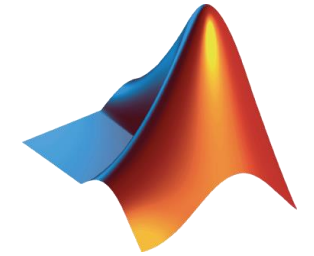


# What's New for MATLAB

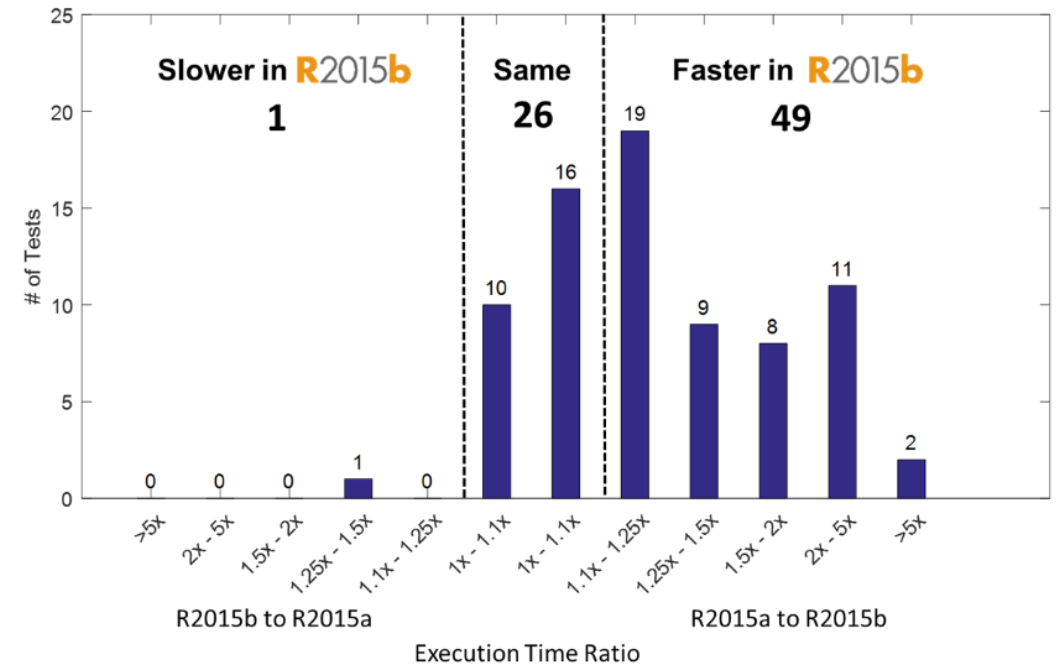
David Willingham



**R2015b**

# MATLAB Execution Engine

- Redesigned **execution engine** runs MATLAB code faster
  - All MATLAB code is now JIT compiled
  - A platform for future improvements
- Average performance improvement of **40%** on **76 performance-sensitive user applications**
  - Function call overhead is lower
  - Many object-oriented features are faster
  - Some element-wise operations are faster
- Learn more
  - [www.mathworks.com/products/matlab/matlab-execution-engine/](http://www.mathworks.com/products/matlab/matlab-execution-engine/)

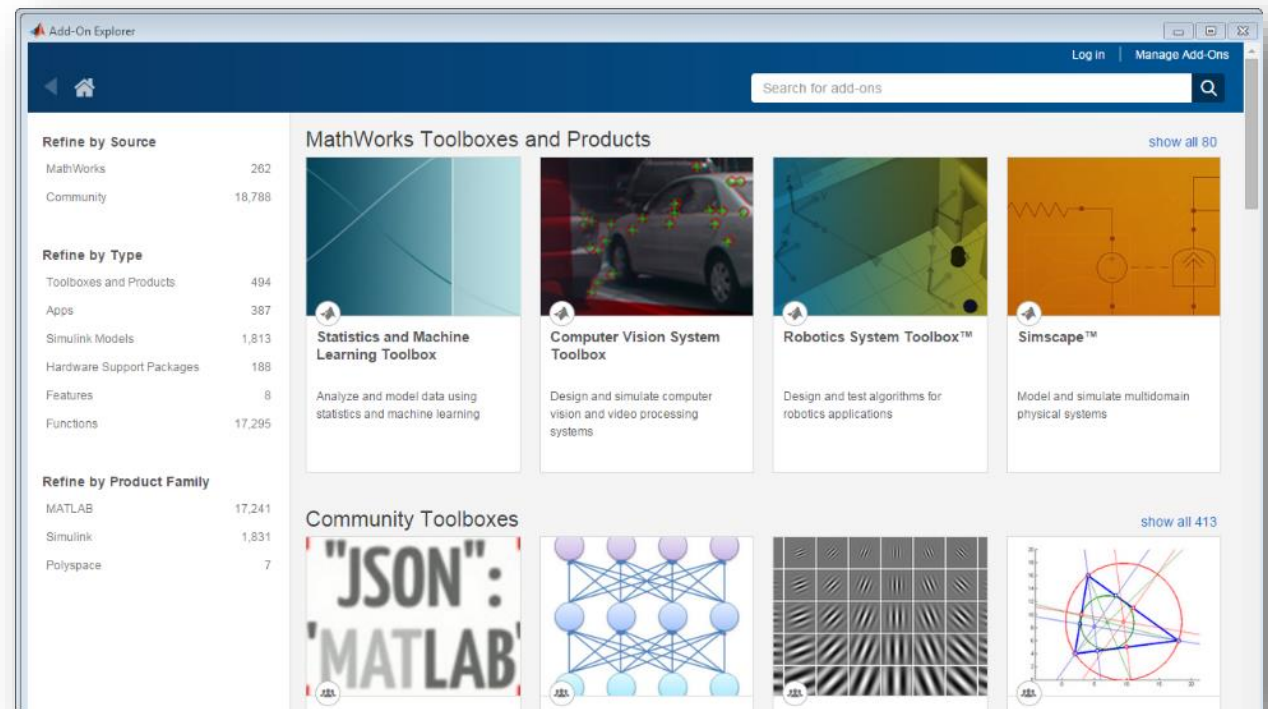


## Other Performance Updates

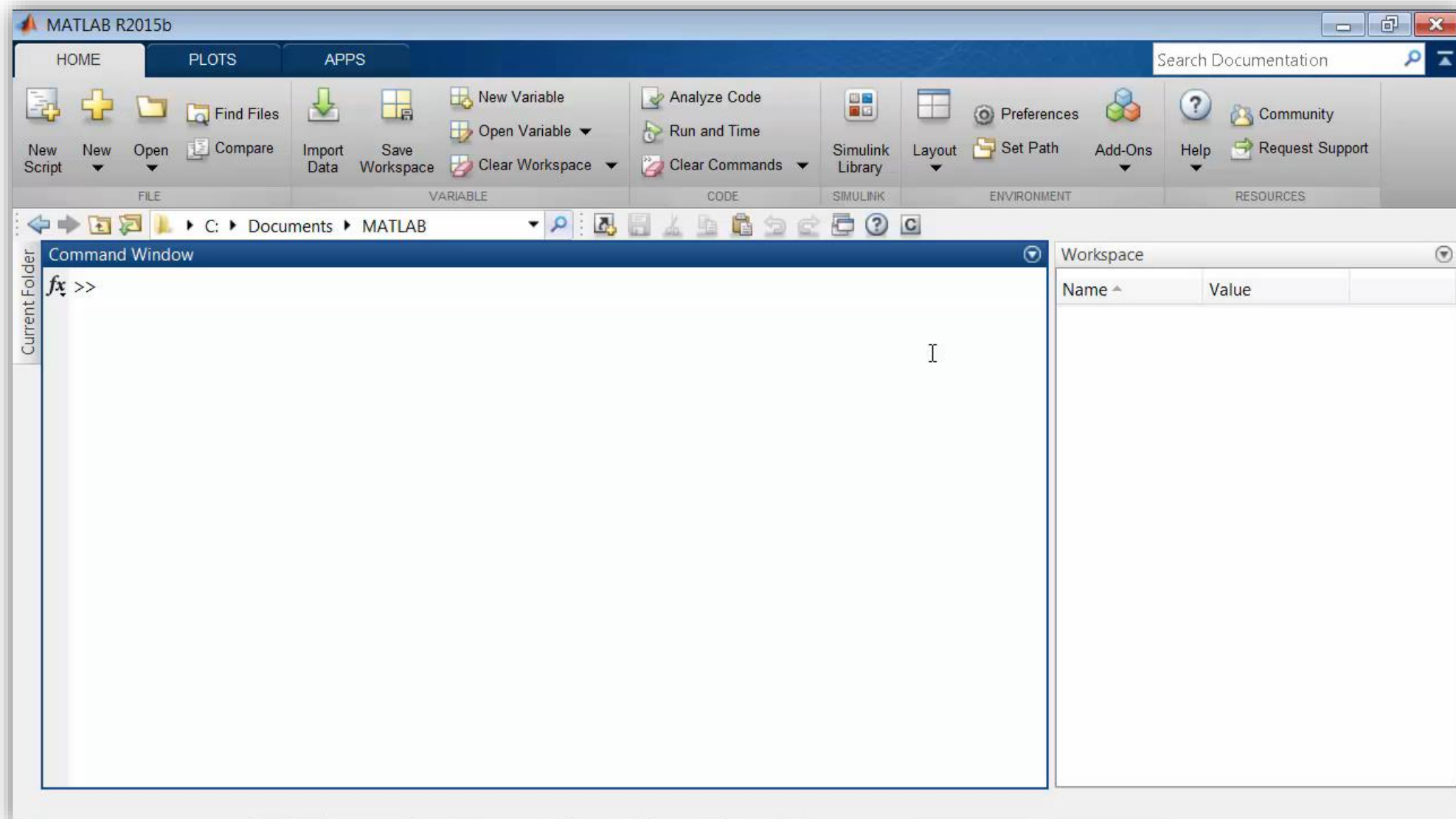
- Database Toolbox
  - Faster database read and write
- Image Processing Toolbox
  - Performance improvements for image filtering and grayscale morphology
- GPU acceleration using Parallel Computing Toolbox
  - More than 90 GPU-enabled functions in Statistics and Machine Learning Toolbox, including:
    - Probability distributions
    - Descriptive statistics
    - Hypothesis testing
  - An additional 16 MATLAB functions supported using gpuArrays
  - An additional 23 MATLAB functions supported using sparse gpuArrays

# Add-On Explorer

- Add capabilities to MATLAB, including **community-authored** and **MathWorks** toolboxes, apps, functions, models, and hardware support
  - Browse and install add-ons directly from MATLAB
  - Access **community-authored** content from File Exchange

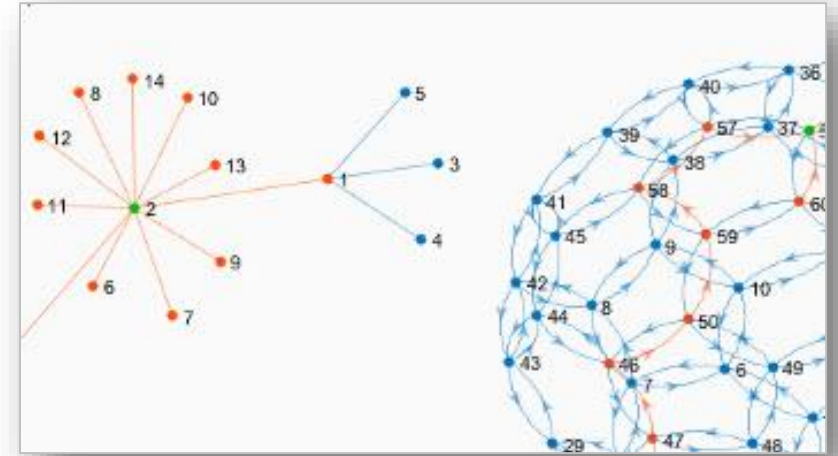


# Add-On Explorer



# Graphs and Network Algorithms

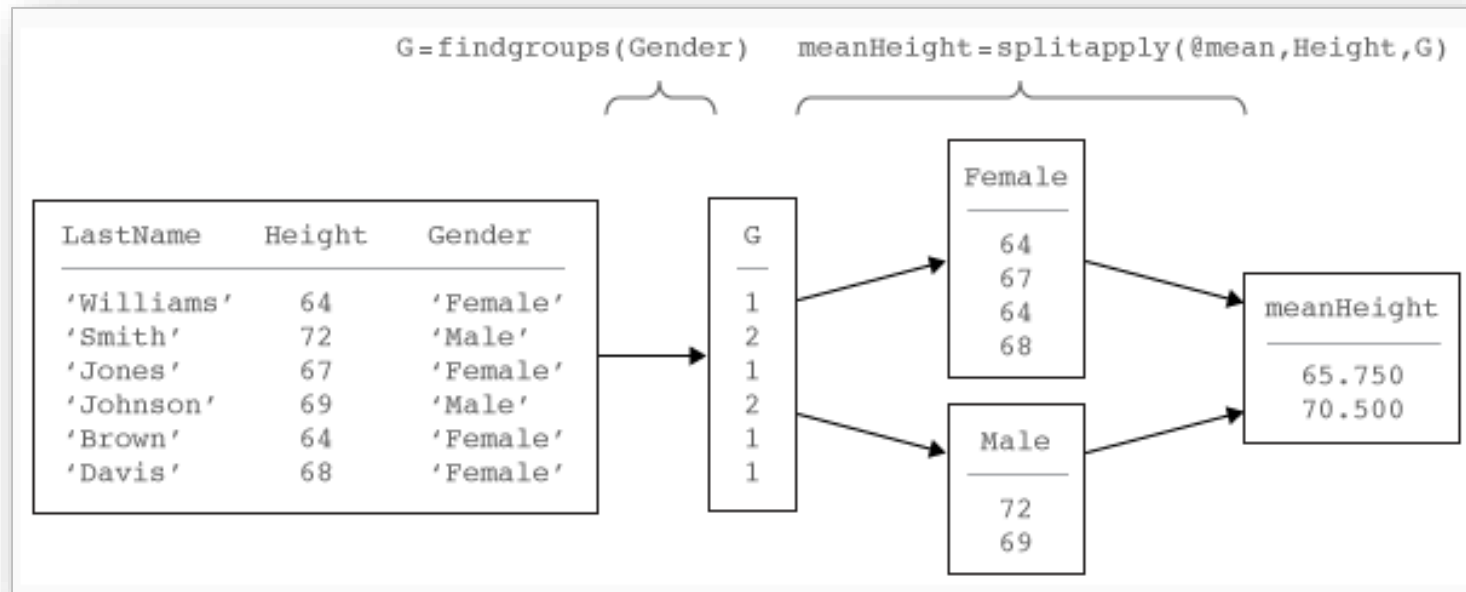
- Graphs model the connections in a network
  - Widely applicable in physical, biological, and information systems
- Two new functions for creating graphs
  - **graph** (undirected graphs)
  - **digraph** (directed graphs)
- Graph objects work just like other MATLAB objects
- Multiple graph layouts available (circular, force-directed, tiered)
- New functions available for working with graphs
  - **shortestpath**, **shortestpathtree**, **minspantree**, **distances** (and many others)



# Split-Apply-Combine Workflow

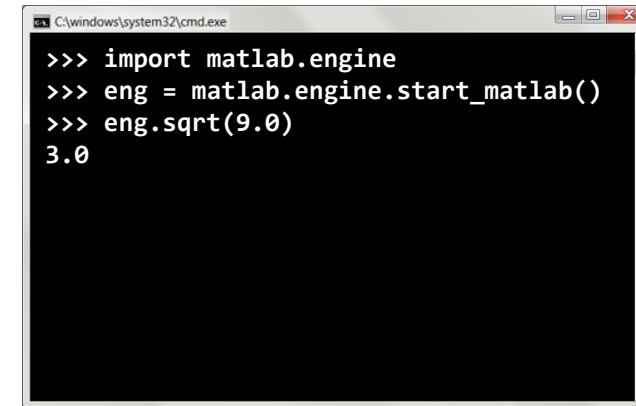
## Analyze Groups of Data

- Two new functions to support this workflow
  - `findgroups` – splits the data into groups
  - `splitapply` – applies a function to each group, and combines the results

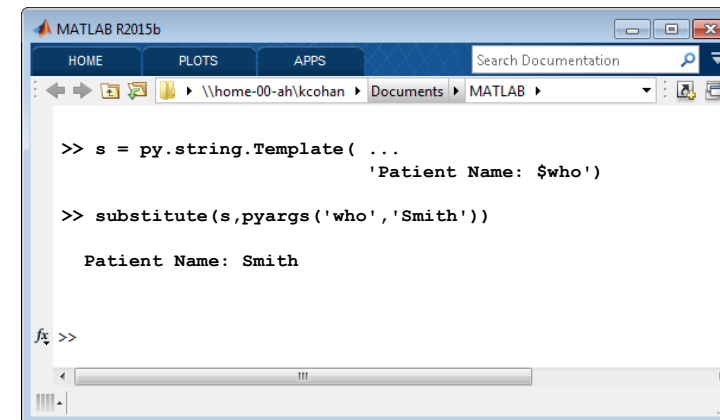


# Enhancements to MATLAB and Python Interoperability

- MATLAB Engine API  
(for calling MATLAB from Python)
  - Call MATLAB functions and objects from Python by connecting to a running session of MATLAB
  
- MATLAB interface to Python  
(for calling Python from MATLAB)
  - Clear Python class definitions with **clear classes** command (useful when reloading revised Python classes)



```
C:\windows\system32\cmd.exe
>>> import matlab.engine
>>> eng = matlab.engine.start_matlab()
>>> eng.sqrt(9.0)
3.0
```

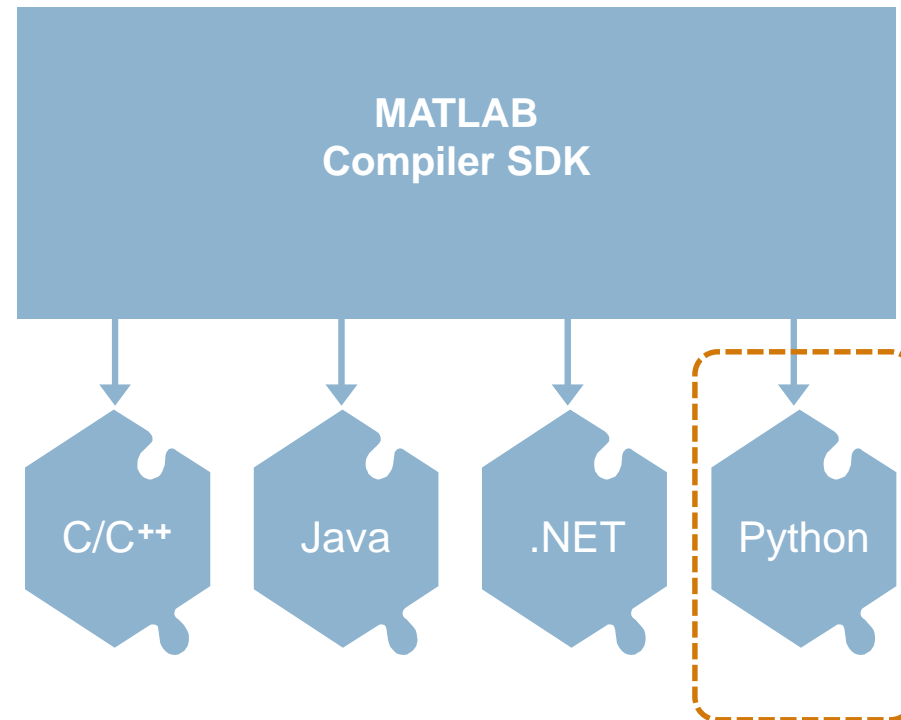


```
MATLAB R2015b
HOME PLOTS APPS Search Documentation
>> s = py.string.Template( ...
    'Patient Name: $who')
>> substitute(s,pyargs('who','Smith'))
    Patient Name: Smith
fx >>
```



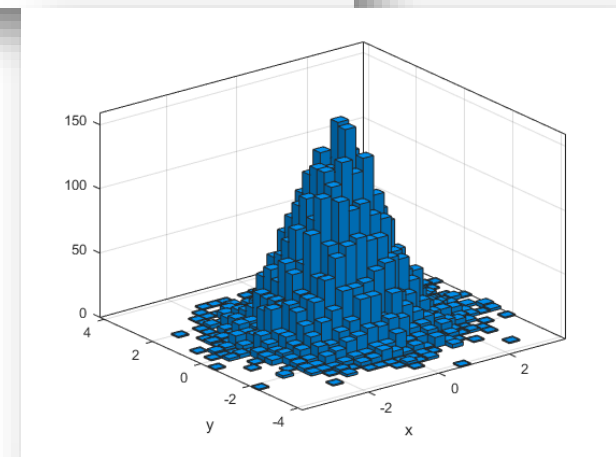
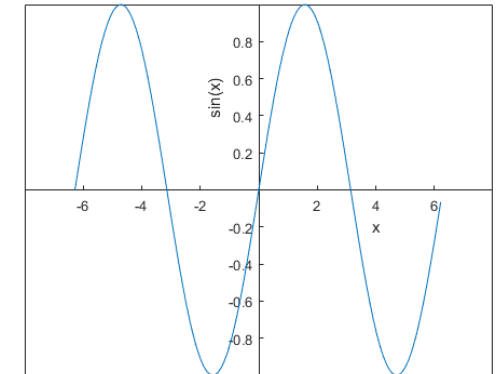
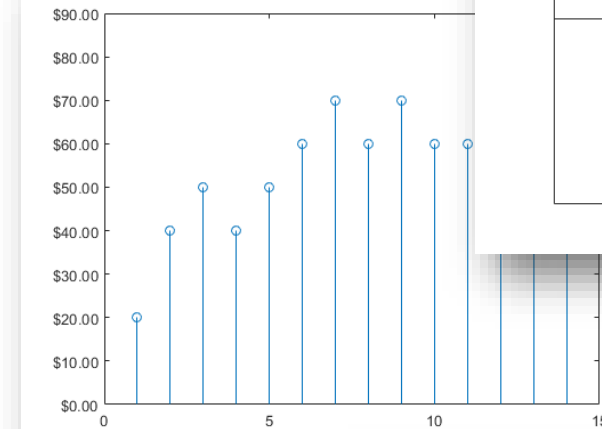
# Deploying to Python Environments

- Create deployable MATLAB components for integration with applications written in Python using MATLAB Compiler SDK



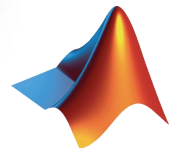
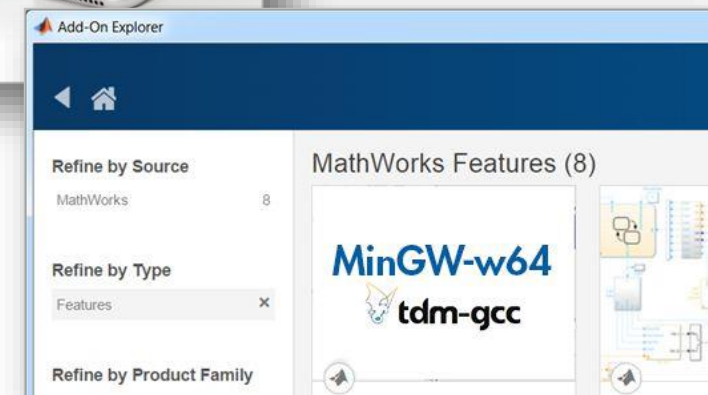
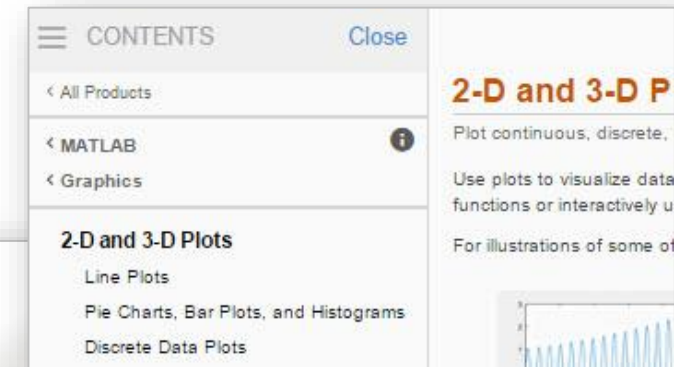
# Visualization Enhancements

- Graphics enhancements for customizing plot axes
  - Setting locations to cross at the origin
  - Controlling the appearance of an individual axis in a plot
- New functions for bivariate histograms
  - Plot using `histogram2`
  - Bin using `histcounts2`



# Other MATLAB Updates

- Documentation
  - Redesigned Help navigation
- Hardware support for:
  - Raspberry Pi 2
  - iOS sensors
  - BeagleBone Black
- MEX compiler support
  - Access to a free compiler (**MinGW-w64**) for 64-bit Windows (*from the Add-On Explorer*)
- imageDataStore**
  - New function for importing data from image collections



# Statistics and Machine Learning Toolbox

## Classification Learner – R2015a

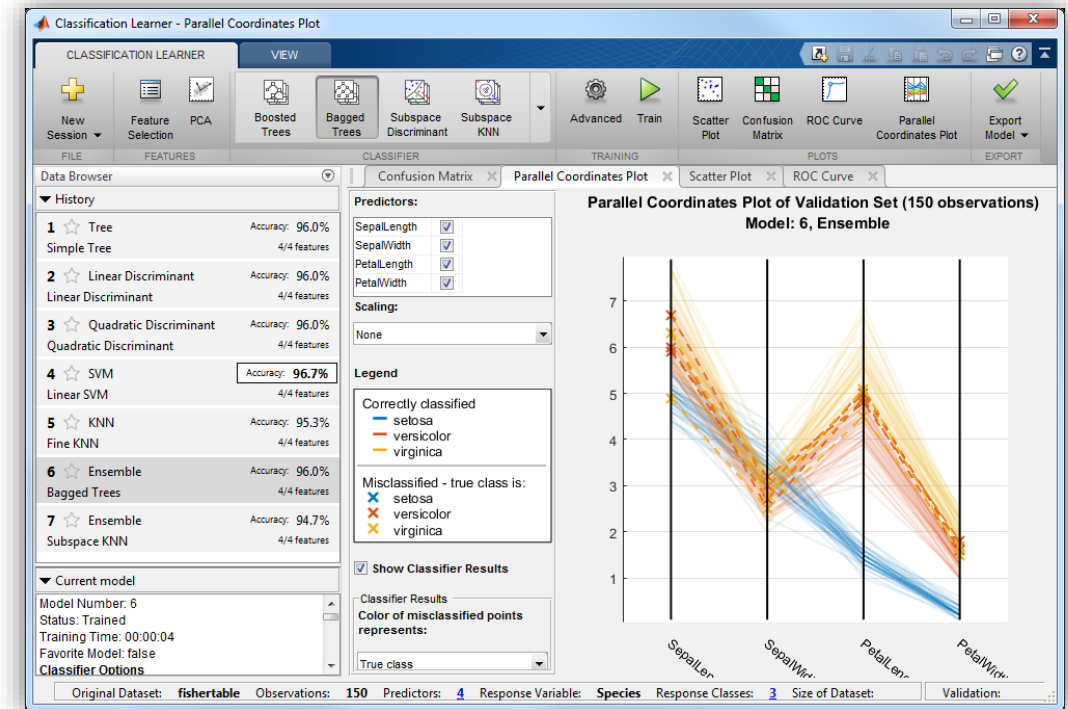
- New app to train models and classify data using supervised machine learning

## New in R2015b

- Classification Learner enhancements
  - PCA, Discriminant Analysis, Categorical Variables
- Nonparametric Regression
  - Support Vector Regression, Gaussian Processes (Kriging)
- Table and categorical data support for Machine Learning
- GPU acceleration for over 65 functions
- C code generation for KMEANS clustering

Requires Parallel Computing Toolbox

Requires MATLAB Coder



# Computer Vision System Toolbox

- 3-D point cloud processing, including geometric shape fitting, normal vector estimation and visualization

