Introduction to MATLAB

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Common steps
Example: Analyse weather data in UK

Historical weather data for different locations in UK

The data consists of:
- Mean daily maximum temperature ($t_{\text{max}}$)
- Mean daily minimum temperature ($t_{\text{min}}$)
- Days of air frost ($af$)
- Total rainfall ($\text{rain}$)
- Total sunshine duration ($\text{sun}$)
Analyse a single weather station data

- Visualise data
- Basic statistical analysis
- Can we see trends? (Ex: Global warming)
- Can we predict future data? (Machine Learning)
Analyse all data sets

- Combine multiple data sets
- 3D visualisation
- Comparisons:
  - Where does it rain the most?
  - Is it true that in Cambridge it does not rain so much?
  - Where should I live in UK if …
Steps

1. Import data
2. Analyse one weather station
3. Repeat for all weather stations
4. Analyse all results
5. Create report

Single data file

Multiple data files

Automate
Challenges with real world data

- **Data**
  - Accessing formatted data
  - Managing heterogeneous data
  - Visualising

- **Quality**
  - Combining different sampling rates
  - Handling missing data
  - Identifying bad data (outliers)

- **Analysing Data**
What else can we do with this data?

- **Graphs**
  1. Given position of weather stations calculate all distances
  2. Represent it as a graph where the weight of the edges is the distance
  3. Calculate minimum spanning tree

- **Solve the travelling salesman problem with Mixed Integer Linear Program**
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MATLAB Academy
Self-paced training web property

- Free
- Interactive training course
- Geared towards new users
MATLAB Onramp

- MATLAB web based version
- Videos
- Interactive exercises
Summary and benefits

- Easy to prototype
- Automatic MATLAB code generation to automate process
- Single software for entire workflow