Low-Code AI:

Making AI Accessible to Everyone

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MathWorks®

Overview
What will we see today?

How to Access Materials

- Set up a MathWorks account if you don't have one
  - Go to https://www.mathworks.com/mwaccount/
- Workshop license (if you don't already have access to MATLAB)
  - https://www.mathworks.com/licensecenter/classroom/4969700/
- Open the GitHub Repository
  - https://github.com/nrobertsMW/simco2025/
  - You can either clone the repo or download all the material

Access MATLAB for your Machine Learning Workshop

MathWorks is pleased to provide a special license to you as a course participant to use for your Machine Learning Workshop. This is a limited license for the duration of your course and is intended to be used only for course work and not for government, research, commercial, or other organization use.

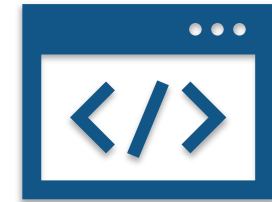| Course Name:	Simian Collective 2025 MATLAB Workshops
Organization:	MathWorks Machine Learning
Starting:	25 Aug 2025
Ending:	26 Aug 2025

Access MATLAB Online
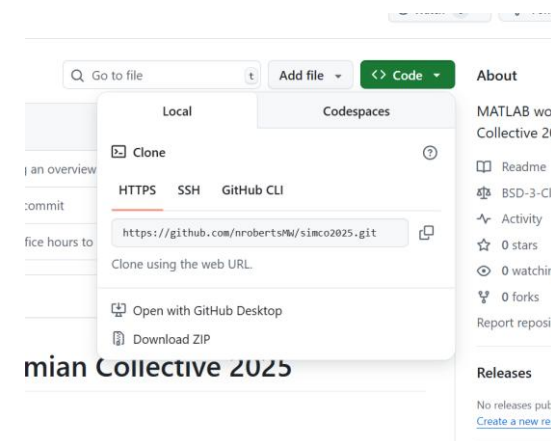
Learning Outcomes

Experience working with example problems

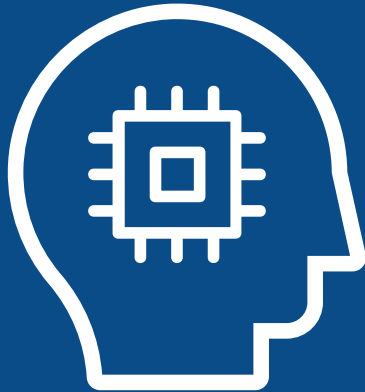Design and train AI models with interactive tools

Automatically generate code for reuse

What is AI?

ARTIFICIAL INTELLIGENCE
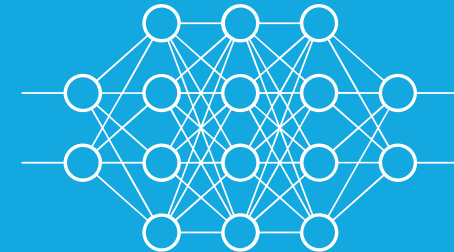Any technique that enables machines to mimic human intelligence

MACHINE LEARNING
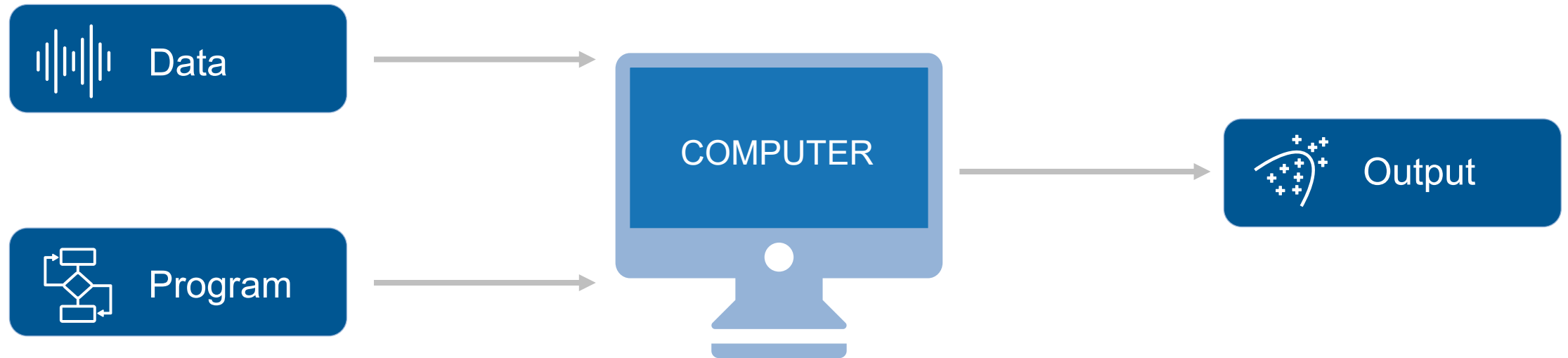Statistical methods that enable machines to "learn" tasks from data without explicitly programming

DEEP LEARNING
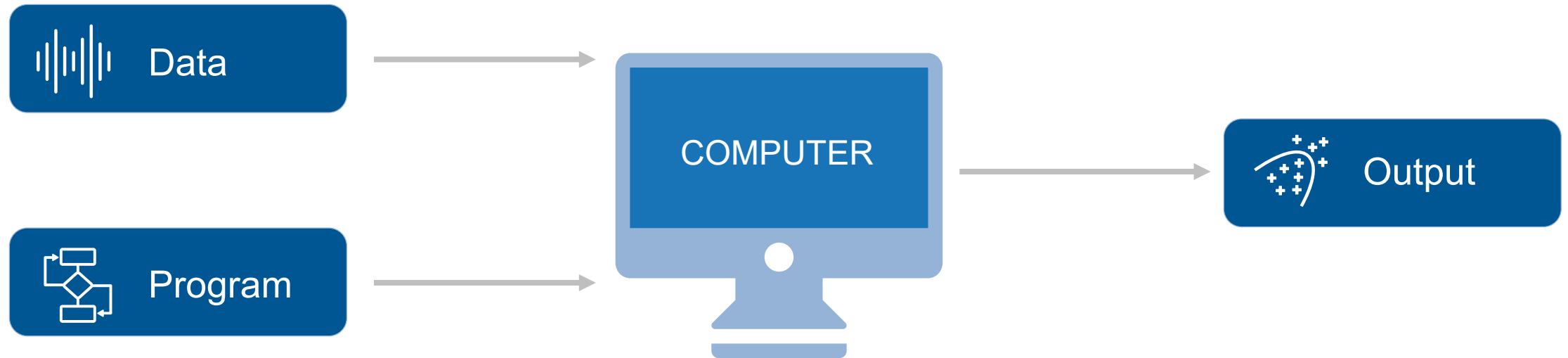Neural networks with many layers that learn representations and tasks "directly" from data
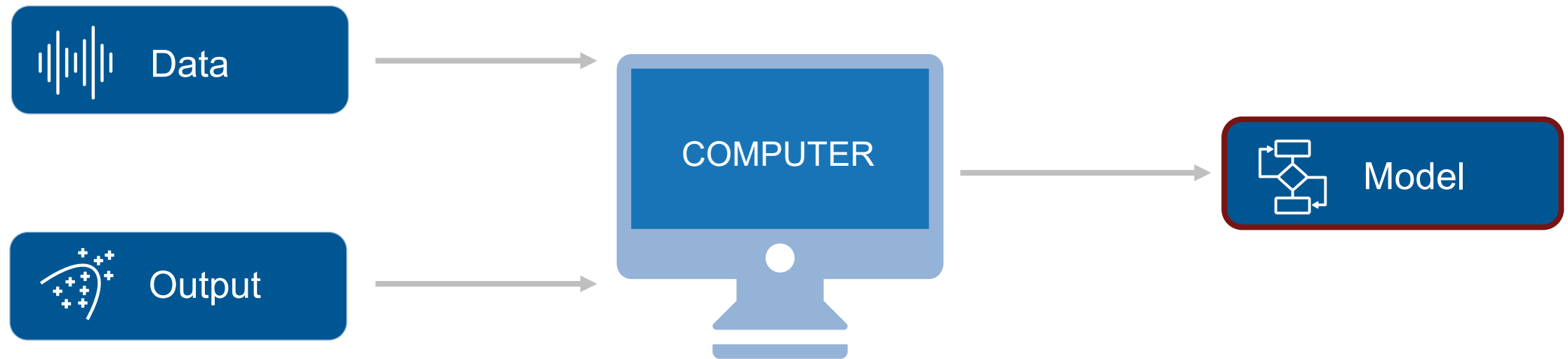
1950s   1980s   2010s

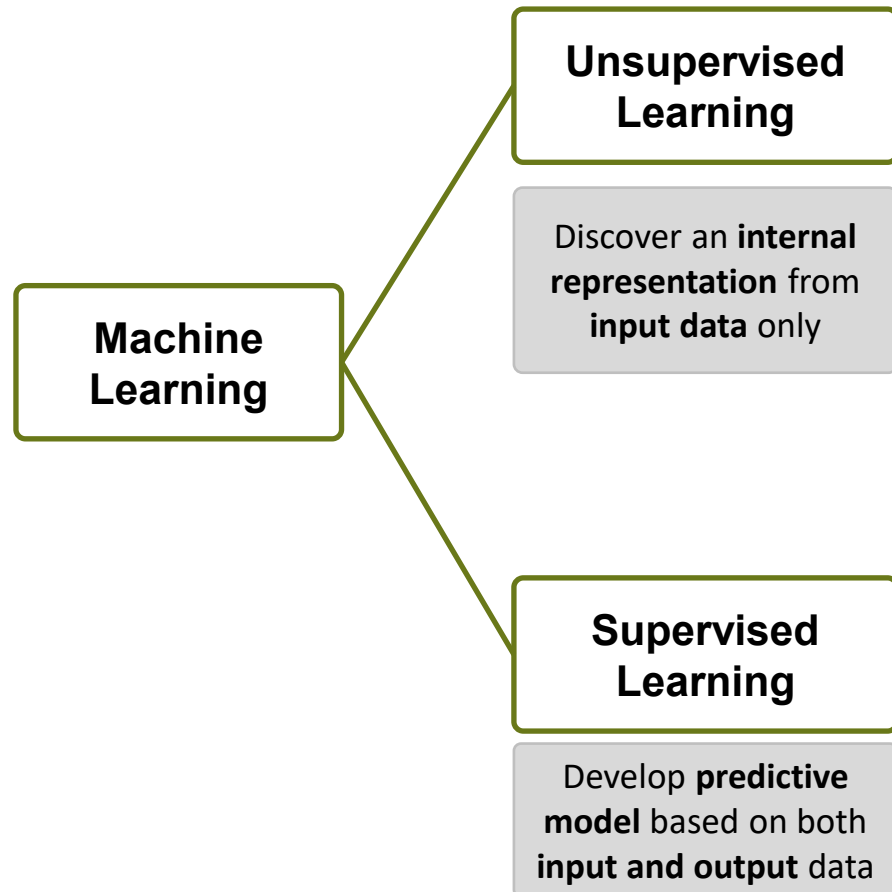# Traditional Programming

Traditional Programming

Machine Learning
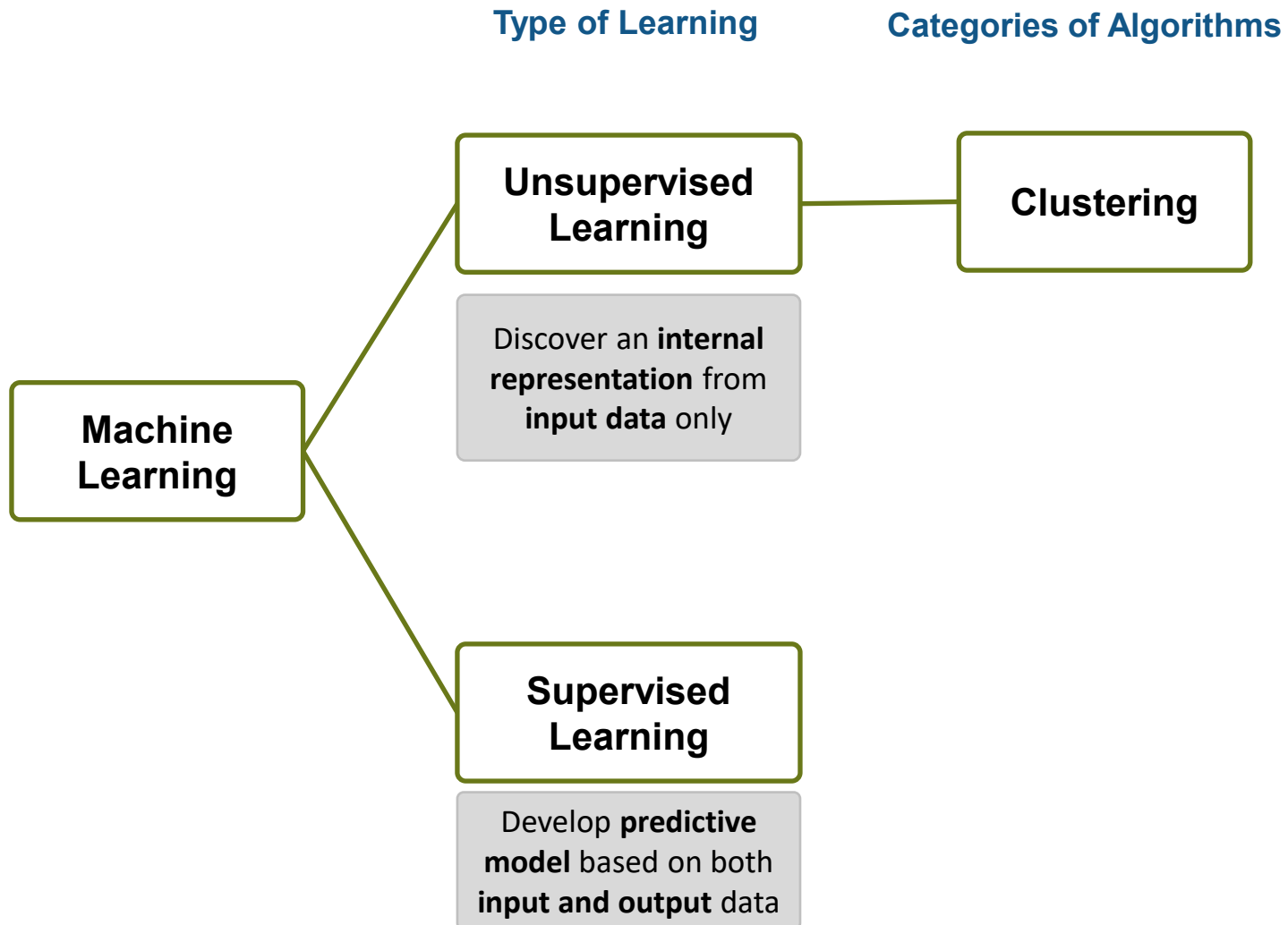
Types of Machine Learning

Type of Learning

```
                    ┌─────────────────────┐
                    │    Unsupervised     │
                    │      Learning       │
                    └─────────────────────┘
                    ┌─────────────────────┐
                    │ Discover an internal│
                    │  representation from│
                    │   input data only   │
                    └─────────────────────┘
┌──────────────┐
│   Machine    │
│   Learning   │
└──────────────┘
                    ┌─────────────────────┐
                    │     Supervised      │
                    │      Learning       │
                    └─────────────────────┘
                    ┌─────────────────────┐
                    │ Develop predictive  │
                    │ model based on both │
                    │ input and output    │
                    │       data          │
                    └─────────────────────┘
```

Types of Machine Learning

Type of Learning

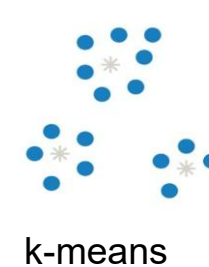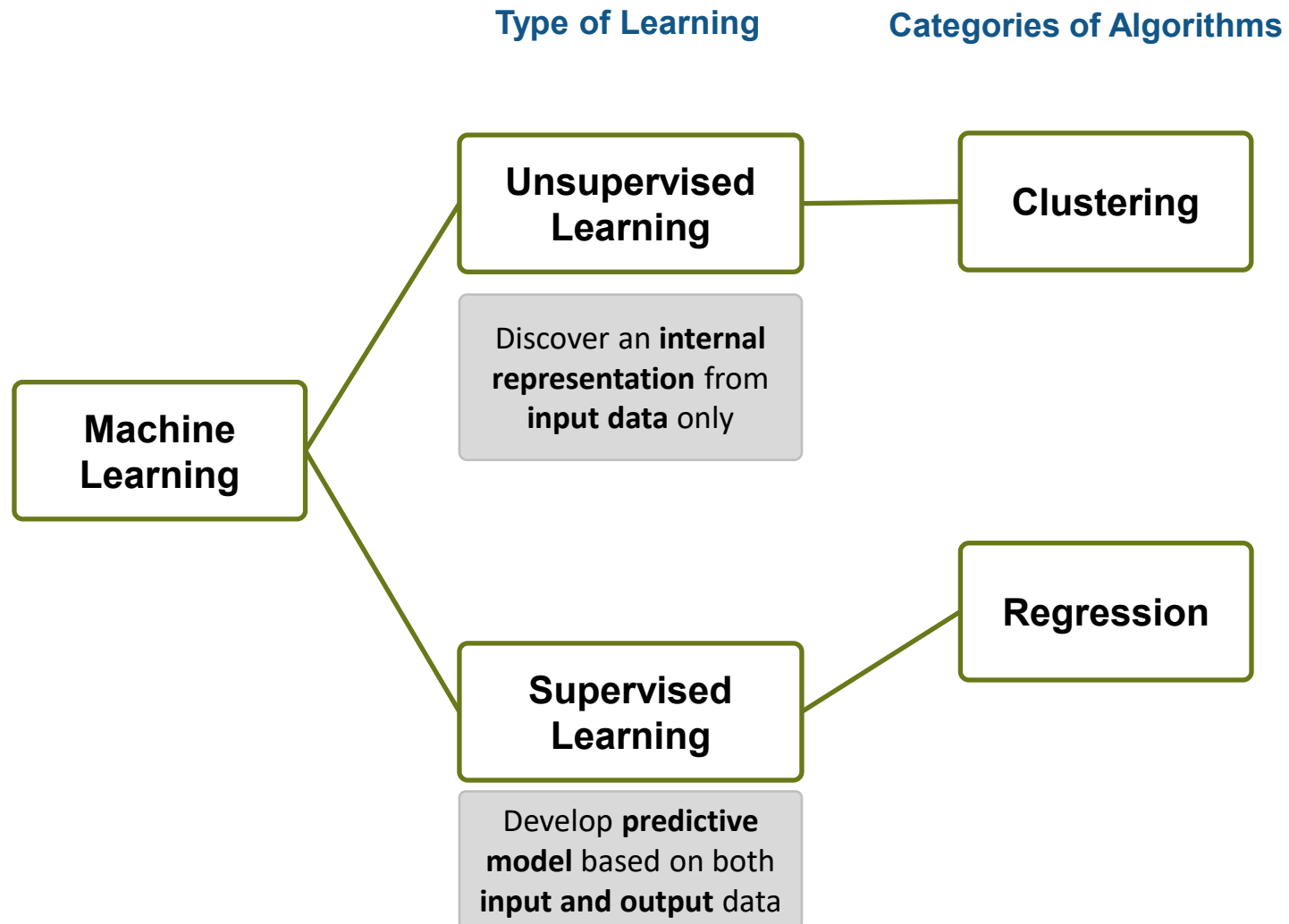**Categories of Algorithms**

Clustering:

- Segmenting data into groups based on data similarity
- Hard clustering models (e.g. k-means)
- Soft clustering models (e.g. Gaussian mixture models)
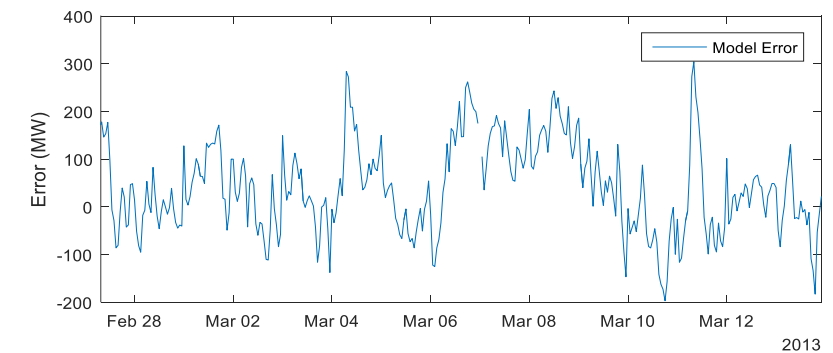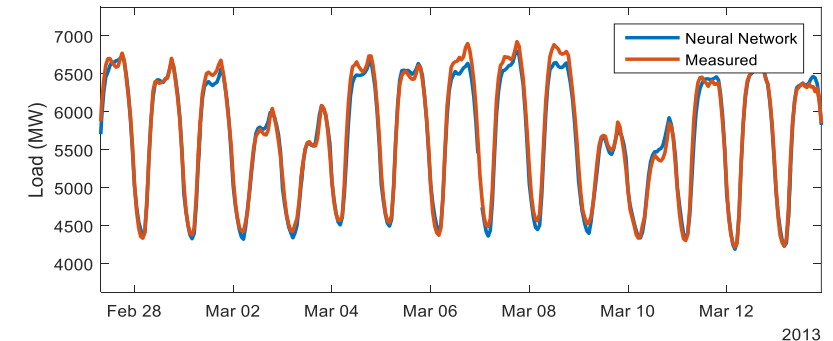- To discover patterns, identify possible features, check for outliers

k-means

Gaussian mixture

More information on clustering can be found [here](#).

Types of Machine Learning

Type of Learning **Categories of Algorithms**

Machine Learning → Unsupervised Learning → Clustering

Discover an **internal representation** from **input data** only

Machine Learning → Supervised Learning → Regression

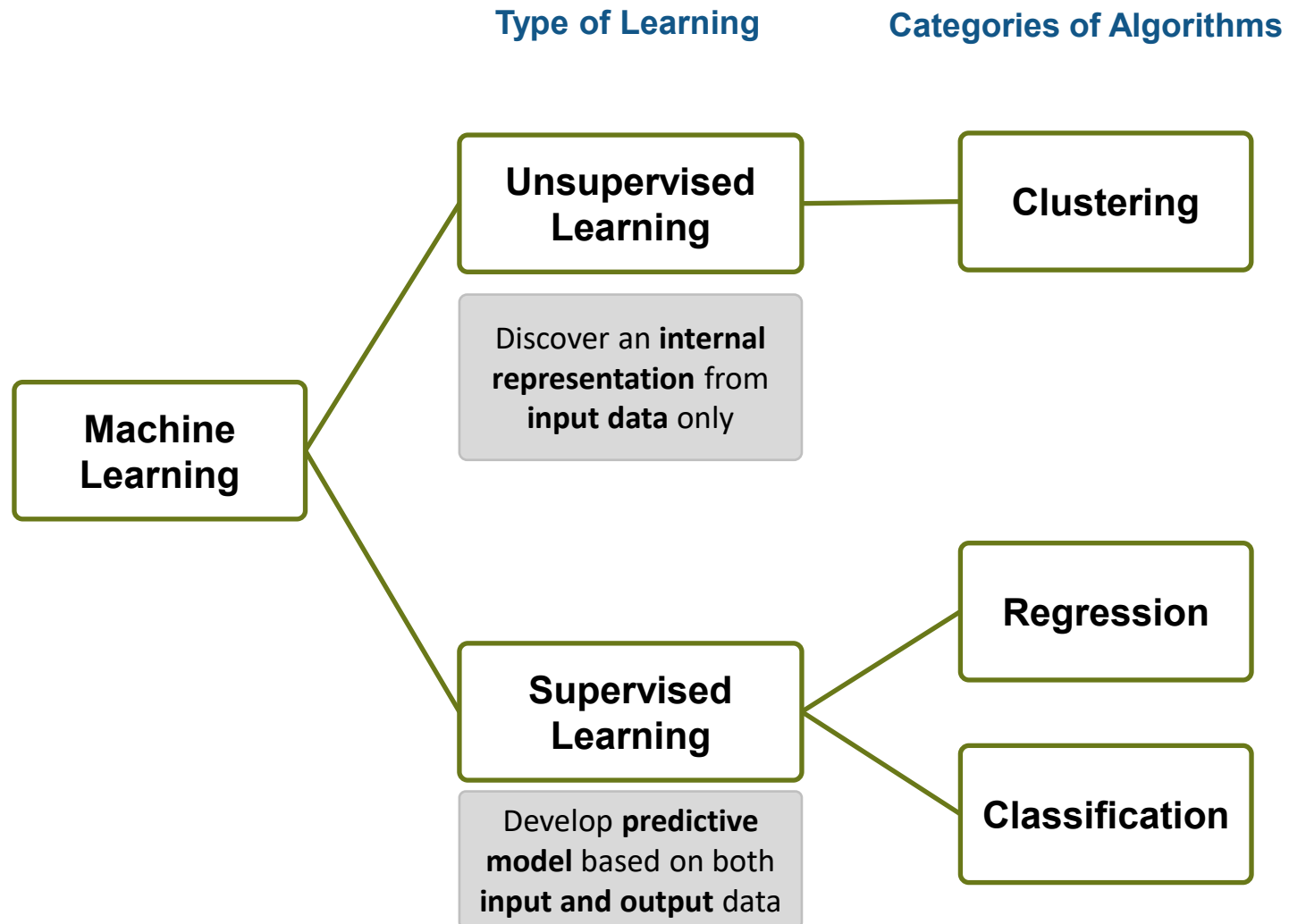Develop **predictive model** based on both **input and output** data

Regression:

Predicted variable (response) is continuous (number)

Types of Machine Learning

Type of Learning **Categories of Algorithms**

Machine Learning

Unsupervised Learning
— **Clustering**

Discover an **internal representation** from **input data** only

Supervised Learning
— **Regression**
— **Classification**

Develop **predictive model** based on both **input and output** data

Classification:

Predicted variable (response) is discrete (class)

Data:

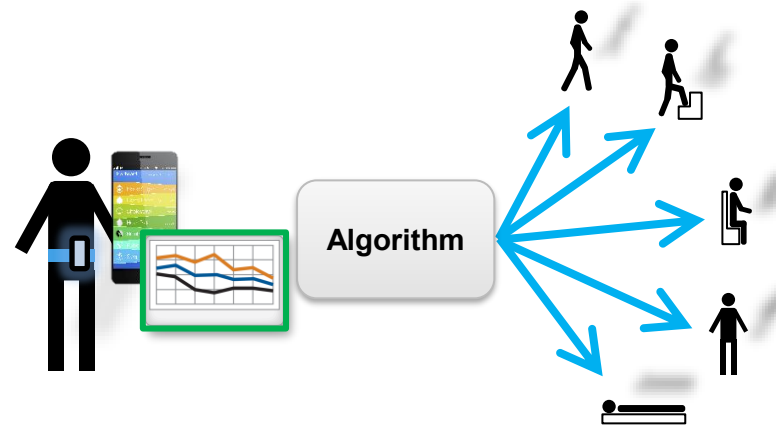| Inputs	3-axial Accelerometer 3-axial Gyroscope
Outputs	

Types of Machine Learning
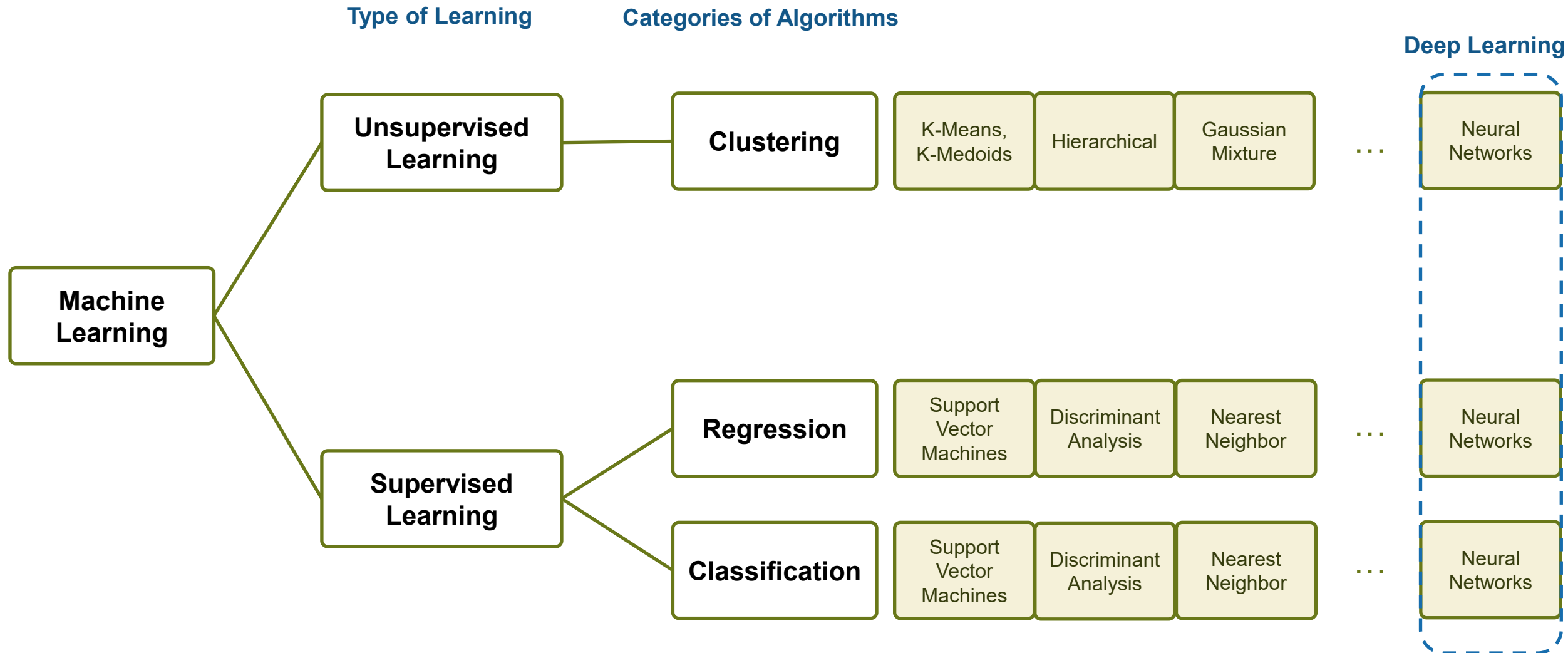
Let's jump into some exercises

Running example: Human Activity Classification

Task: Classify activity data acquired from the sensors in a mobile phone

Case 1: no labels are available ➡ **clustering**

Case 2+3: labels are available ➡ **classification** < **machine learning** / **deep learning**

Dataset courtesy of:
Davide Anguita, Alessandro Ghio, Luca Oneto, Xavier Parra and Jorge L. Reyes-Ortiz. *Human Activity Recognition on Smartphones using a Multiclass Hardware-Friendly Support Vector Machine.*
International Workshop of Ambient Assisted Living (IWAAL 2012). Vitoria-Gasteiz, Spain. Dec 2012
http://archive.ics.uci.edu/ml/datasets/Human+Activity+Recognition+Using+Smartphones

Recap

Clustering can be used to label raw data

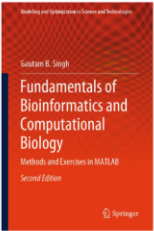Classification Learner lets you try out different models

Deep Network Designer lets you design networks interactively

Relevant textbooks and doc examples

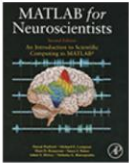## MATLAB and Simulink Based Books

Books Main Page   Search   Join Book Program

Fundamentals of Bioinformatics and Computational Biology: Methods and Exercises in MATLAB, 2nd edition

Gautam B. Singh, *Oakland University*
Springer International Publishing, 2025
ISBN: 978-3-031-75694-8; Language: English

Fundamentals of Bioinformatics and Computational Biology covers all the core bioinformatics topics and includes practical examples
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enginee
biology.
genetics
biology.
essentia

Domain		Example Workflow	Learn More
Image classification, regression, and processing	bell pepper (98.2%)	Apply deep learning to image data tasks. For example, use deep learning for image classification and regression.	Get Started with Transfer Learning Pretrained Deep Neural Networks Create Simple Deep Learning Neural Network for Classification Train Convolutional Neural Network for Regression Preprocess Images for Deep Learning
Sequences and time series		Apply deep learning to sequence and time series tasks. For example, use deep learning for sequence classification and time series forecasting.	Sequence Classification Using Deep Learning Time Series Forecasting Using Deep Learning
Computer vision		Apply deep learning to computer vision applications. For example, use deep learning for semantic segmentation and object detection.	Get Started with Semantic Segmentation Using Deep Learning (Computer Vision Toolbox) Recognition, Object Detection, and Semantic Segmentation (Computer Vision Toolbox)

MATLAB for Neuroscientists: An Introduction to Computing in MATLAB, 2e

Pascal Wallisch, *New York University*; Mike Lusignan, *University of Chicago*; Marc Benayoun, *University of Chicago*;
Tanya I. Baker, *The Salk Institute*; Adam S. Dickey, *University of Chicago*; Nicho G. Hatsopoulos, *University of Chicago*
Academic Press, 2014
ISBN: 978-0-12-383836-0; Language: English

Written for students and researchers, *MATLAB for Neuroscientists: An Introduction to Scientific Computing in MATLAB* provides a comprehensive introduction to MATLAB and its use within the fields of neuroscience and psychology. The book aims to empower users of MATLAB to design and implement their own analytical tools. Topics include stimulus generation, experimental control, data collection, data analysis, and modeling.
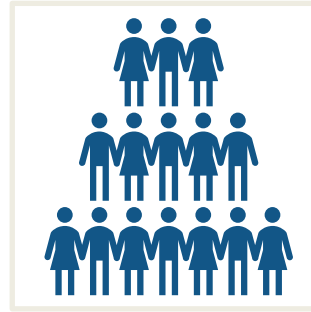
MATLAB is used throughout the book to solve many application examples. In addition, a set of MATLAB code files is available for download.

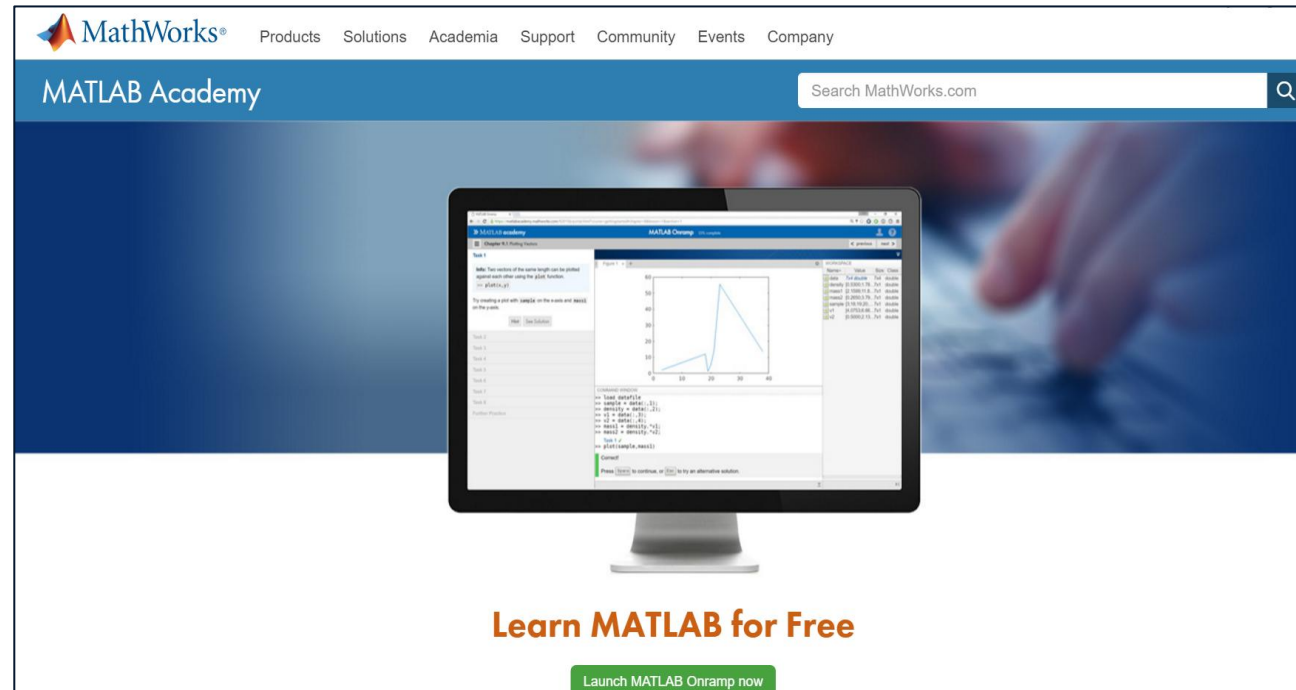# Key takeaways

Ease-of-use through interactive tools

AI accessible to everyone

Interactive tools can enhance programming skills

Supporting *Your* Success
Self-Paced Online Trainings

OVERVIEW COURSES (2-3 hours)

MATLAB Onramp

Simulink Onramp

Stateflow Onramp

Simscape Onramp

Machine Learning Onramp

Deep Learning Onramp

Reinforcement Learning Onramp

Control Design with Simulink Onramp

Power Electronics Onramp

Signal Processing Onramp

Image Processing Onramp

Wireless Communications Onramp

Circuit Simulation Onramp

Optimization Onramp

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Self-Paced Courses

FREE "getting started" content – available for everyone

Machine Learning Onramp

Start course | Share Course | Certificate & Progress Report | Quick Reference | Settings | 0%

Learn the basics of practical machine learning for classification problems in MATLAB®. Use a machine learning model that extracts information from real-world data to group your data into predefined categories.

Course modules
- Overview of Machine Learning 10 min
- Import Data 10 min
- Extract Features 15 min
- Split Data for Validation 10 min
- Train Models 10 min
- Evaluate Performance 10 min
- Improve Performance 5 min
- Conclusion 5 min

About this course
Format: Self-paced
Length: About 1 hour
Language: English (change)

Recommended prerequisites
MATLAB Onramp 3%

Features
- Hands-on exercises with automated feedback
- Access to MATLAB through your web browser
- Shareable progress report and course certificate

Authored By:
Andrea Bayas
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Related Learning
- Machine Learning Techniques in MATLAB
  LEARNING PATH: 4 COURSES
- Deep Learning Onramp
  Get started quickly using deep learning methods to perform image recognition.
- Data Analysis in MATLAB
  LEARNING PATH: 5 COURSES

» View all self-paced courses

Deep Learning Onramp

Start course | Share Course | Certificate & Progress Report | Quick Reference | Settings | 0%

Learn the basics of deep learning for image classification problems in MATLAB®. Use a deep neural network that experts have trained and customize the network to group your images into predefined categories.

Course modules
- Introduction 5 min
- Use Pretrained Networks 15 min
- Manage Collections of Image Data 0.5 hours
- Prepare Inputs for Transfer Learning 25 min
- Perform Transfer Learning 20 min
- Conclusion 5 min

About this course
Format: Self-paced
Length: About 1.5 hours
Language: English (change)

Recommended prerequisites
MATLAB Onramp 3%

Features
- Hands-on exercises with automated feedback
- Access to MATLAB through your web browser
- Shareable progress report and course certificate

Authored By:
Renee Coetsee
MathWorks

Related Learning
- Deep Learning Techniques in MATLAB for Image Applications
  LEARNING PATH: 4 COURSES
- Machine Learning Onramp
  Learn the basics of practical machine learning methods for classification problems.
- Reinforcement Learning Onramp
  Master the basics of creating intelligent controllers that learn from experience.

» View all self-paced courses

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- **MathWorks Education Application Engineers**
- Harish Chintakunta
- hchintak@mahtworks.com

- We consult with faculty and researchers to support them with their STEM initiatives, including integrating computational or systems thinking into their curriculum and research

- Office hours with my colleague Noah
  - Meet with Noah on 08/26
  - (link also in GitHub Repository!)

Feedback: Simian Collective
MATLAB Workshops

Link

Thank you!

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