data preprocessing, image labeling, network design and transfer learning.

MATLAB supports interoperability with open source deep learning frameworks, enabling students to apply TensorFlow, PyTorch, and other popular frameworks in their MATLAB deep learning projects.

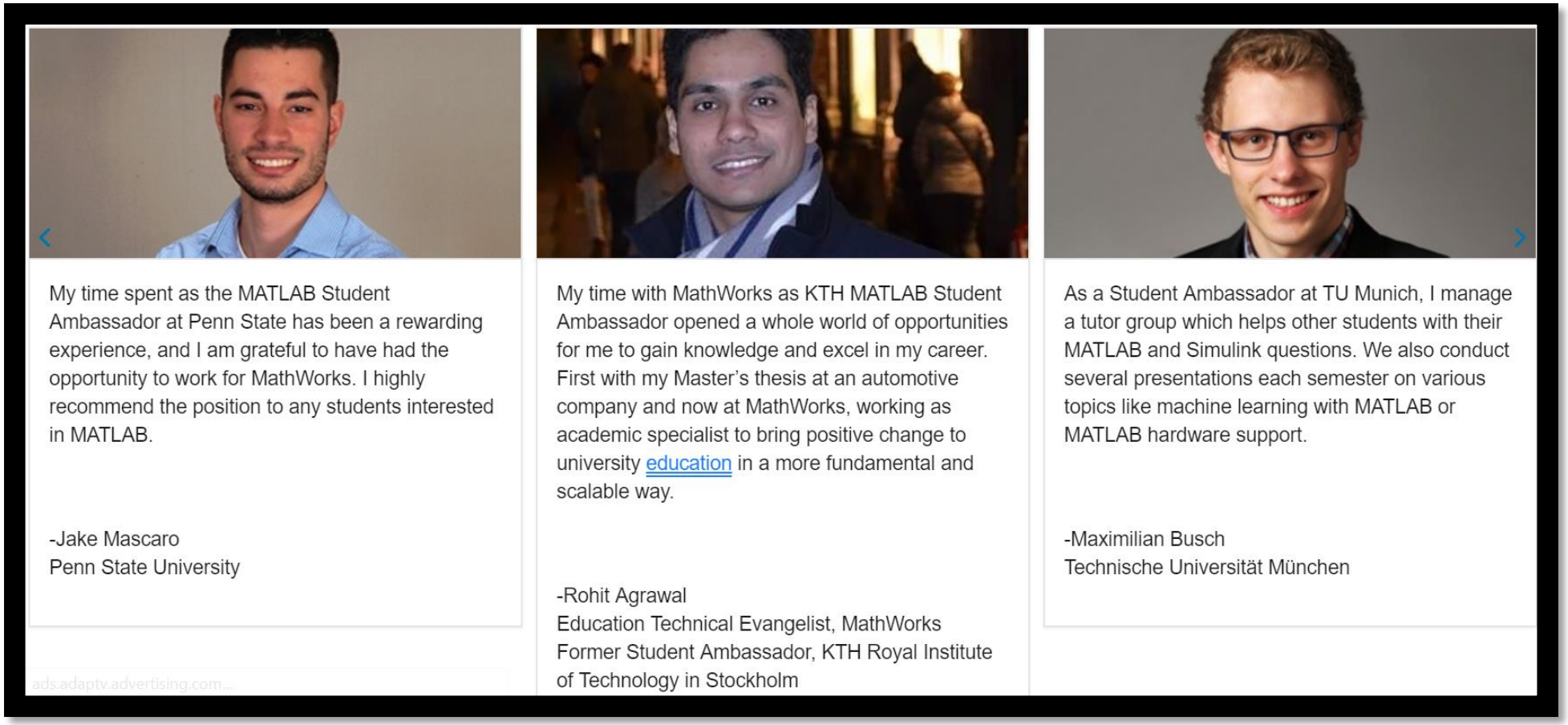
Below is a sampling of course curricula, textbooks, code examples, and additional tools for teaching deep learning with MATLAB.

Course Curricula

- Machine learning and deep learning
  - Dartmouth: Deep Learning

Student Ambassadors and Internships

"I never felt like an intern at MathWorks- I was assigned the same responsibilities as a professional engineer. People here do not look at where/which/what position you are in, rather they listen to what you have to say." - Balaji, Technical Support



Georgia Tech- Robotic Prosthetic Drumming Hand

Questions?

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Visit: www.mathworks.com

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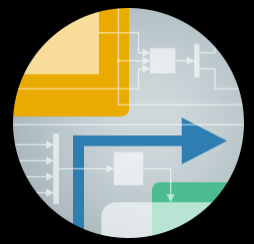

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