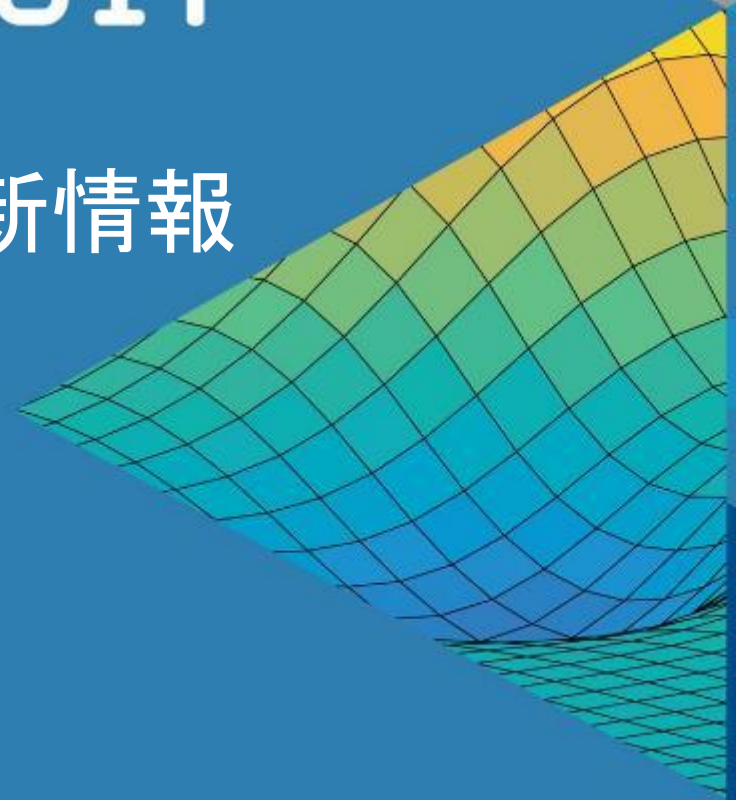
MATLAB EXPO 2017

MATLAB® and Simulink® 最新情報

R2017b R2017a

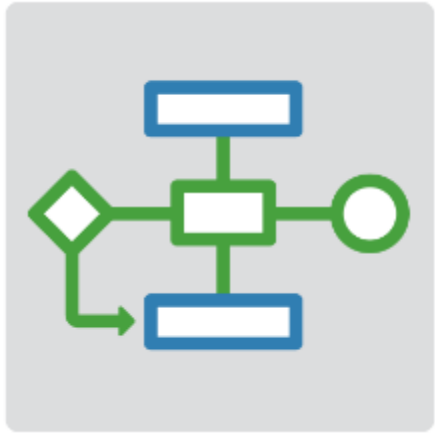


MathWorks Japan
アプリケーションエンジニアリング部
宅島 章夫

Platform Productivity

Getting your work done faster

Workflow Depth



Support for your entire workflow

Application Breadth

Products for the work you do

Platform Productivity

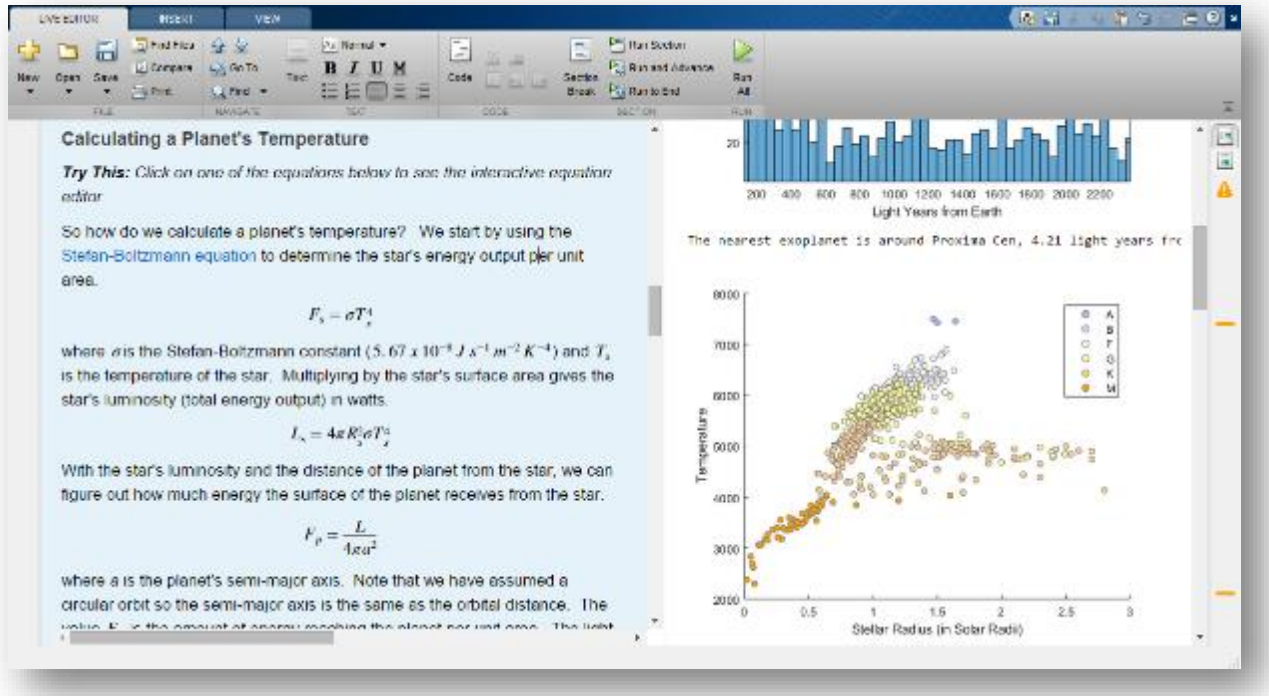
Getting your work done faster

MATLAB Live Editor

R2017a R2017b

Create scripts that not only capture your code – they tell a story you can share with others. ***(introduced in R2016a)***

- Edit figures interactively
- Code with automated, contextual hints for arguments, property values, and alternative syntaxes
- Export live scripts to LaTeX format
- Display high-resolution plots in PDF output

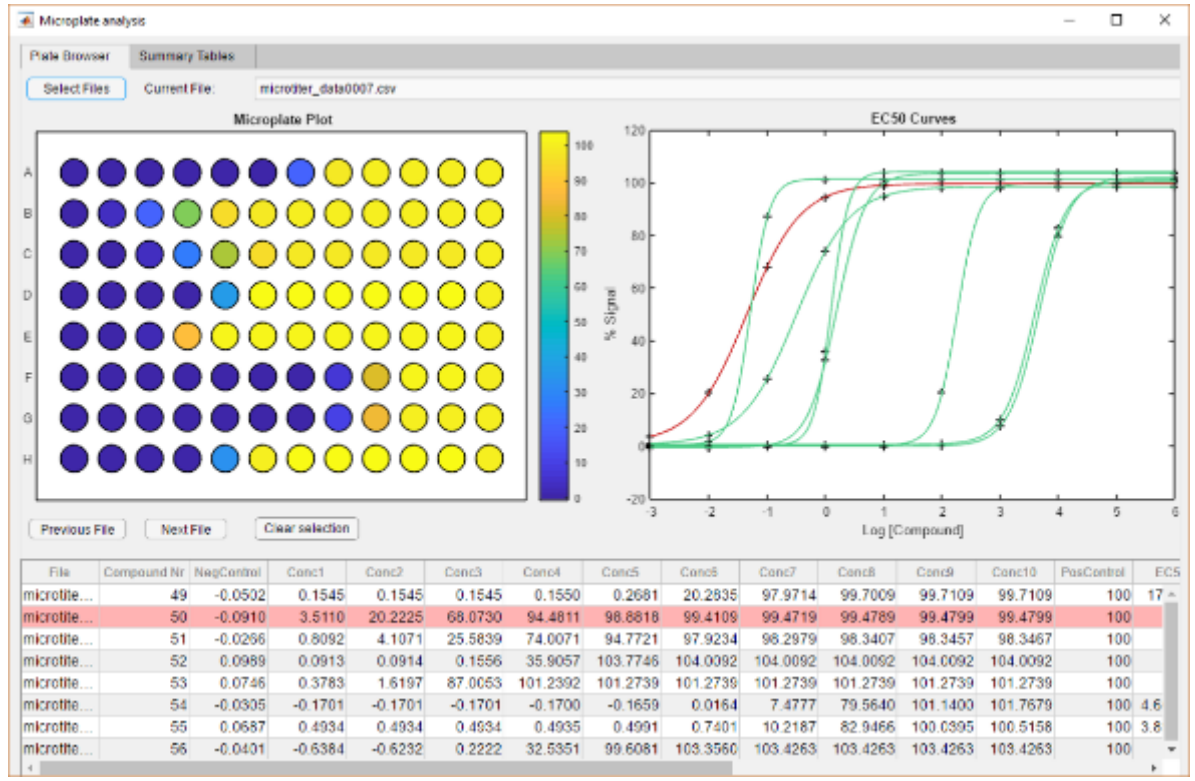


App Designer

R2017a R2017b

Create professional apps without having to be a professional software developer. ***(introduced in R2016a)***

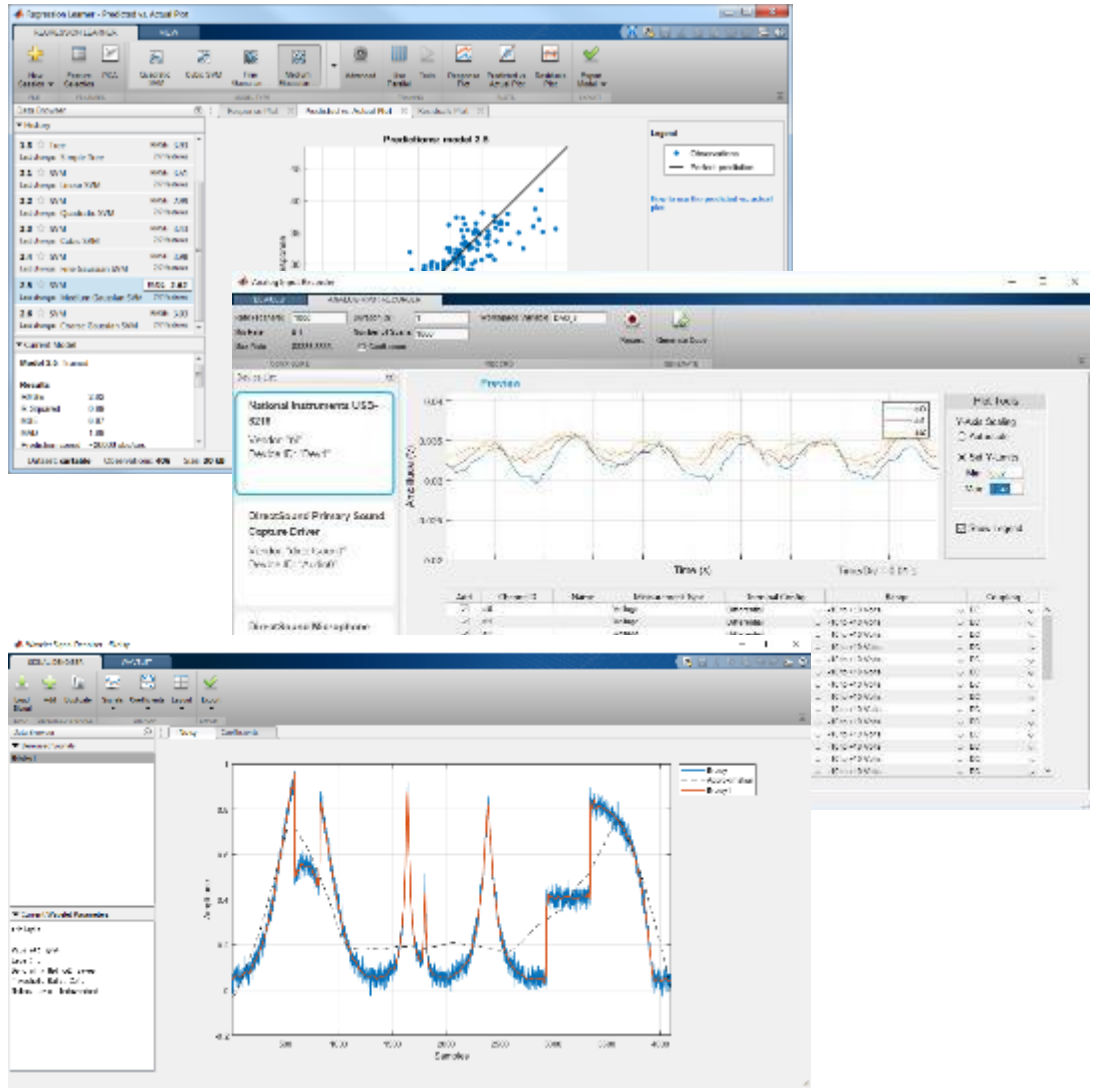
- Expanded support for 2-D and 3-D plots
- New component for app menus
- Enhancements for packaging and sharing
- Zoom and pan plots in apps



Apps Simplify Modeling and Analysis

These interactive applications automate common technical computing tasks

- Regression Learner app
  - Train regression models using supervised machine learning
- Analog Input Recorder app
  - Acquire and visualize analog input signals
- Wavelet Signal Denoiser app
  - Visualize and denoise time series data



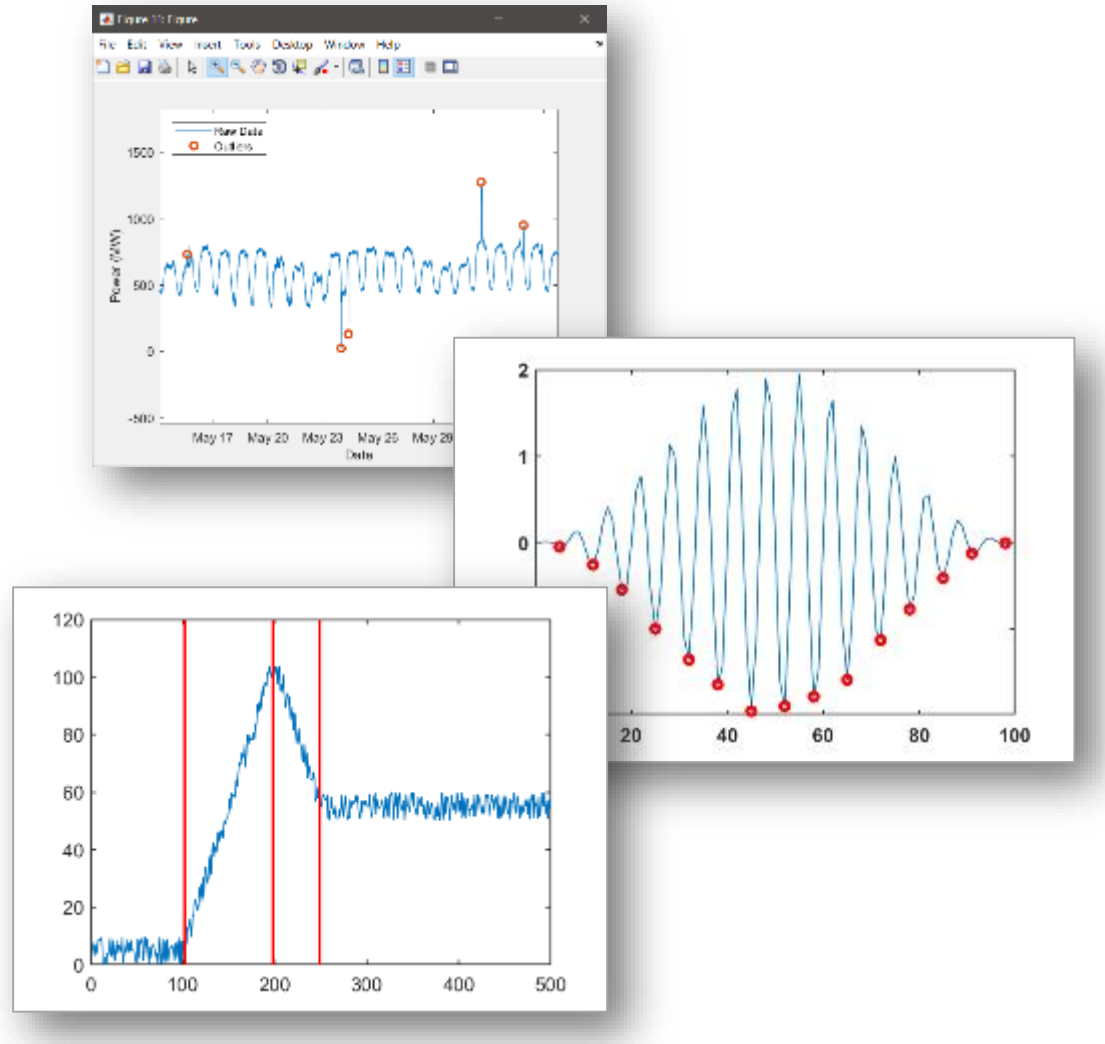
Statistics and Machine Learning Toolbox™
Data Acquisition Toolbox™
Wavelet Toolbox™

Preprocessing and Analyzing Data Just Got Easier

R2017a R2017b

Spend less time preparing your data and more time analyzing it

- Detect and replace outliers with `isoutlier` and `filloutliers`
- Smooth noisy data with filtering or local regression using `smoothdata`
- Detect local minima and maxima using `islocalmin` and `islocalmax`
- Detect abrupt changes in data with `ischange`

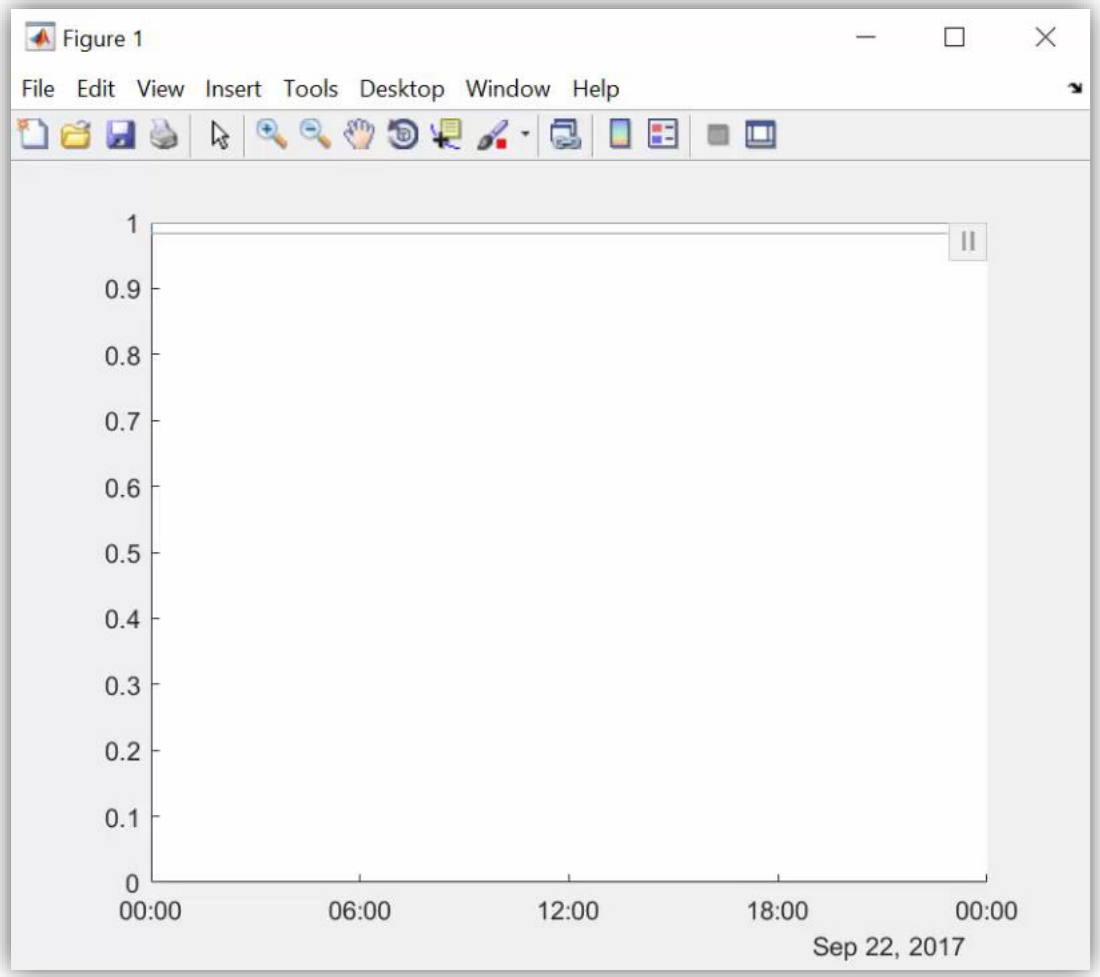


Working with Big Data Just Got Easier

R2016b R2017a R2017b

Use tall arrays to manipulate and analyze data that is too big to fit in memory

- Tall arrays let you use familiar MATLAB functions and syntax to work with big datasets, even if they don't fit in memory
- Support for hundreds of functions in MATLAB and Statistics and Machine Learning Toolbox
- Works with Spark + Hadoop Clusters

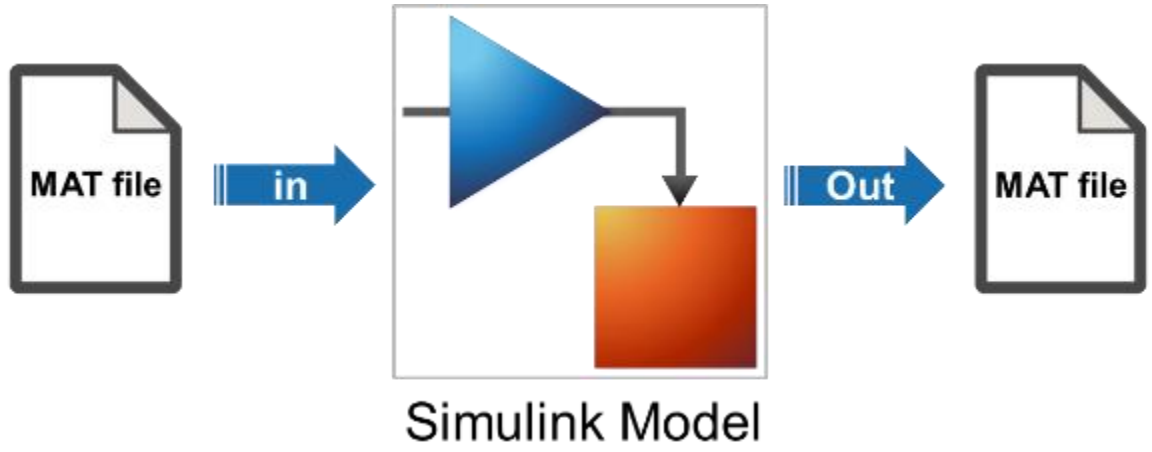


Working with Big Data Just Got Easier in Simulink Too

R2017a

Stream large input signals from MAT-files without loading the data into memory

- Provides a big data workflow for Simulink simulations
- Use big data in Simulink logging and loading
- Especially useful when running many simulations where data retrieved is too large to fit into memory

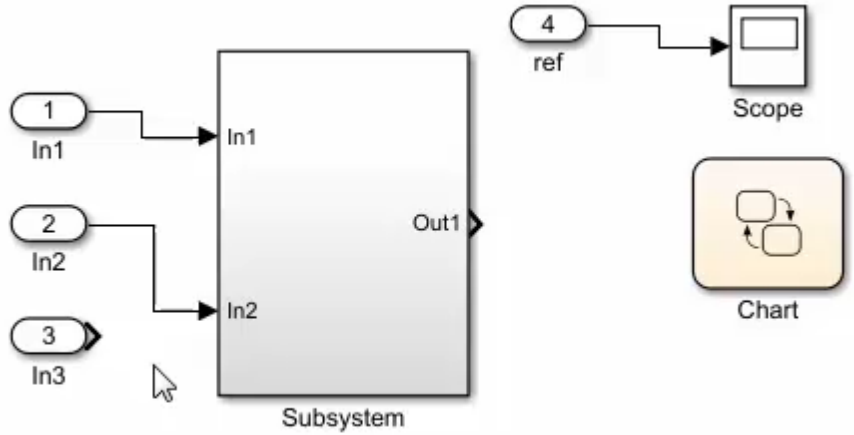


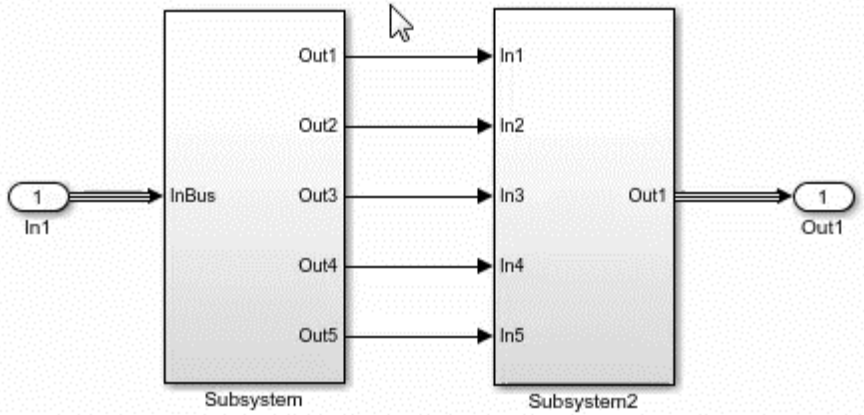
Create Your Models Faster

R2017a

Use automatic port creation and reduced bus wiring

- Add inports and outports to blocks when routing signals
- Quickly group signals as buses and automatically create bus element ports for fewer signal lines





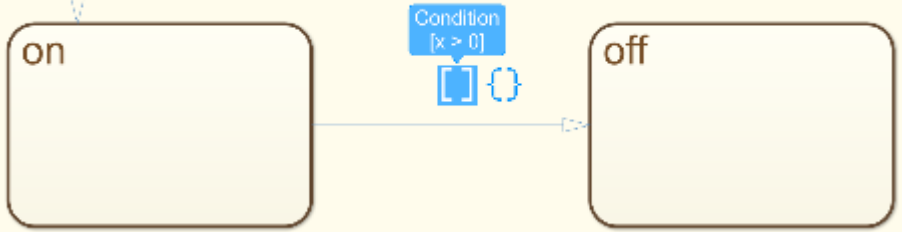
Create Your Stateflow Charts Faster

R2017a R2017b

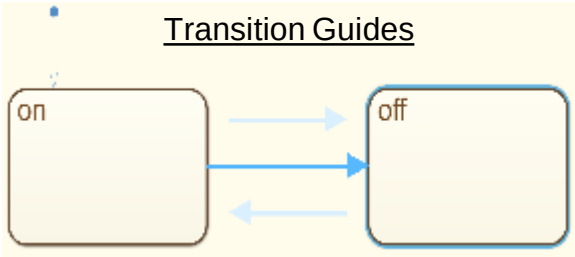
Use smart editing cues and automatic layout to create clean diagrams quickly

- Learn the Stateflow language quicker
- Recall syntax when returning to Stateflow
- Easier to create concise, readable diagrams

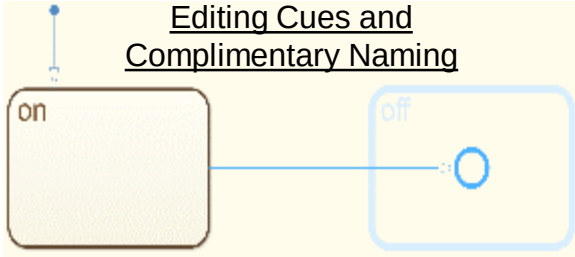
Transition Syntax Cues



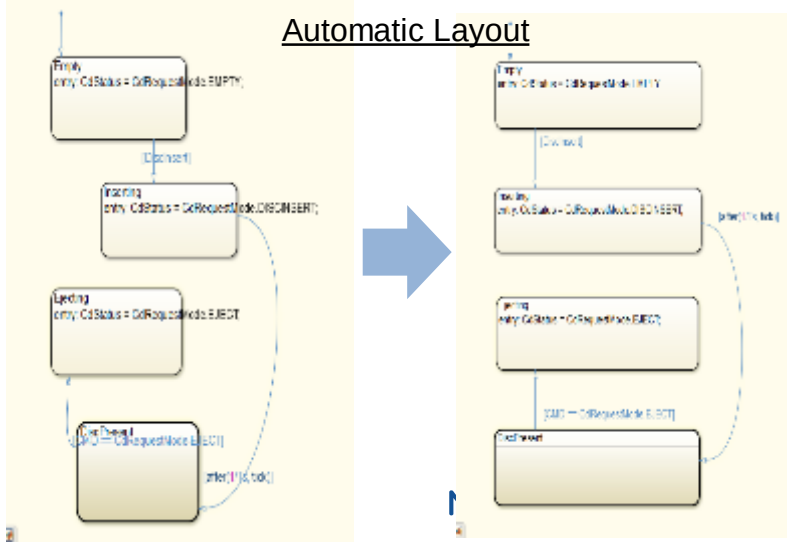
Transition Guides



Editing Cues and Complimentary Naming



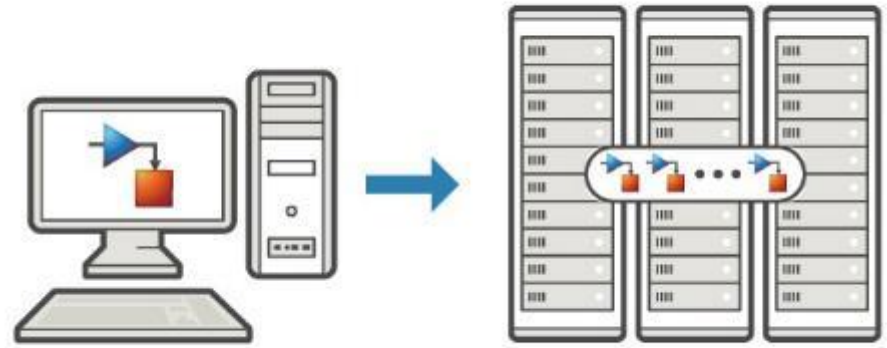
Automatic Layout



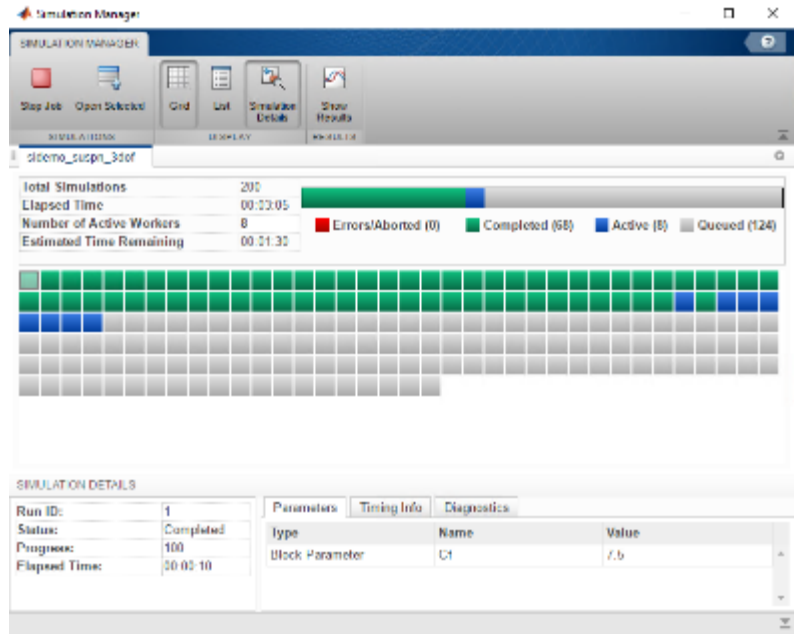
Simulate your Model Faster

R2017a R2017b

Use the new `parsim` command to speed up your simulations

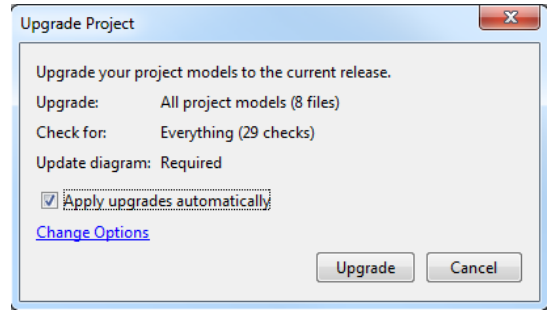


- Directly run multiple parallel simulations from the `parsim` command
- Monitor simulation status and progress in the Simulation Manager
- Especially useful for Monte Carlo simulations and Design of Experiments



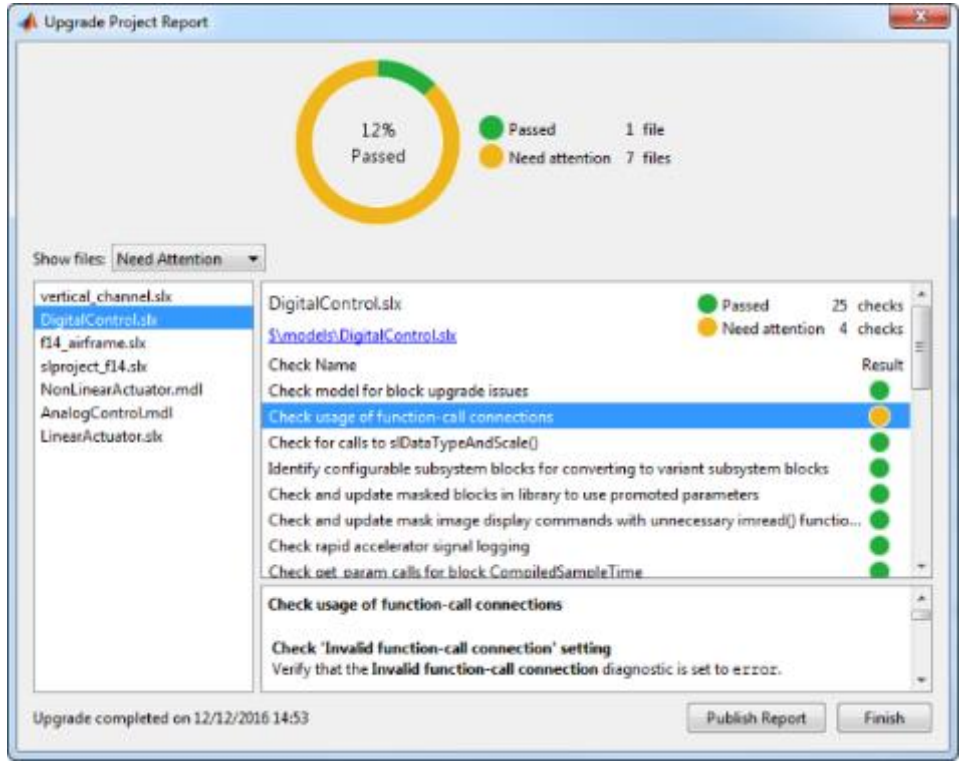
Parallel Computing Toolbox™
MATLAB Distributed Computing Server™

Simulink Project Upgrade



Easily update all the models in your Simulink Project to the latest release

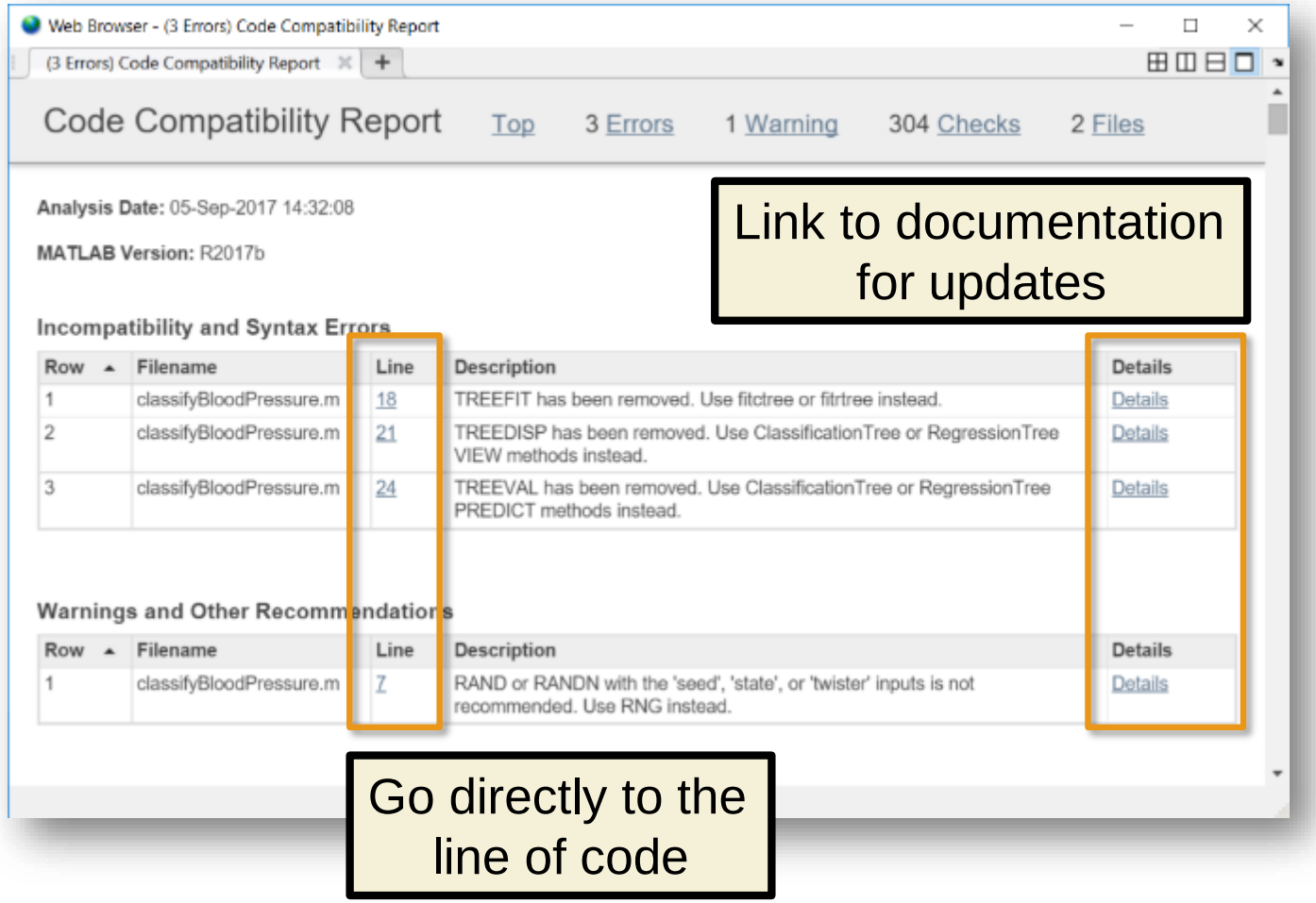
- Avoid the manual process of upgrading one model at a time
- Simulink Project upgrade is an easy to use UI to automate the upgrade process of all the models in a Simulink project
- Fixes are automatically applied and a report gets generated



Code Compatibility Report

R2017b

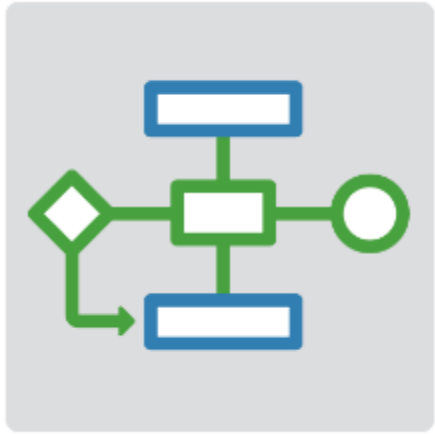
- Tool to help upgrade code to a newer release
- Identifies potential compatibility issues
- Includes hundreds of checks for incompatibilities, errors, and warnings



Platform Productivity

Getting your work done faster

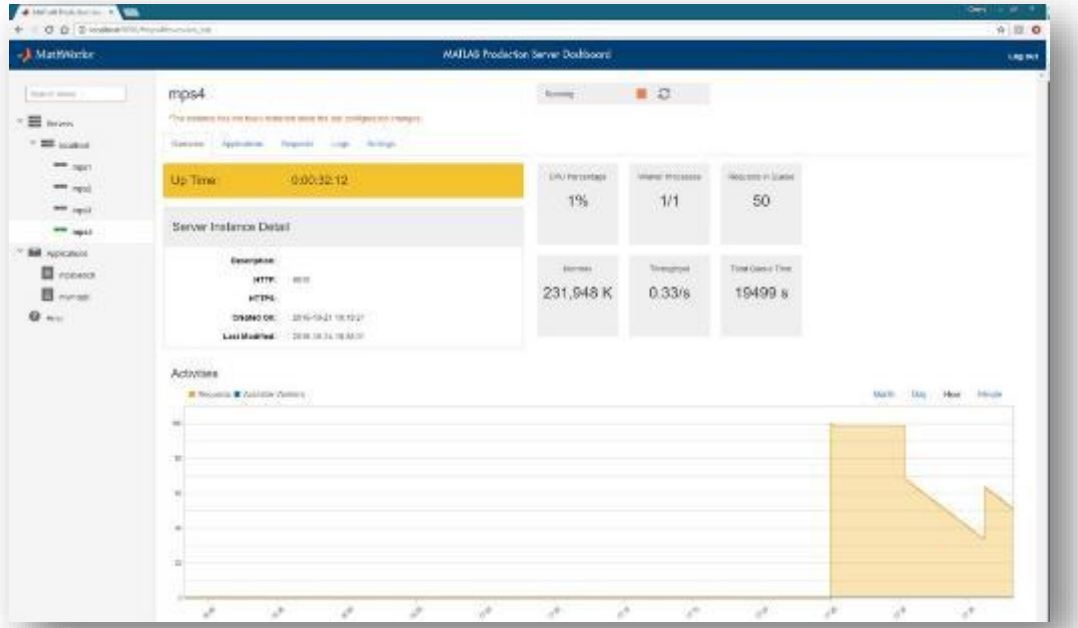
Workflow Depth



Support for your entire workflow

Integrate MATLAB Analytics into Enterprise Applications

- Production deployment of MATLAB programs without recoding or creating custom infrastructure
- Scalable performance and management of MATLAB analytics
- Lightweight client library for secure access to analytics from enterprise applications
- Centralized analytic service accessible via the RESTful JSON interface or from .NET, Java, C/C++, and Python environments



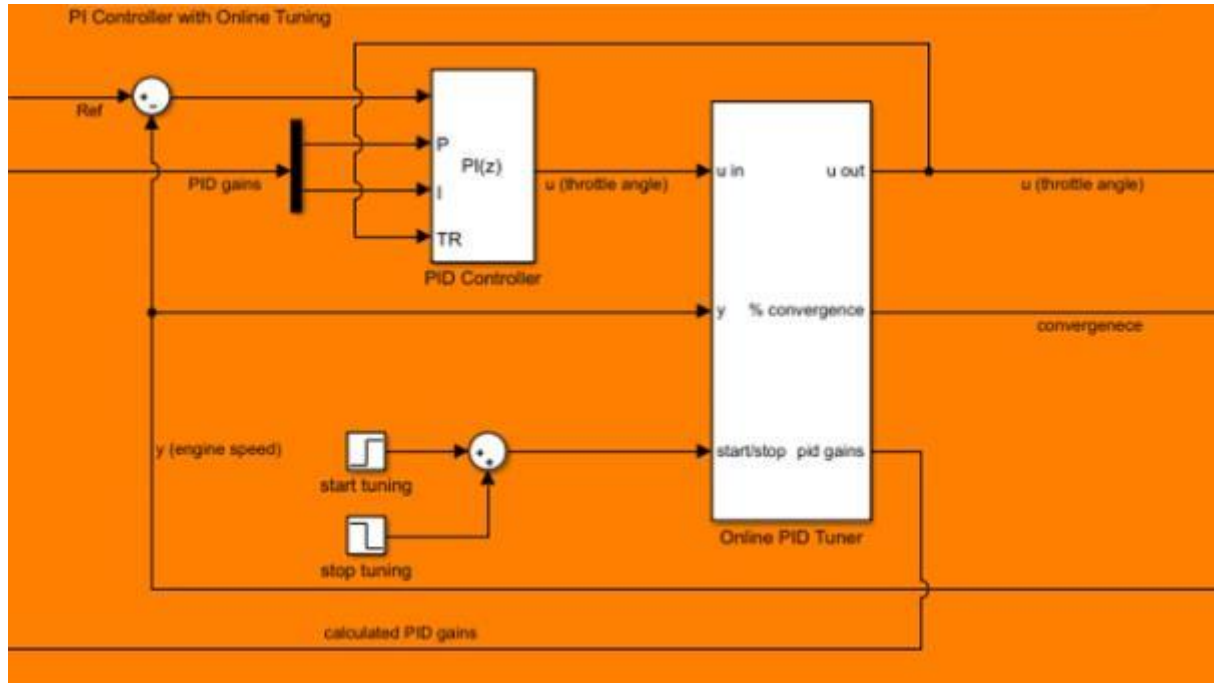
- Web-based management dashboard for IT configuration and control R2017b

PID Auto-tuning

R2017b

Implement an embedded PID auto-tuning algorithm

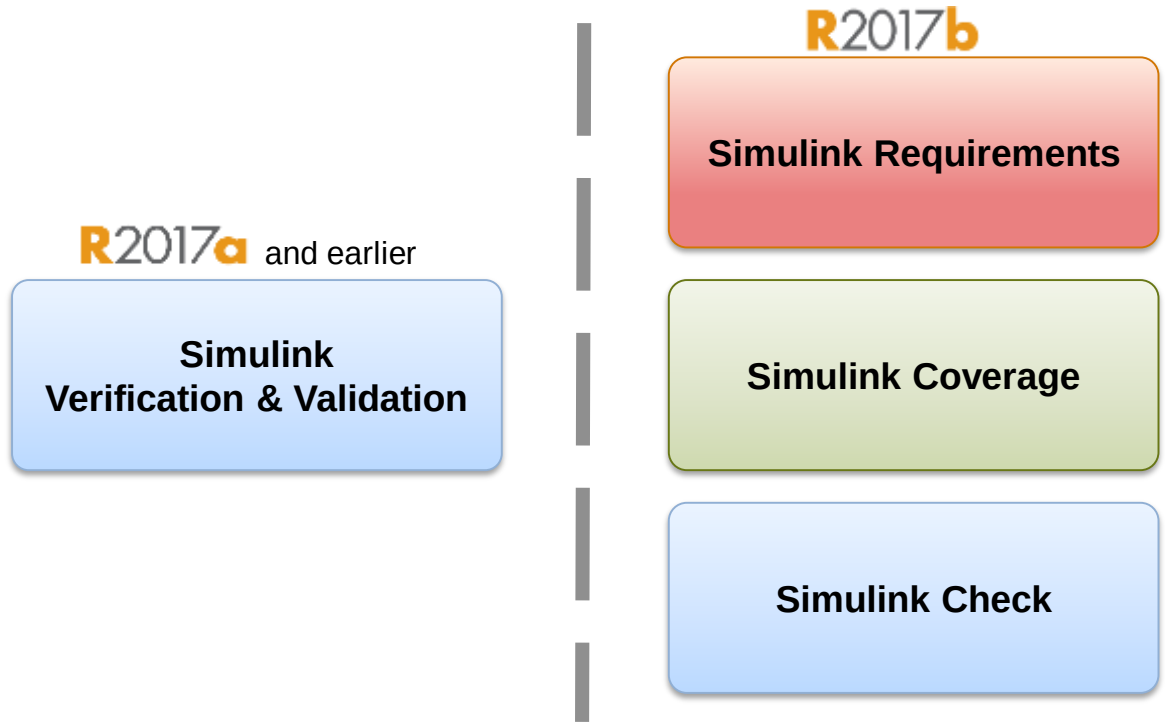
- Automatically tune PID controller gains in real time against a physical plant
- No model of plant dynamics required
- Deploy the auto-tuning algorithm to embedded software using automatic code generation



Verification and Validation

New products for more flexibility to align products based on usage

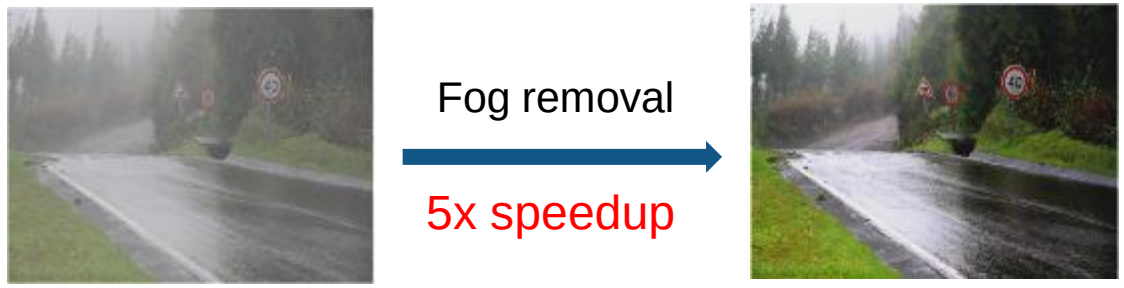
- Simulink Requirements – requirements authoring, editing, trace, management
- Simulink Coverage – model and code coverage analysis
- Simulink Check – static checking, metrics, clone detection

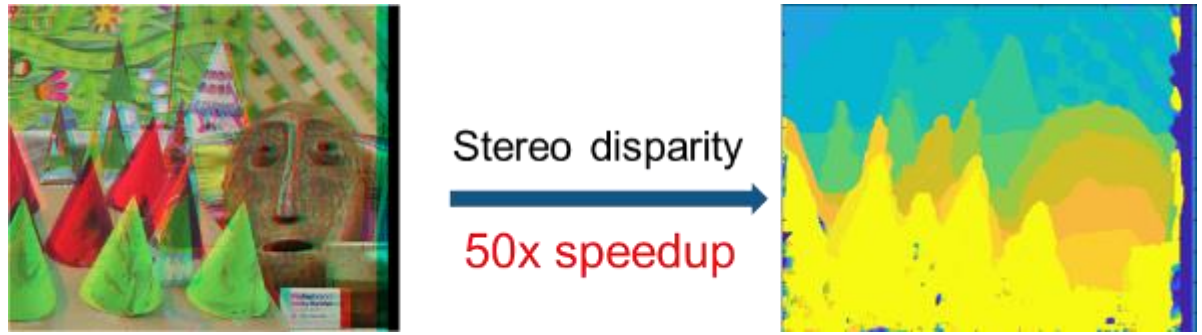


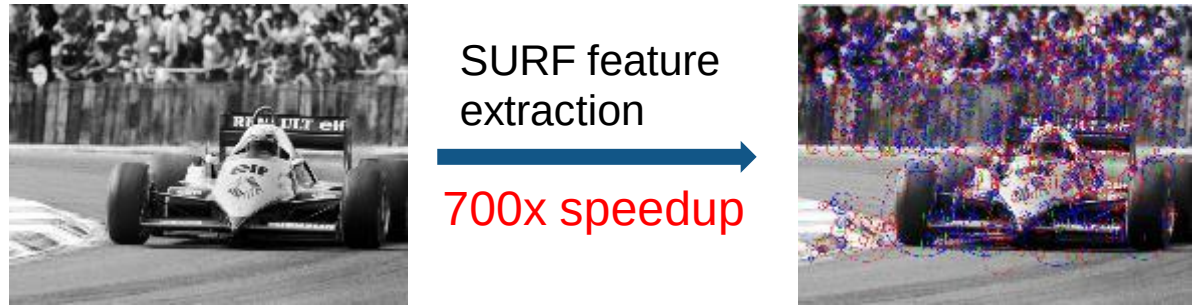
Simulink Requirements™
Simulink Coverage™
Simulink Check™

Generate CUDA Code for Implementation on NVIDIA GPU's R2017b

- Generate optimized CUDA code from MATLAB code for deep learning, radar, embedded vision, and autonomous systems
- Generated CUDA code is portable across NVIDIA GPUs – from desktop to servers to embedded
- Use generated CUDA code within MATLAB to accelerate computationally intensive portions of your MATLAB code



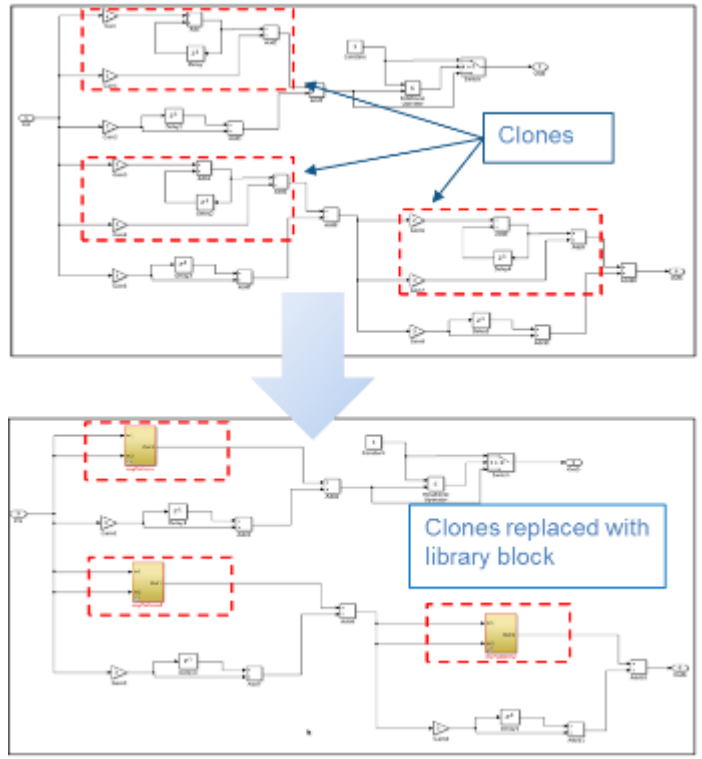




Efficient Code Generation

Improve code quality with clone detection and dynamic memory allocation

- Refactor repeating library patterns and subsystem clones
  - Reduces redundancy
  - Improves reusability
- Generate C code that uses dynamic memory allocation from MATLAB Function blocks
  - Allocate memory as needed at runtime

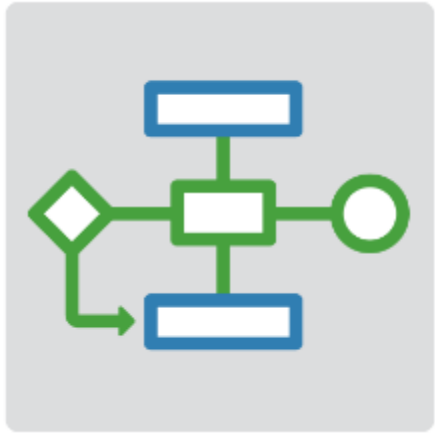



```
118    /* MATLAB Function: '<Root>/MATLAB Function' */
119    /* MATLAB Function 'MATLAB Function': '<S1>:1' */
120    if (!mymdl_DW.p_not_empty) {
121      /* '<S1>:1:4' */
122      /* '<S1>:1:5' */
123      k = mymdl_DW.p->size[0] * mymdl_DW.p->size[1];
124      mymdl_DW.p->size[0] = 1;
125      mymdl_DW.p->size[1] = 0;
126      mymdl_emxEnsureCapacity((emxArray__common_mymdl_T *)mymdl_DW.p, k, (int
127        sizeof(real_T));
128      mymdl_DW.p_not_empty = false;
129    }
```

Platform Productivity

Getting your work done faster

Workflow Depth



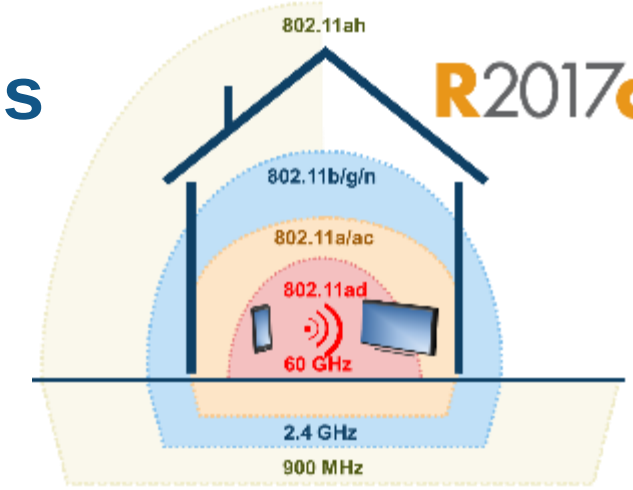
Support for your entire workflow

Application Breadth

Products for the work you do

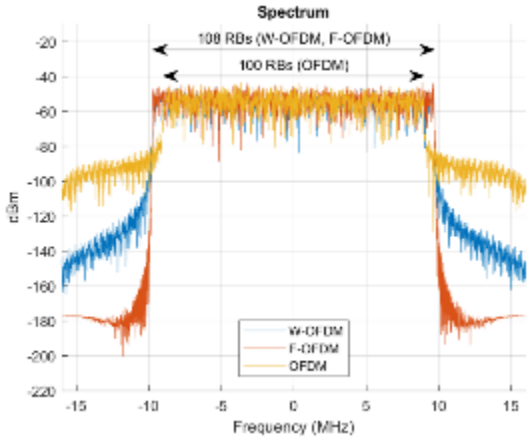
Support for the Latest Wireless Standards

R2017a R2017b



Generate IEEE 802.11ad compliant waveforms and simulate 3GPP 5G radio technologies

- IEEE 802.11ad is a new Wi-Fi standard intended for high data rate short range communication
  - e.g., streaming video between a phone and a TV
- A new 5G library is available to explore the behavior and performance of new proposed 5G radio technologies
- LTE HDL Toolbox is a new product for modeling LTE communications subsystems for FPGAs and ASICs



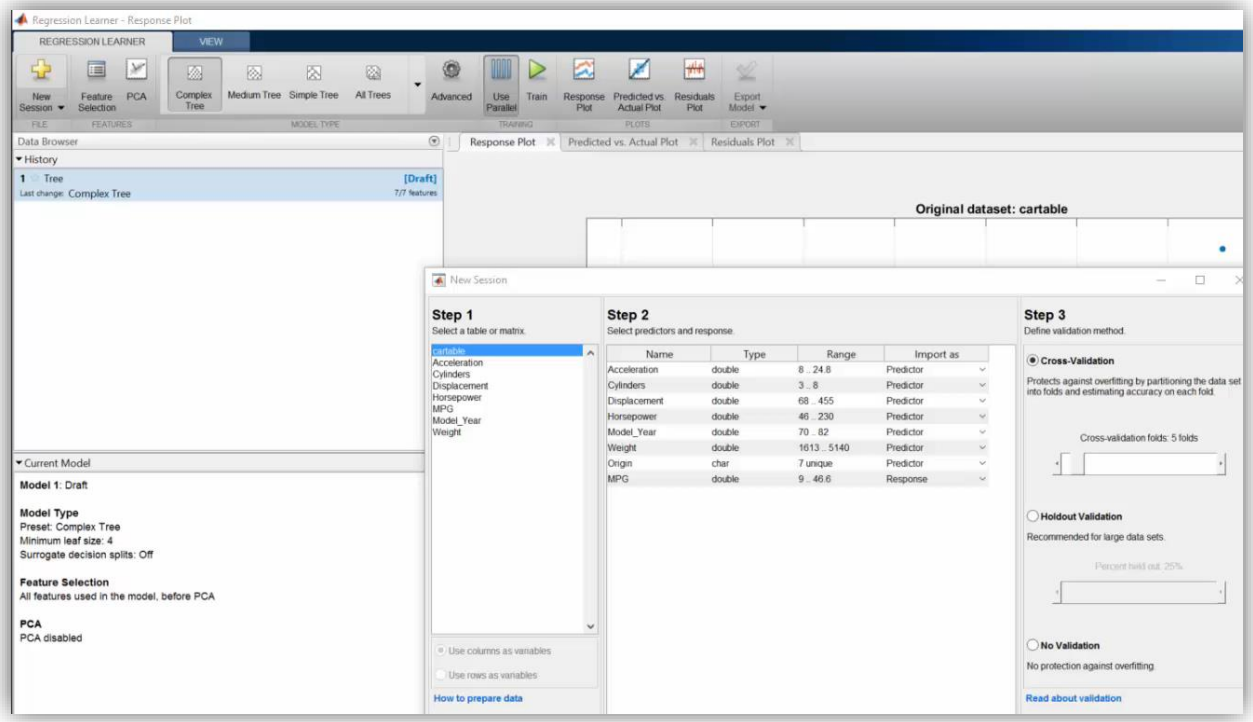
WLAN System Toolbox™
LTE System Toolbox™
LTE HDL Toolbox™

Machine Learning

“Learn" information directly from data without assuming a predetermined equation as a model

- Regression Learner app
  - Choose from multiple algorithms
  - Train and validate multiple models
  - Assess model performance, compare results, and choose the best model

- Code generation
  - Generate C code for predictive models that can be deployed directly to hardware devices



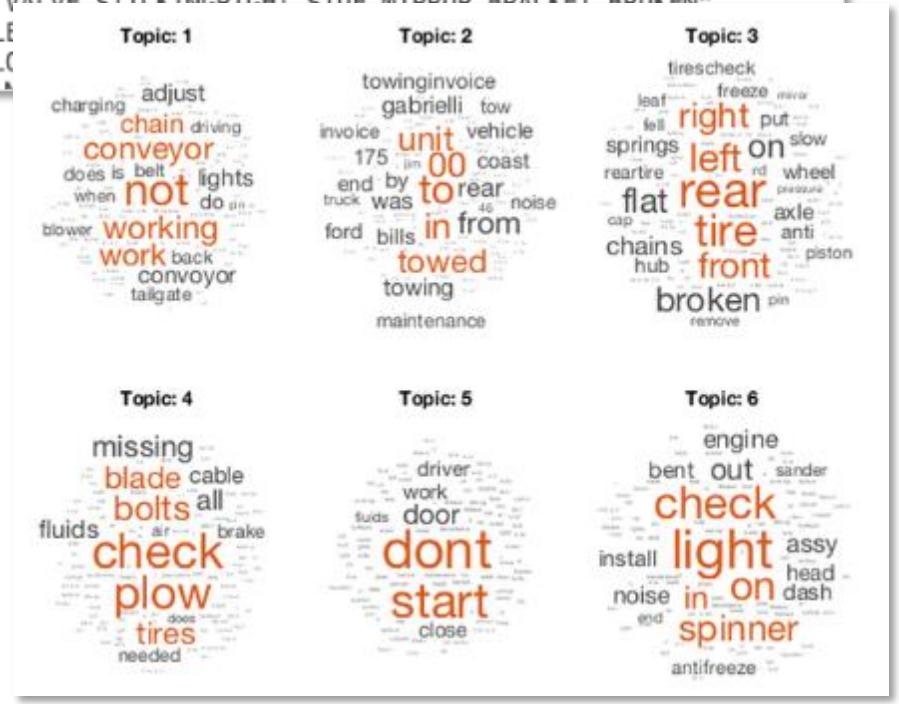
Text Analytics

R2017b

Analyze and model text data

- Text extraction from PDF and Microsoft Word files
- Text preprocessing and normalization
- TF-IDF and word frequency statistics
- Machine learning algorithms, including Latent Dirichlet Allocation (LDA) and Latent Semantic Analysis (LSA)
- Word-embedding training, and pretrained model import with word2vec, FastText, and GloVe
- Word cloud and text scatter plots

```
repairNotes = 617×1 string array
    "PM SERVICE, CHECK TURN SIGNAL, CLUNKING NOISE WHEN DRIVING"
    "SERVICEROB,EXT,5604"
    "NEED 4 PLOW PINS"
    "INSTALL SPINNER ASSY"
    "DONT START"
    "DOG BONE PIN BROKEN"
    "NEED SERVICE, CHECK BRAKES"
    "HYD CAP CHECK ENGINE LIGHT ON"
```



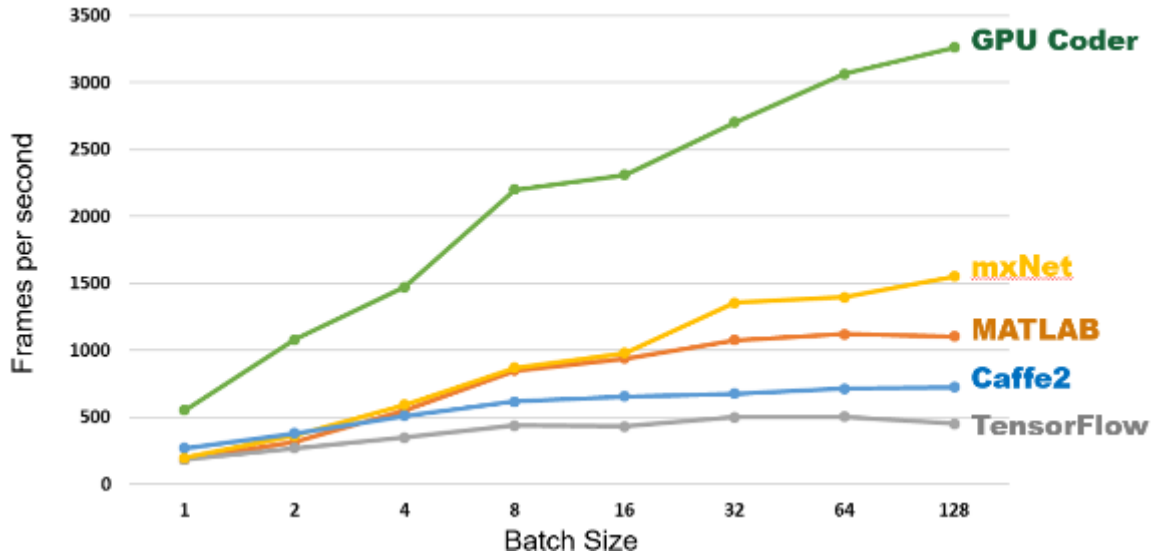
Text Analytics Toolbox™

Deep Learning

R2017a R2017b

Design, build, and visualize convolutional neural networks

- Access the latest models
  - GoogLeNet, ResNet, VGG-16, and VGG-19
- Import pretrained models from:
  - Caffe, TensorFlow/Keras
- Design and build your own models
  - R-CNN, Fast R-CNN, and Faster R-CNN algorithms
- Use NVIDIA GPUs to train your models
- Automatically generate high-performance CUDA code for embedded deployment *(requires GPU Coder)*



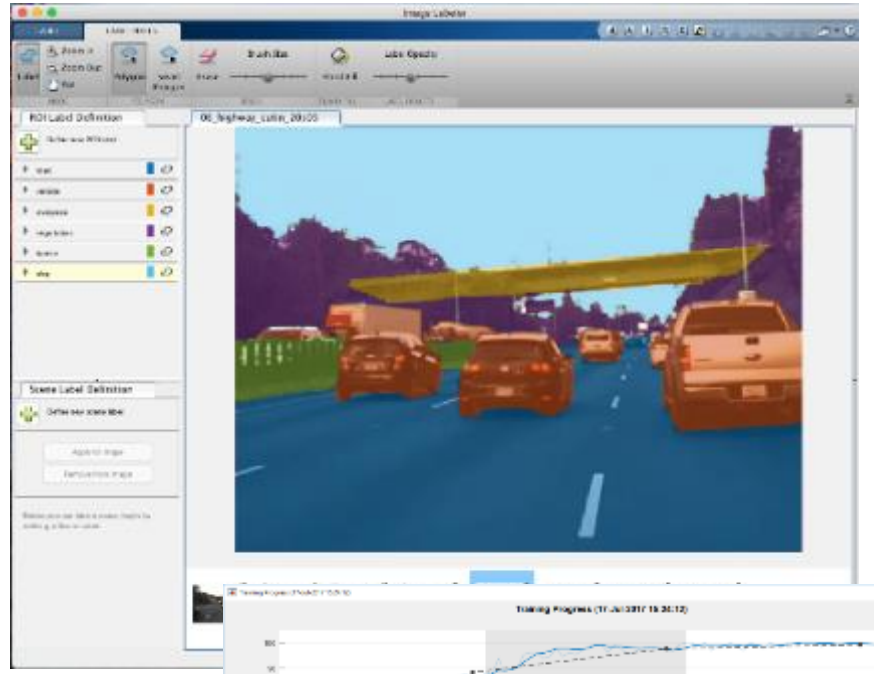
CPU:	Intel(R) Xeon(R) CPU E5-1650 v3 @ 3.50GHz
GPU:	Pascal TitanXP

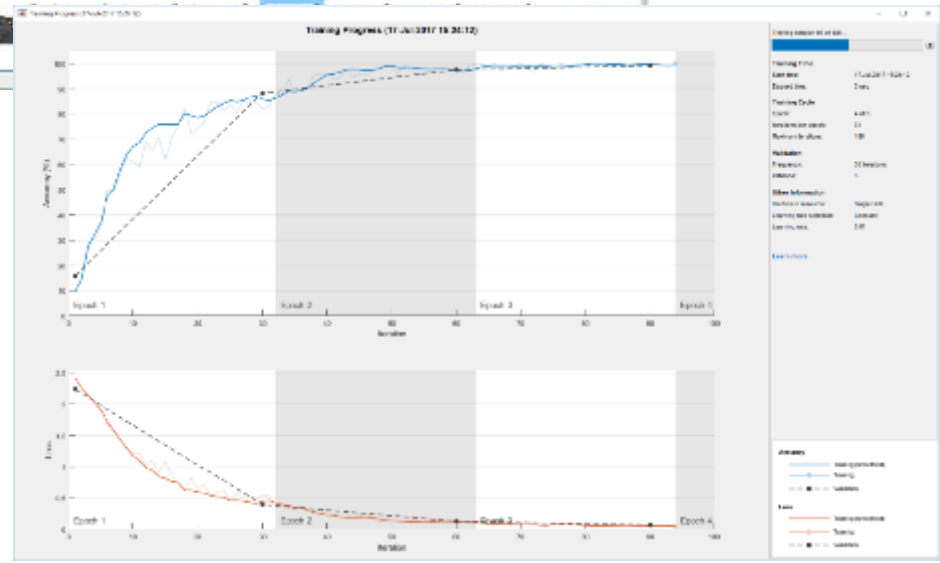
Neural Network Toolbox™
Computer Vision System Toolbox™
GPU Coder

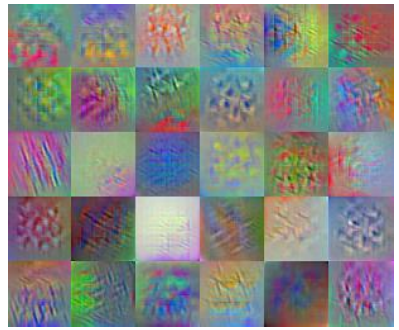
Deep Learning

R2017a R2017b

- Use the Image Labeler app to label pixels and regions for semantic segmentation
- Monitor training progress with plots for accuracy, loss, validation metrics, and more
- Visualize and debug deep learning models



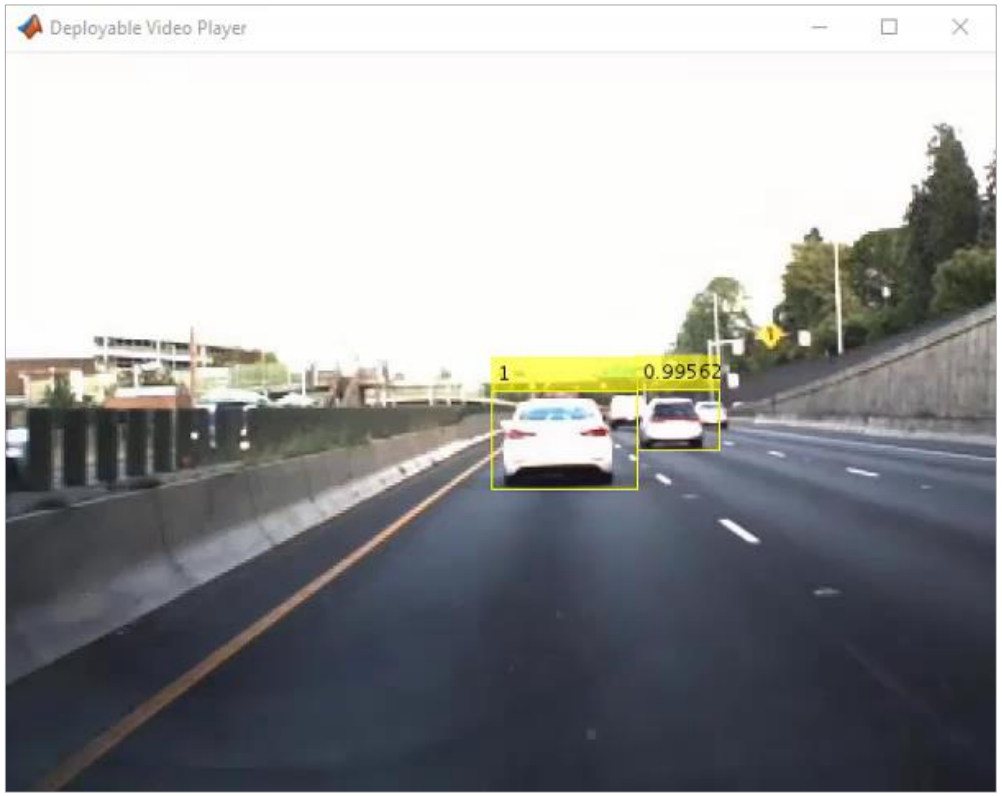




Computer Vision System Toolbox
Neural Network Toolbox

Detection and Localization Using Deep Learning

R2017a



Regions with Convolutional Neural Network Features (R-CNN)

R2017b

Semantic Segmentation using SegNet

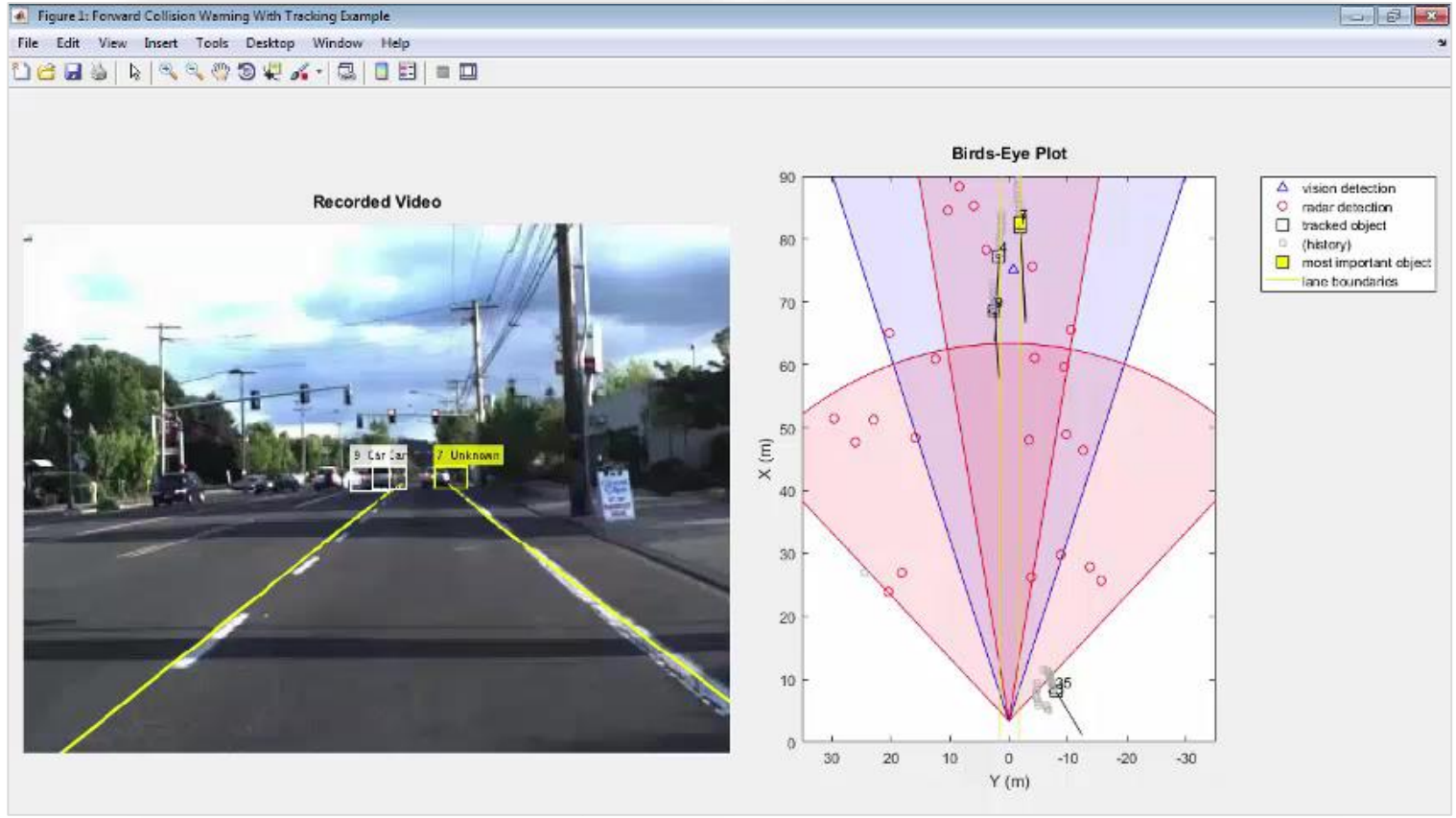
CamVid Database: Brostow, Gabriel J., Julien Fauqueur, and Roberto Cipolla. "Semantic object classes in video: A high-definition ground truth database." *Pattern Recognition Letters*Vol 30, Issue 2, 2009, pp 88-97.

Autonomous Driving Systems

R2017a

Design, simulate, and test ADAS and autonomous driving systems

- Algorithm development
  - Sensor Fusion
  - Computer Vision
  - Deep learning
- Visualization tools
- Testing and verification
  - Ground Truth Labeling App
  - Traffic scenario generation

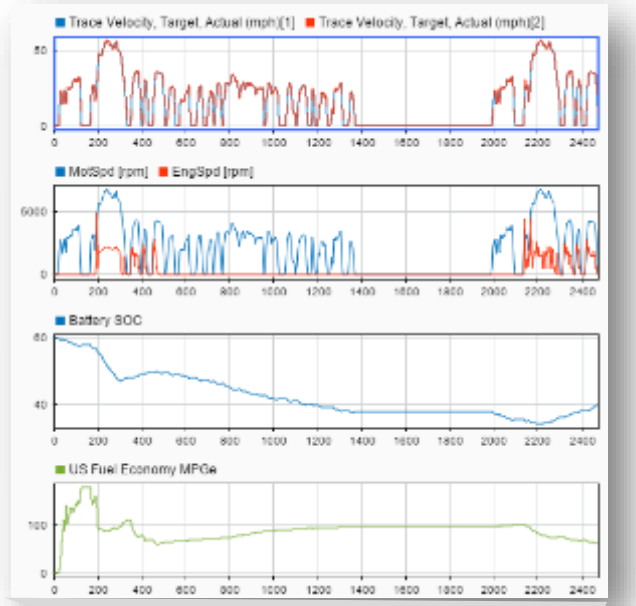


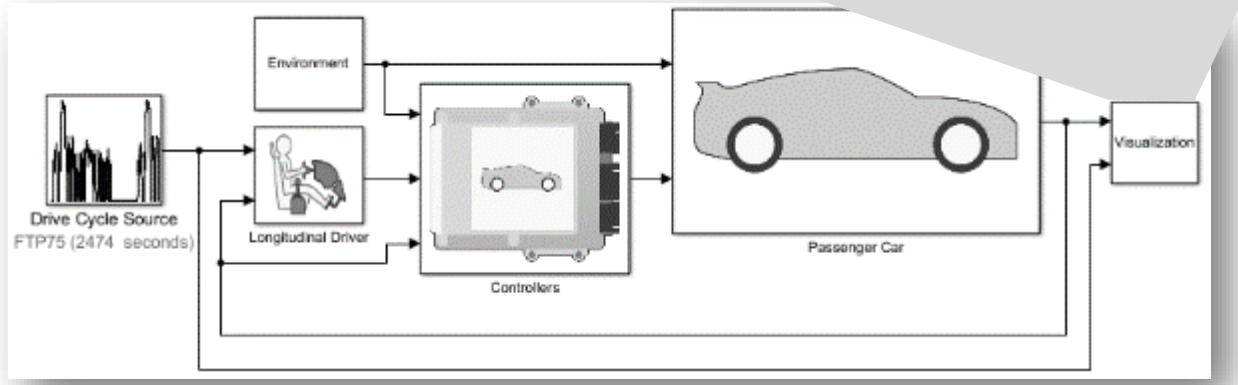
Model and simulate automotive powertrain systems

R2017a

Accelerate your powertrain controls development process

- Simulate engine and controller subsystems, transmission assemblies, battery packs
- Use pre-built conventional, EV, and HEV vehicle models that can be parameterized and customized
- Run fuel economy and performance simulations
- Deploy fast-running models onto HIL systems



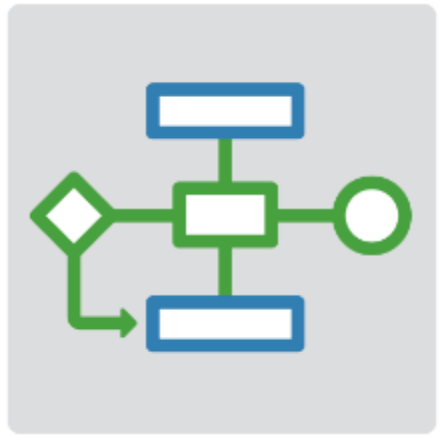


Powertrain Blockset™

Platform Productivity

Getting your work done faster

Workflow Depth



Support for your entire workflow

Application Breadth

Products for the work you do

What's New in MATLAB and Simulink?

Platform Productivity

- Live Editor
- MATLAB Apps
- Big Data
- Modeling enhancements
- Release adoption

Workflow Depth

- Enterprise applications
- Control system design
- Verification and validation
- CUDA code generation
- C code generation enhancement

Application Breadth

- New wireless standards
- Machine learning
- Deep learning
- Autonomous driving
- Powertrain systems

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Thank You