Introduction to MATLAB

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What is MATLAB?

- High-level language
- Interactive

Uses
- Numerical computation
- Data analysis and visualization
- Algorithm development and programming
- Application deployment
Technical Computing Workflow

Access
- Files
- Software
- Hardware

Explore & Discover
- Data Analysis & Modeling
- Algorithm Development
- Application Development

Share
- Reporting and Documentation
- Outputs for Design
- Deployment

Automate

Code & Applications

MATLAB, Excel, C/C++, Java, .dll, .exe, .NET

For k=1:max
\[ x = \text{fft}(\text{dat}) \]
\[ y = 20*\log_10(x) \]
Demo: Fuel Economy Analysis

- **Goal**
  - Study the relationships between fuel economy, power, and type of vehicle

- **Approach**
  - Access data from Excel
  - Interactively visualize and explore trends
  - Create a model
  - Document results
Demo: Fuel Economy Analysis

Access
- Files
- Software
- Hardware
  - Code & Applications

Explore & Discover
- Data Analysis & Modeling
- Algorithm Development
  - For k=1:max
  - x = fft dat
  - y = 20*log1

Application Development

Share
- Reporting and Documentation
- Outputs for Design
- Deployment
  - MATLAB
  - Excel
  - .NET
  - C/C++
  - Java
  - .dll

Automate
Accessing Data from MATLAB

Access

- Files
  - Excel, text, or binary
  - Audio and video, image
  - Scientific formats and XML

- Applications and languages
  - C/C++, Java, FORTRAN
  - COM, .NET, shared libraries
  - Databases
    *(Database Toolbox)*

- Measurement hardware
  - Data acquisition hardware
    *(Data Acquisition Toolbox)*
  - Stand-alone instruments and devices
    *(Instrument Control Toolbox)*
Data Analysis and Visualization

- Built-in engineering and mathematical functions
  - Interpolation, filtering, smoothing, Fourier analysis

- Extensive plotting capabilities
  - 2-D, 3-D, and volume visualization
  - Tools for creating custom plots
Expanding MATLAB

- Math, statistics, and optimization
- Control system design and analysis
- Signal processing and communications
- Image processing and computer vision
- Parallel computing

- Partner products
  - Additional interfaces
  - Domain-specific analysis
  - Support for niche applications
Sharing with MATLAB

- Automatically generate reports
- Package as an app
- Deploy applications
Using MATLAB

- High-level language
  - Native support for vector and matrix operations
  - Built-in math and visualization functions

- Development environment
  - Interactive and easy to get started
  - Ideal for iterative exploration and design

- Technical computing platform
  - Add-on products for a range of application areas
Questions?