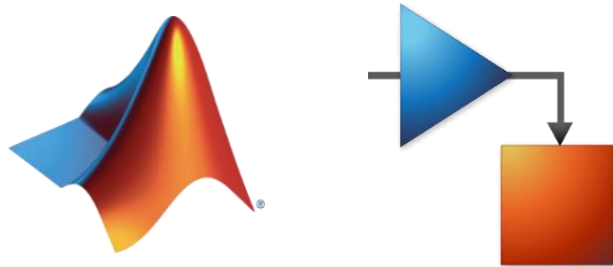


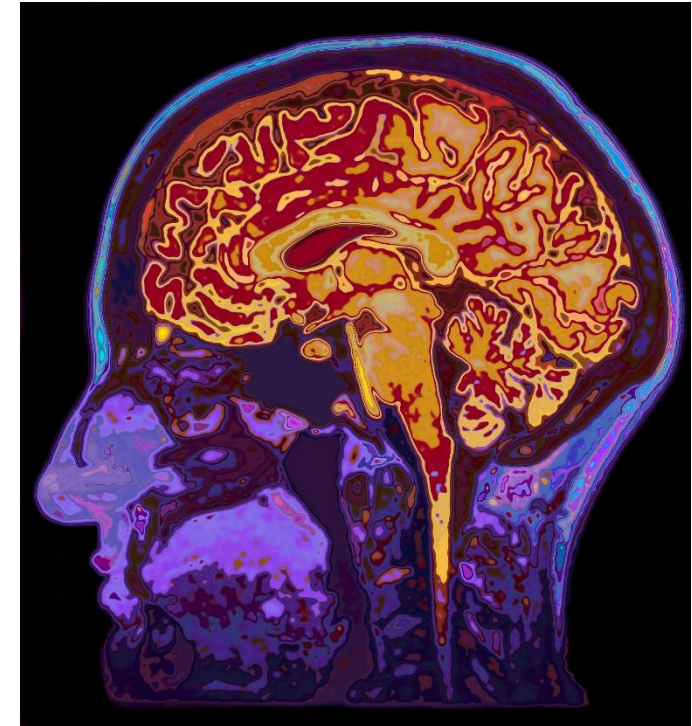
MATLAB for Open Science in MRI



Reza Fazel-Rezai, Ph.D.

Senior Customer Success Engineer
MathWorks

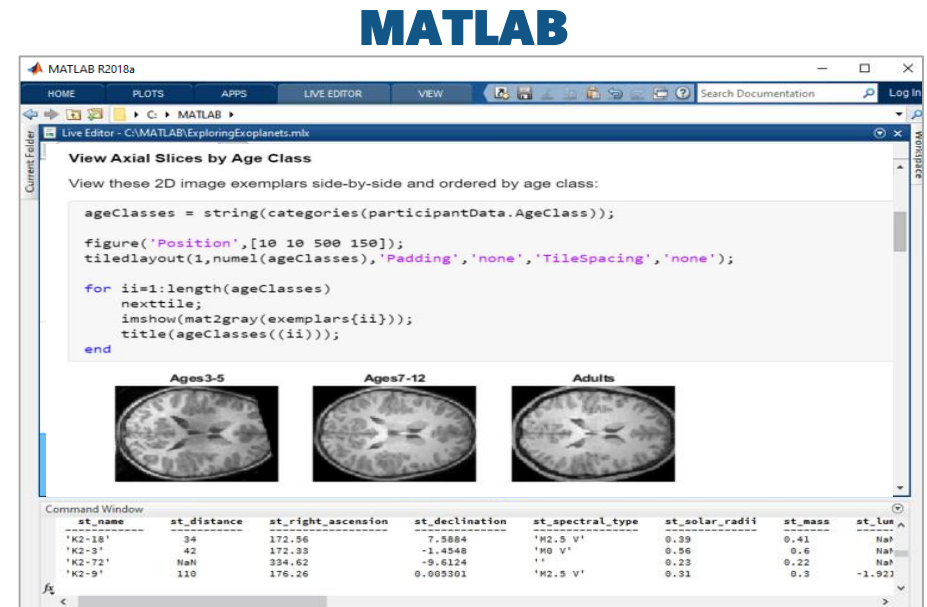
rfazelre@mathworks.com



MATLAB® & SIMULINK®



- MATLAB is a programming environment for algorithm development, data analysis, visualization, and numeric computation.
- Simulink is a graphical for simulation and Model-Based Design of multidomain and embedded engineering systems.
- Over 100 add-on products for specialized tasks.

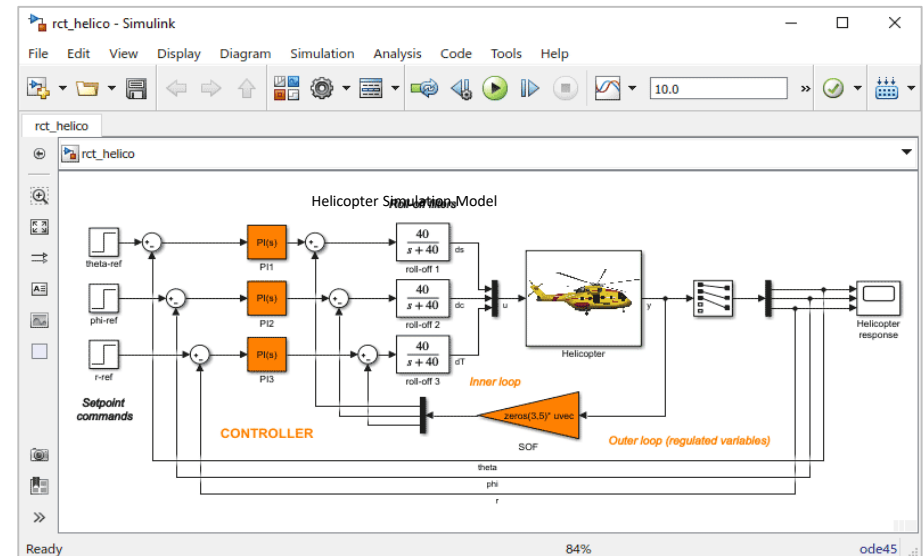


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Simulink

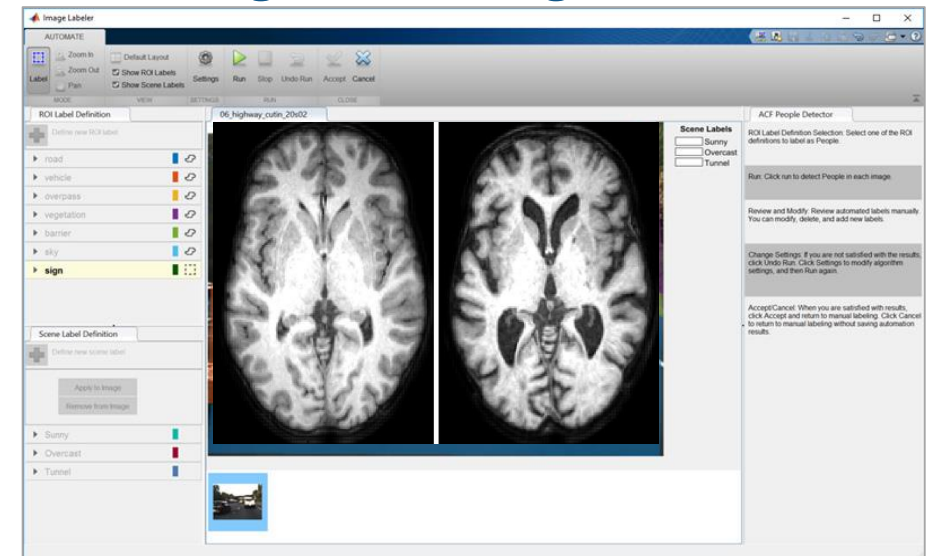


MATLAB® & SIMULINK®



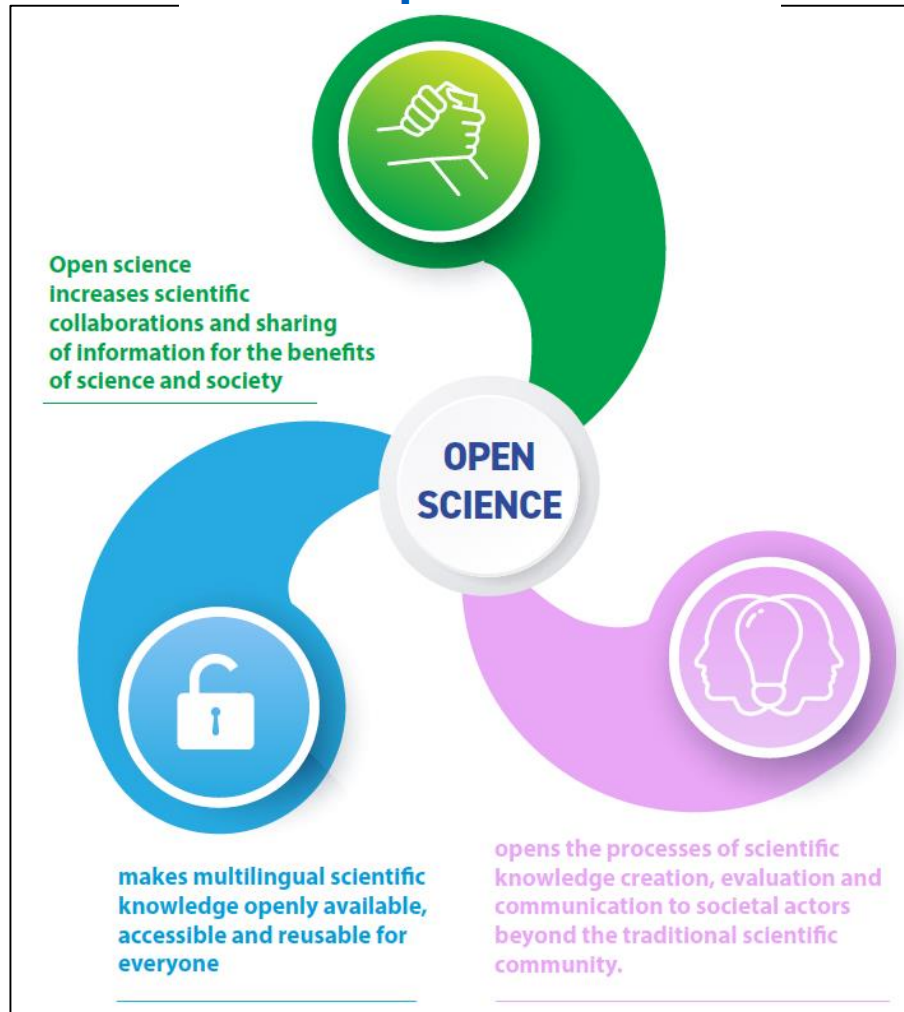
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Image Processing Toolbox

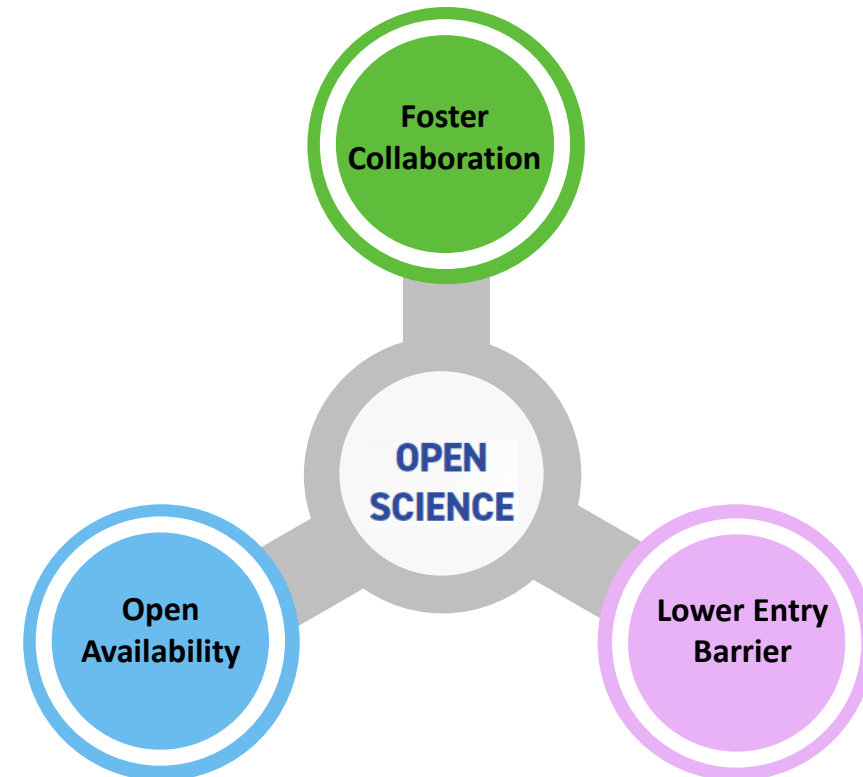


What is Open Science?

UNESCO Recommendation on Open Science *



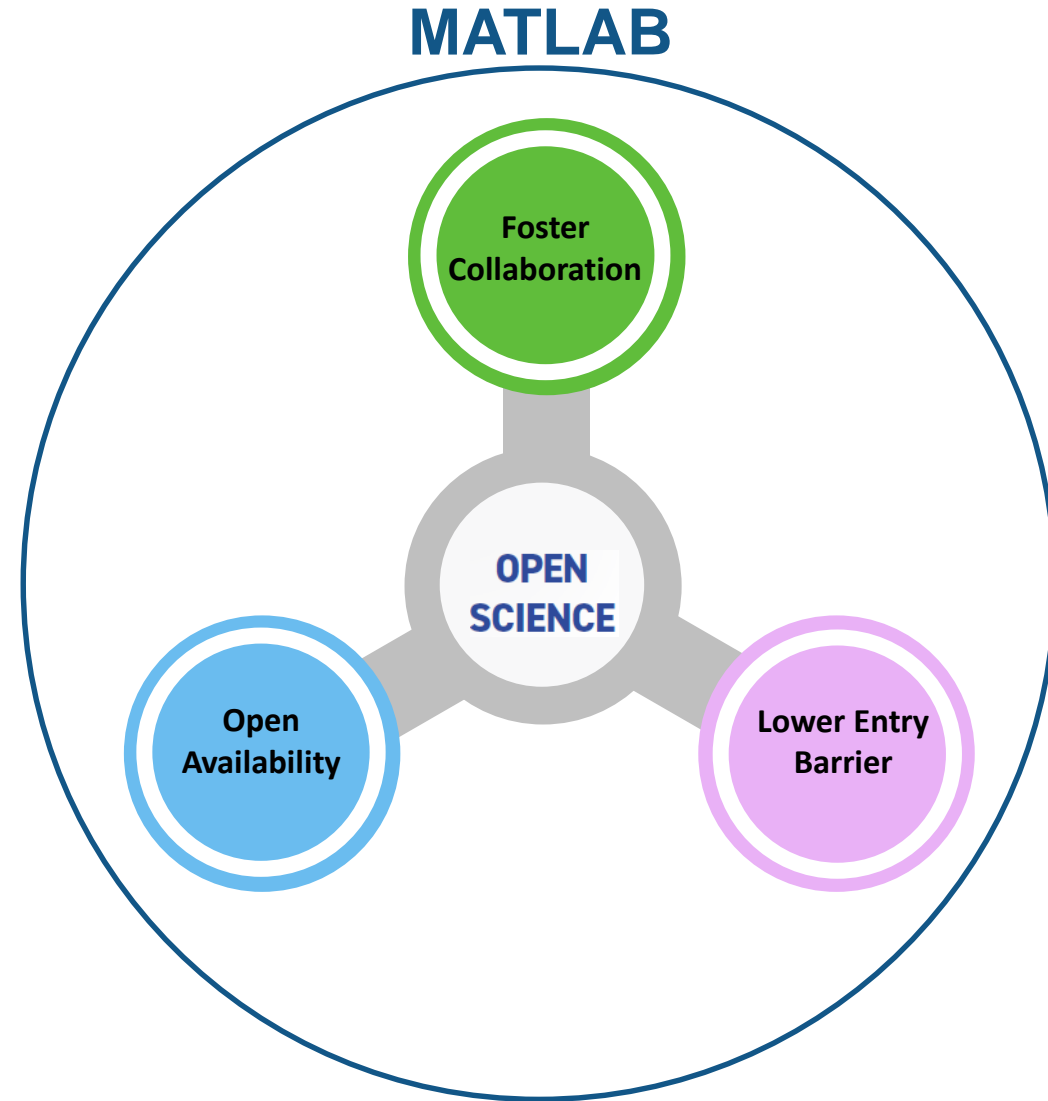
*“Open science is defined as an inclusive construct that combines various movements and practices aiming to make multilingual scientific knowledge openly available, accessible and reusable for everyone, to increase scientific collaborations and sharing of information for the benefits of science and society, and to open the processes of scientific knowledge creation, evaluation and communication to societal actors beyond the traditional scientific community.” **



* [UNESCO Recommendation on Open Science, September 8, 2021 \(https://www.unesco.org/en/natural-sciences/open-science\)](https://www.unesco.org/en/natural-sciences/open-science)

MATLAB for Open Science

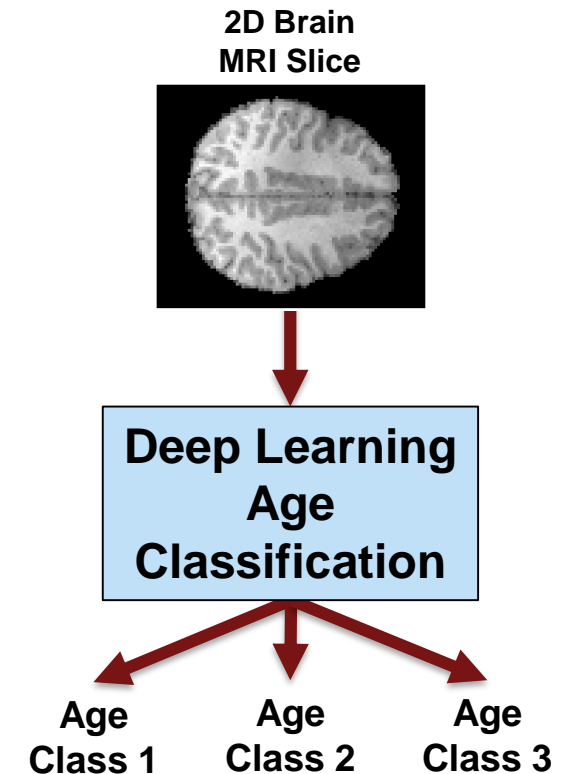
	Open Availability	Foster Collaboration	Lower Barrier Entry
Live Script	✓	✓	✓
Apps Usage, Creation, & Sharing	✓	✓	✓
Automation and Code Generation	✓	✓	✓
Viewable Source Code	✓	✓	✓
Integrated Source Control	✓	✓	✓
Interoperability with Python, ...	✓	✓	✓
MATLAB Online / Mobile / Drive	✓	✓	✓
Documentation	✓	✓	✓
Online Courses and Tutorials	✓	✓	✓
File Exchange and Examples	✓	✓	✓
Community Toolboxes	✓	✓	✓



MATLAB for Open Science in MRI: Demo

❖ Brain MRI Age Classification Using Deep Learning

- **MRI Dataset:** Collected by MIT researches available at [OpenNEURO resource](#)
- **DL Demo:** MATLAB File Exchange entry that is available publicly ([Link](#))
- **Tools:**
 - [MATLAB](#)
 - [Deep Learning Toolbox](#)
 - [Image Processing Toolbox](#)
 - [Statistical Parametric Mapping – SPM](#) (**Community Toolbox**)



Resources: Self-Paced Courses

Self-Paced Online Courses

Home | My Courses

Learn MATLAB and Simulink at your own pace

- Complete **hands-on exercises**.
 - Take **entire courses** or focus on **specific topics**.
- 🕒 Watch an introduction (1 min) » View courses you've started

Browse self-paced online courses

- Getting Started (12)
- MATLAB (4)**
- Simulink (5)
- AI, Machine Learning, and Deep Learning (5)
- Math and Optimization (6)
- Image and Signal Processing (3)
- Explore over 50 virtual and in-person **classroom courses**

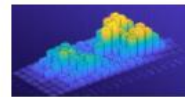
MATLAB



MATLAB Onramp

14 modules | 2 hours | Languages

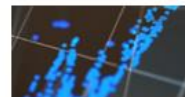
Get started quickly with the basics of MATLAB.



MATLAB Fundamentals

18 modules | 16.5 hours | Languages

Learn core MATLAB functionality for data analysis, modeling, and programming.



MATLAB for Data Processing and Visualization

11 modules | 9 hours | Languages

Create custom visualizations and automate your data analysis tasks.



MATLAB Programming Techniques

10 modules | 16 hours | Languages

Improve the robustness, flexibility, and efficiency of your MATLAB code.

Getting Started (12)

MATLAB (4)

Simulink (5)

AI, Machine Learning, and Deep Learning (5)

Math and Optimization (6)

Image and Signal Processing (3)

Explore over 50 virtual and in-person **classroom courses**

Open Availability

AI, Machine Learning, and Deep Learning



Machine Learning Onramp

6 modules | 2 hours | Languages

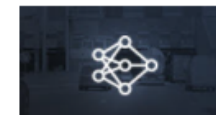
Learn the basics of practical machine learning methods for classification problems.



Machine Learning with MATLAB

7 modules | 12 hours | Languages

Explore data and build predictive models.



Deep Learning Onramp

5 modules | 2 hours | Languages

Get started quickly using deep learning methods to perform image recognition.



Deep Learning with MATLAB

13 modules | 8 hours | Languages

Learn the theory and practice of building deep neural networks with real-life image and sequence data.



Reinforcement Learning Onramp

5 modules | 3 hours | Languages

Master the basics of creating intelligent controllers that learn from experience.

Thank you!

Q & A

Reza Fazel-Rezai, Ph.D.

Senior Customer Success Engineer
MathWorks

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Accelerating the Pace of Engineering and Science

We at MathWorks believe in the importance of engineers and scientists.
They increase human knowledge and profoundly improve our standard of living.

We created MATLAB and Simulink to help them do their best work.