# Cross Industry Standard Process for Data Mining (CRISP-DM)

by University of California San Diego

# CRISP-DM

## CRoss Industry Standard Process for Data Mining


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# CRISP-DM Phases

- Business Understanding
- Data Understanding
- Data Preparation
- Modeling
- Evaluation
- Deployment

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# Phase 1 – Business Understanding

- Define problem or opportunity
- Assess situation
- Formulate goals

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# Phase 2 – Data Understanding

- Data acquisition
- Data exploration

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# Phase 3 – Data Preparation

- Prepare data for modeling
- Address quality issues, select features to use, process data for modeling


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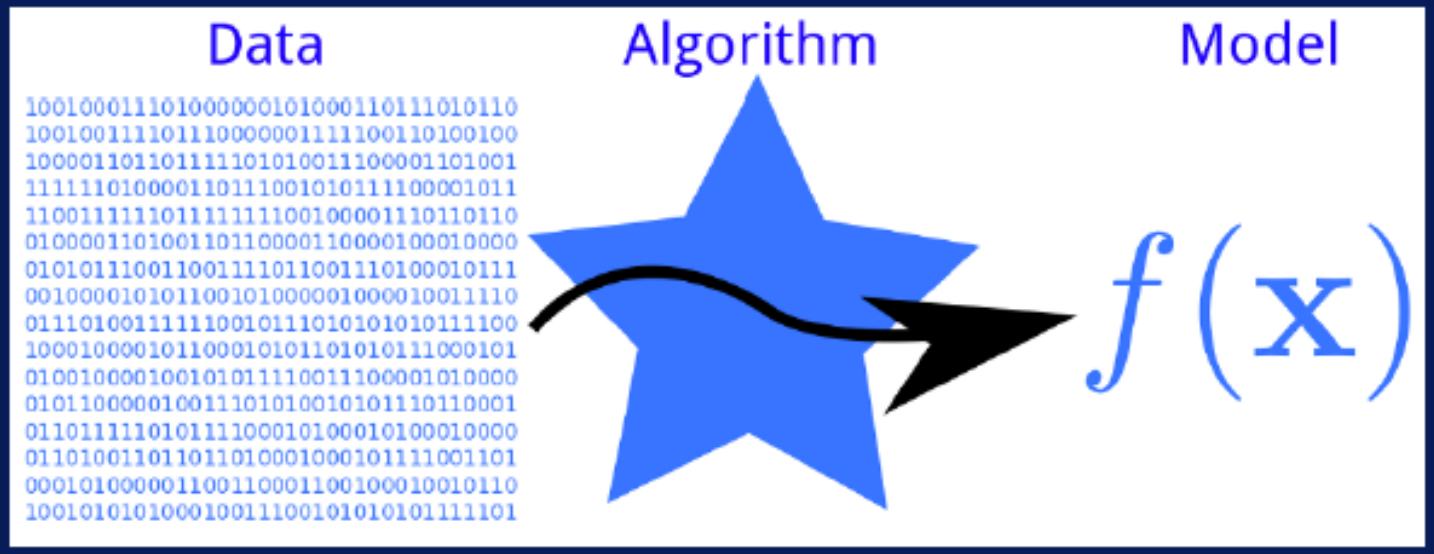
# Phase 4 – Modeling

- Determine type of problem
- Select modeling technique(s) to use
- Build model

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# Phase 5 – Evaluation

- Assess model performance
- Evaluate model results with respect to success criteria

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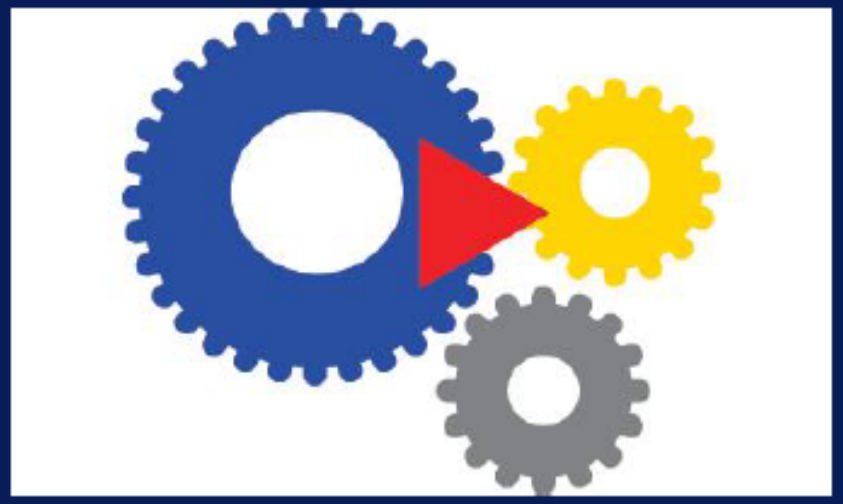
# Phase 6 – Deployment

- Produce final report
- Deploy model
- Monitor model



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# Machine Learning Process

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ACQUIRE PREPARE ANALYZE REPORT ACT

# Step 1: Acquire Data

- Identify data sources
- Collect data
- Integrate data

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ACQUIRE | **PREPARE** | ANALYZE | REPORT | ACT

# Step 2: Prepare Data

Step 2-A: Explore

Step 2-B: Pre-process

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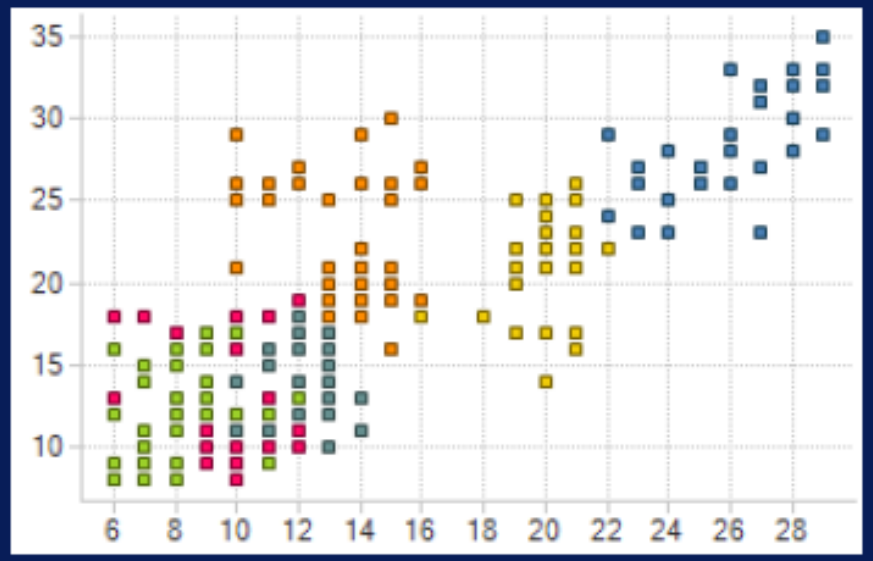
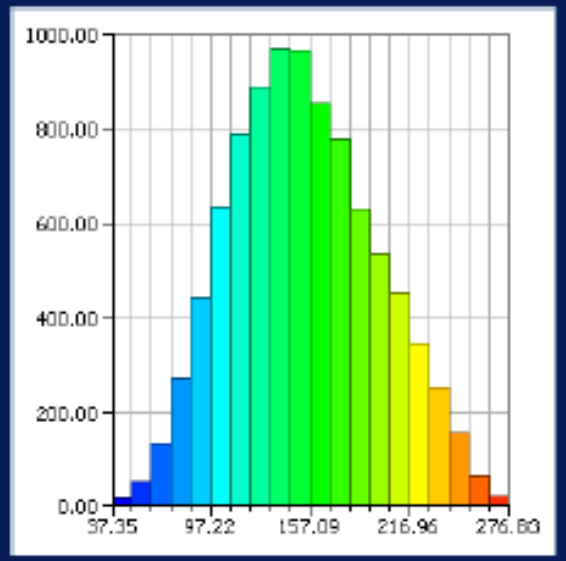
ACQUIRE | **PREPARE** | ANALYZE | REPORT | ACT

# Step 2-A: Explore Data




Understand nature of data




Preliminary analysis

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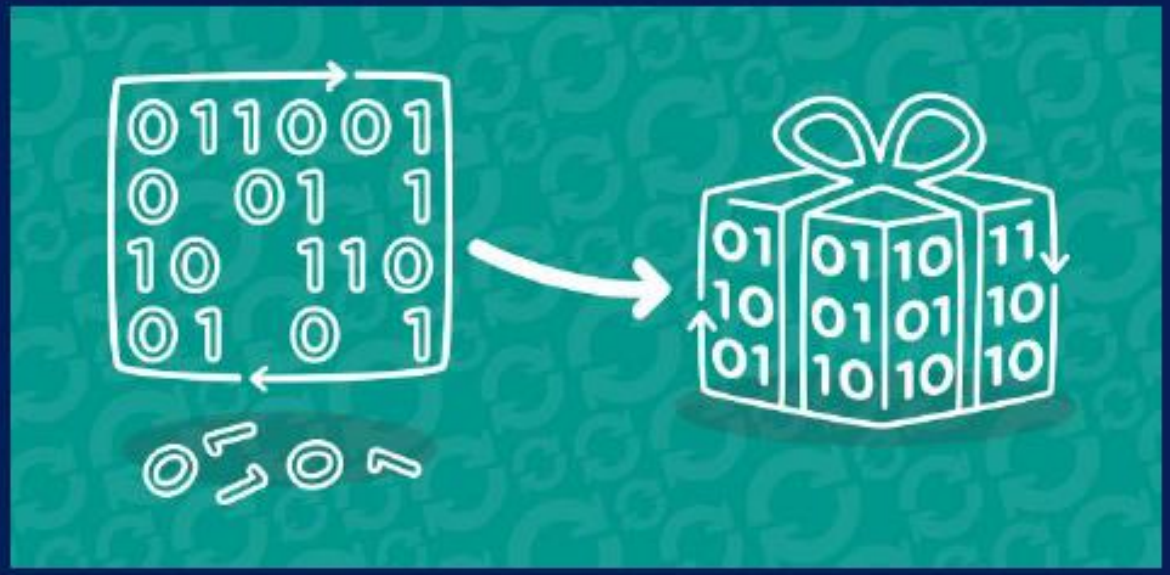
ACQUIRE | **PREPARE** | ANALYZE | REPORT | ACT

# Step 2-B: Pre-process Data



Clean | Select | Transform

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ACQUIRE PREPARE **ANALYZE** REPORT ACT

# Step 3: Analyze Data


Select analytical techniques

Build models

Assess results

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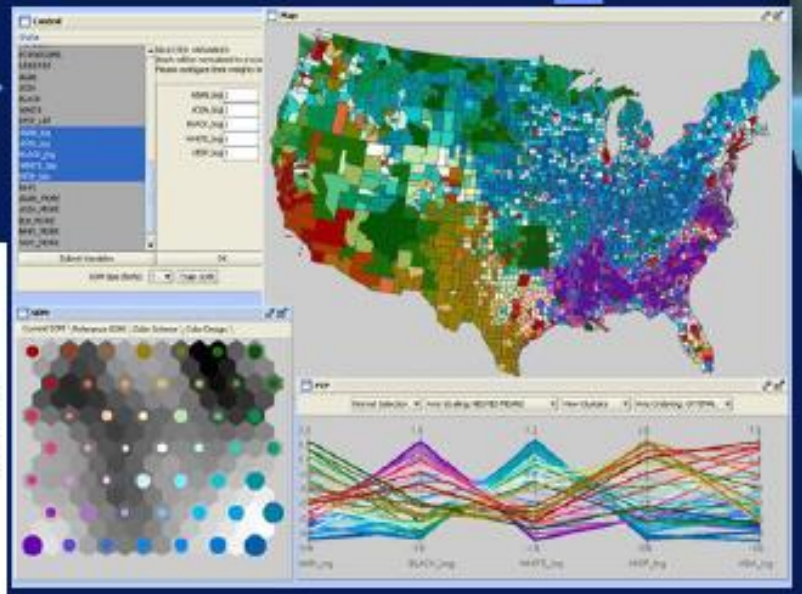
ACQUIRE PREPARE ANALYZE **REPORT** ACT

# Step 4: Communicate Results

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ACQUIRE PREPARE ANALYZE REPORT **ACT**

# Step 5: Apply Results



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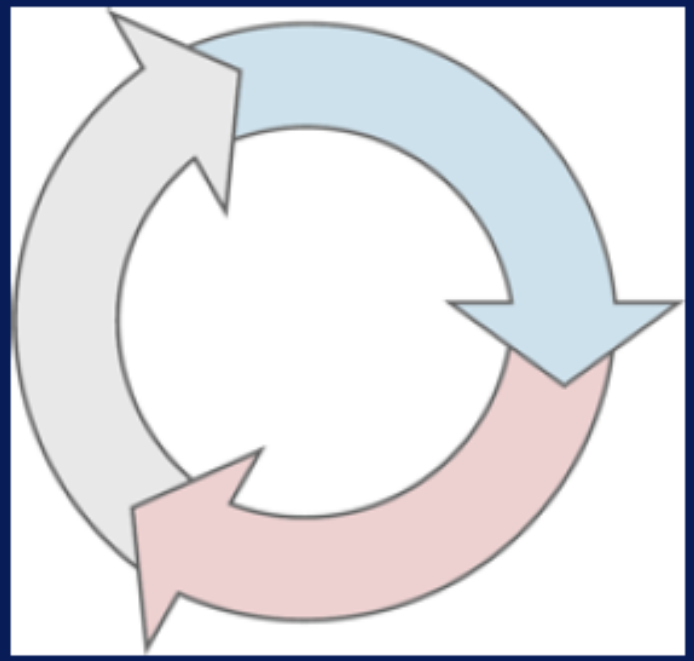
ACQUIRE → PREPARE → ANALYZE → REPORT → ACT



# Iterative process

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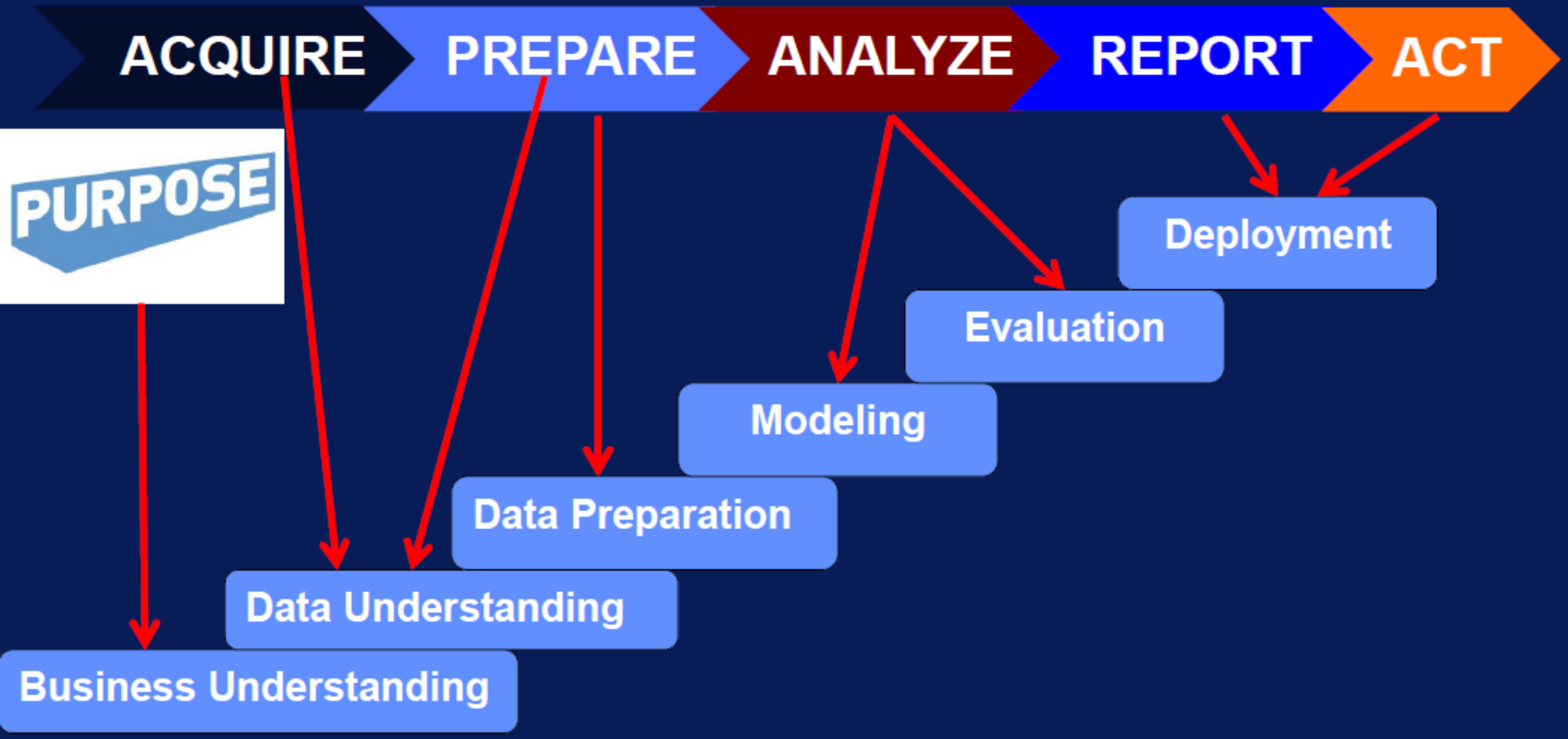


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# Goals and Activities in the Machine Learning Process

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ACQUIRE PREPARE ANALYZE REPORT ACT

Goal: Identify and obtain all data related to problem

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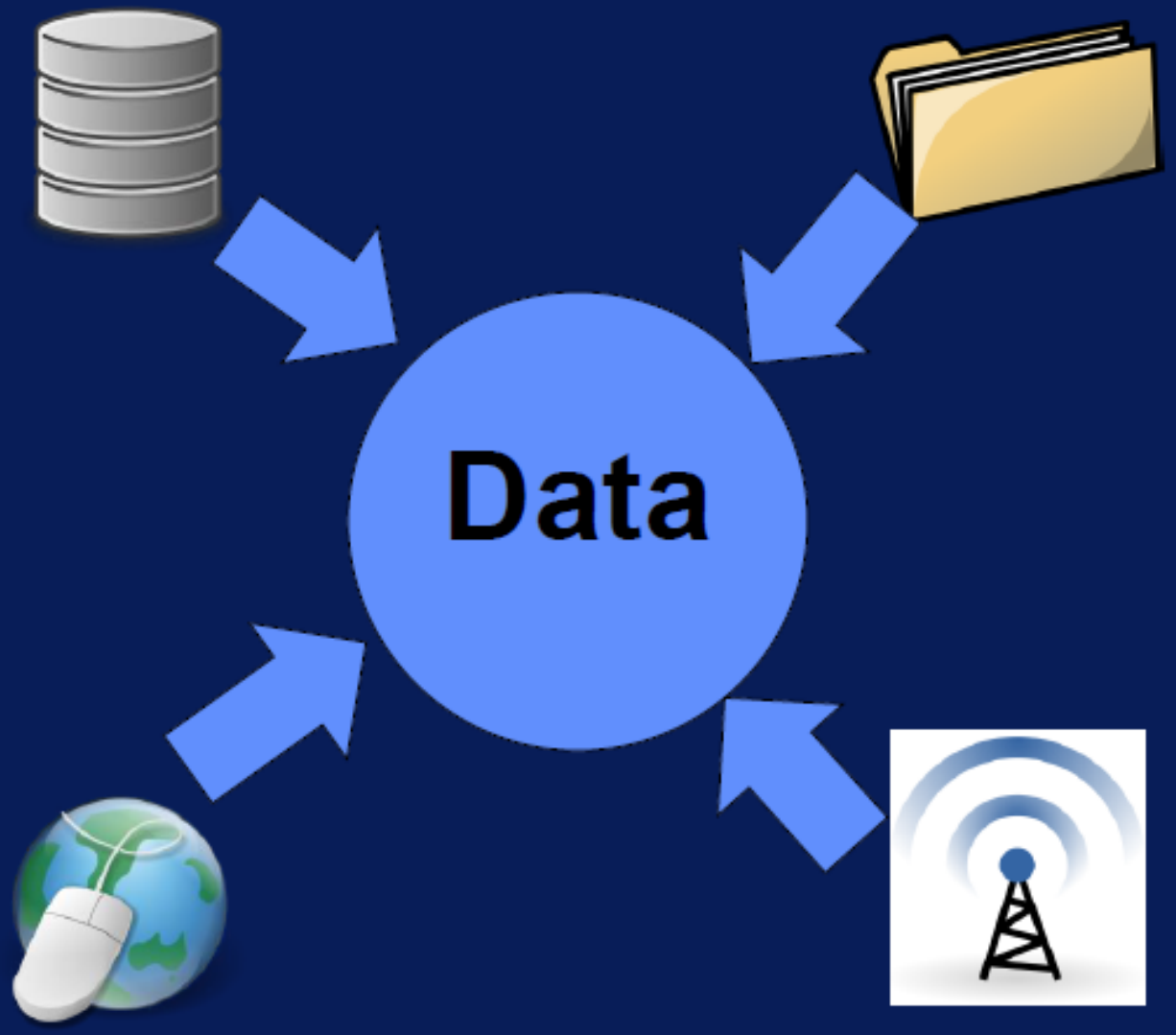
# Acquire Data




Identify data sources
Collect data
Integrate data

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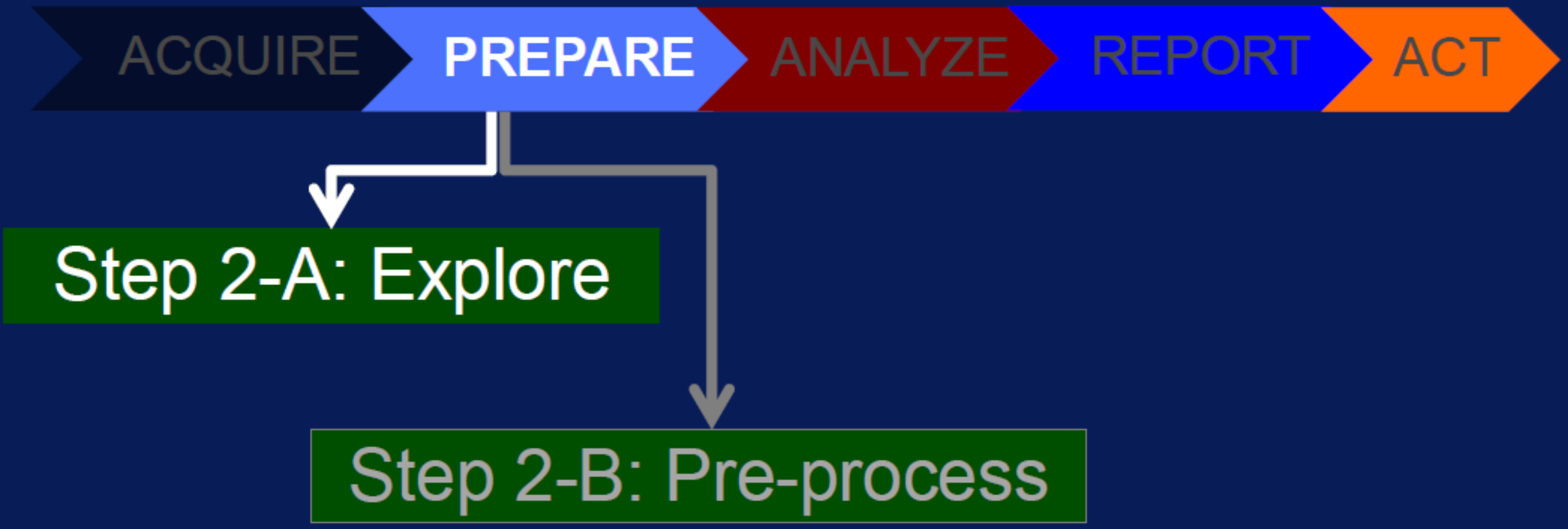


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# Why Explore?

Goal: Understand your data

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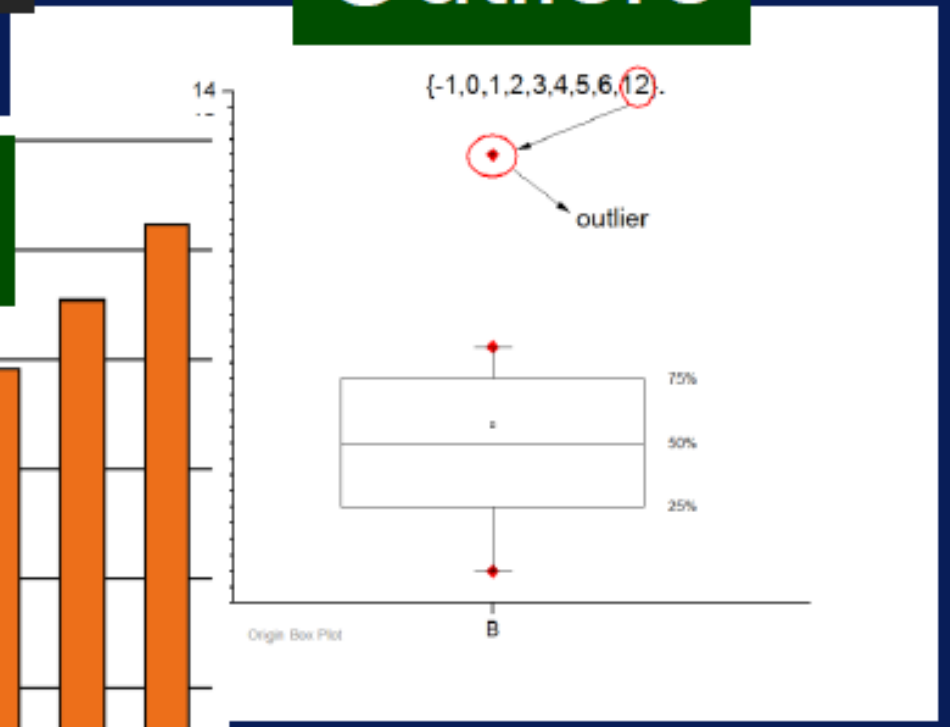
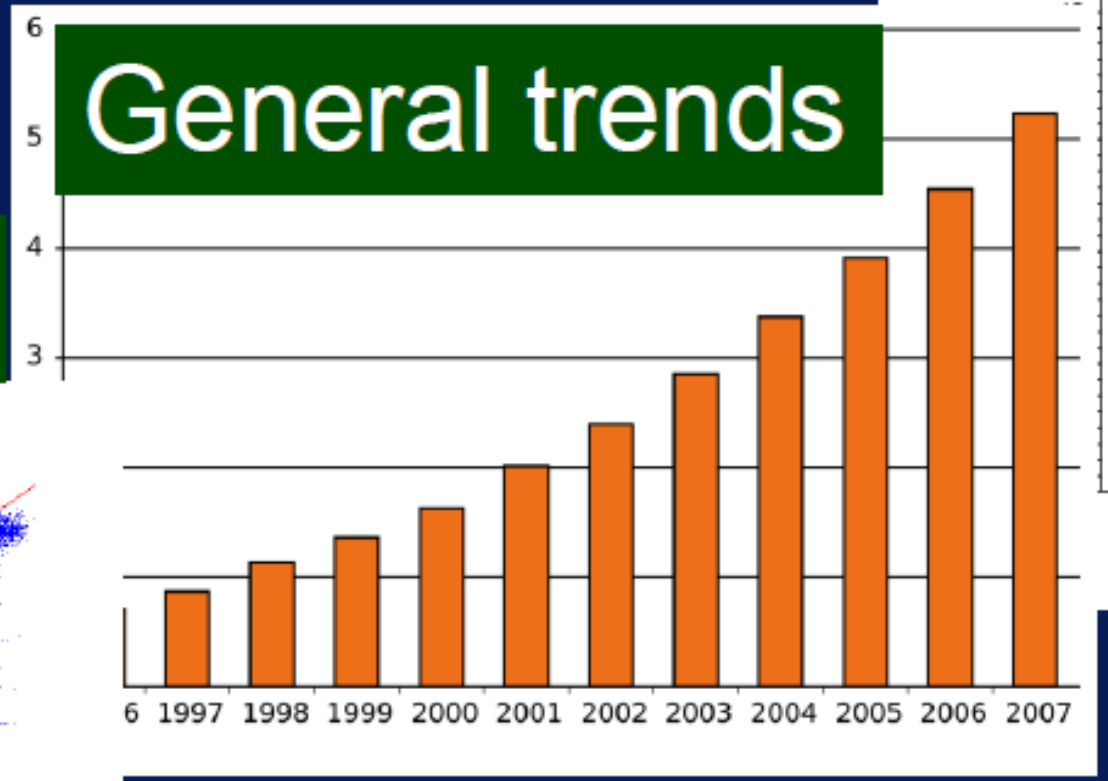
# Why Explore?

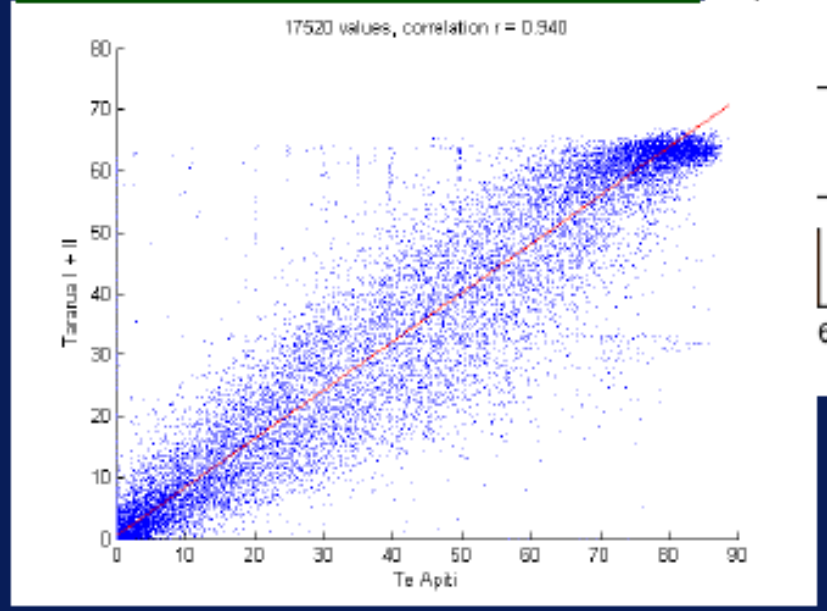
## Outliers




## General trends




## Correlations

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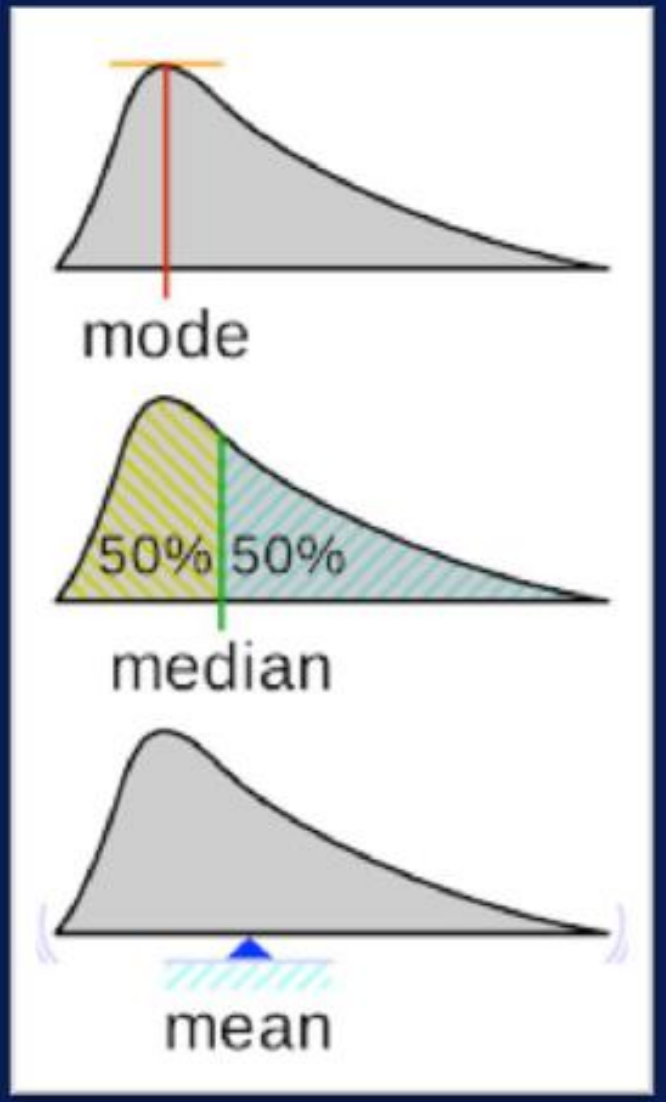
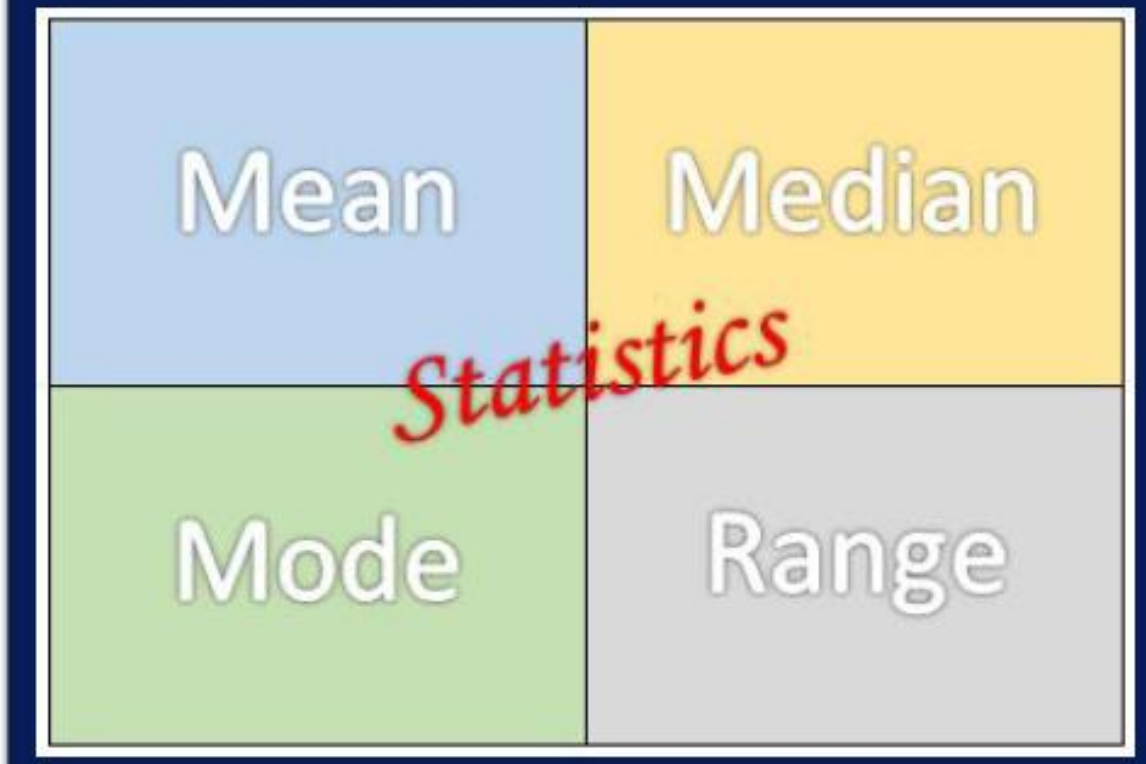
# Describe Your Data

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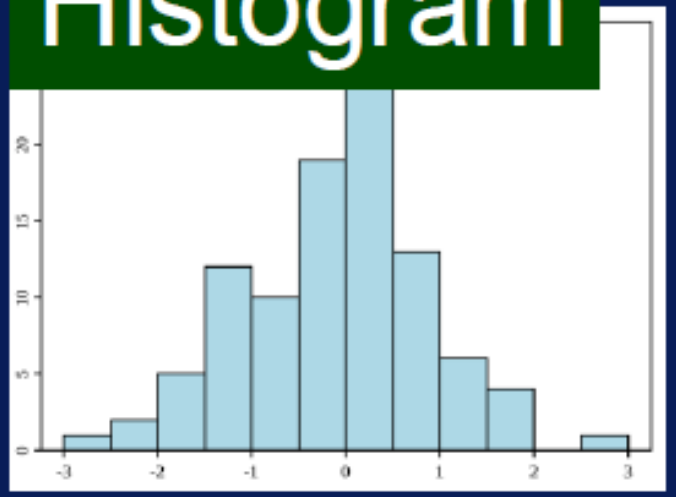
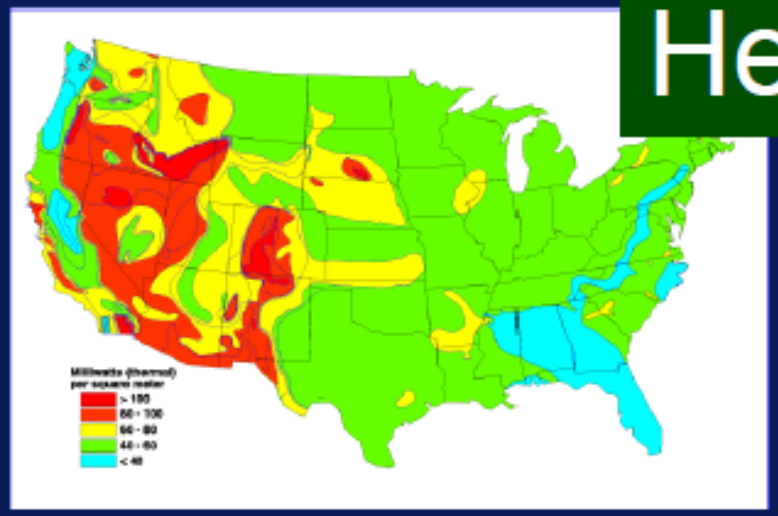
# Visualize Your Data

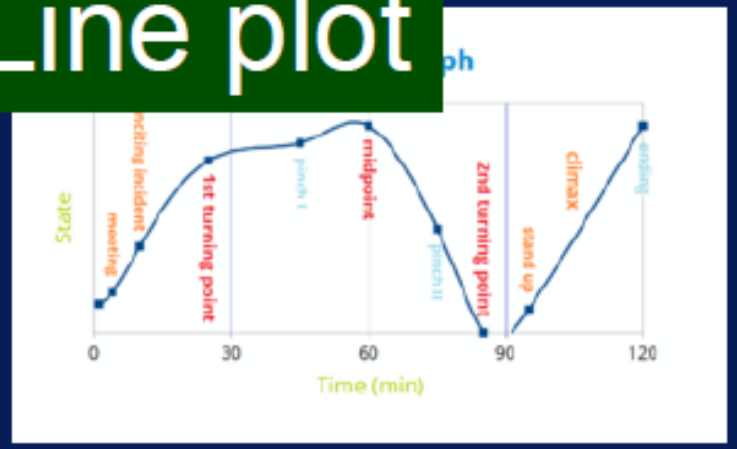
## Histogram



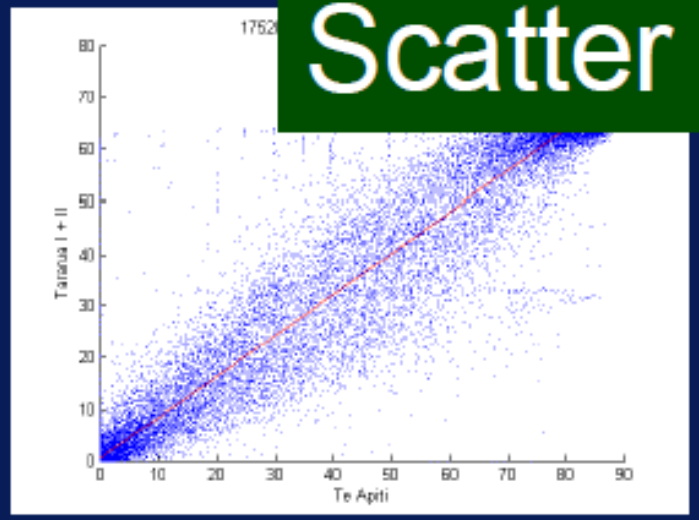

## Heat map



## Line plot




## Scatter plot

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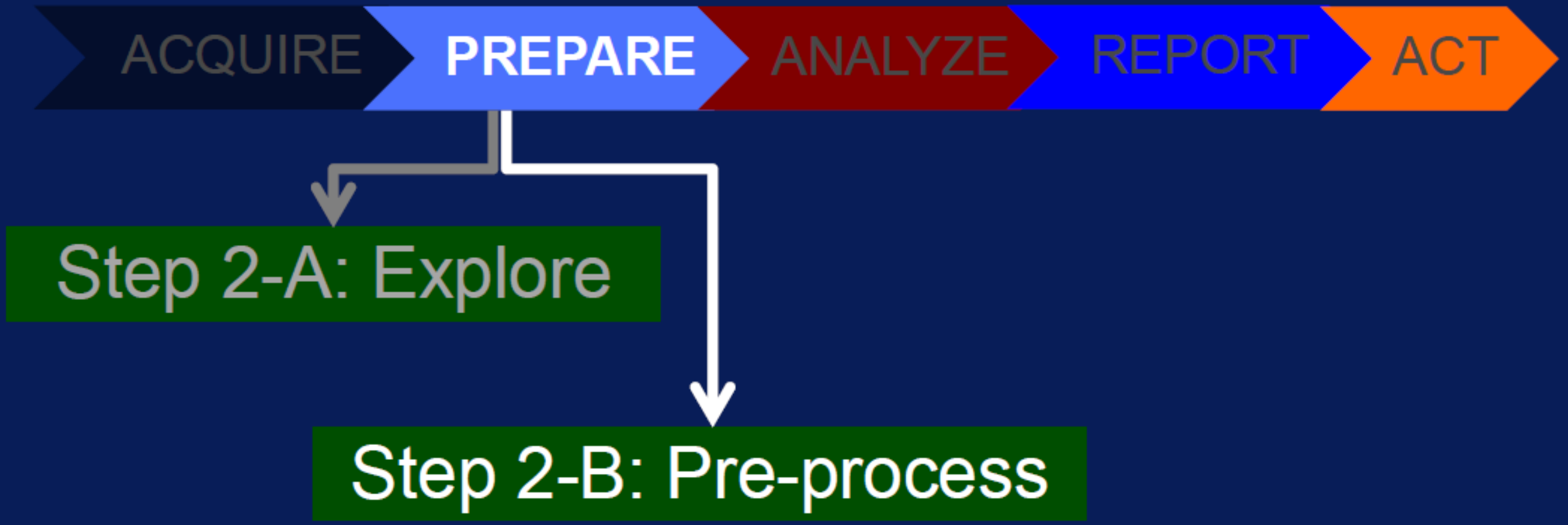


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ACQUIRE | **PREPARE** | ANALYZE | REPORT | ACT

Step 2-A: Explore

Goal: Create data for analysis

Step 2-B: Pre-process

Clean

Select

Transform

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# Data Cleaning

- Missing values
- Duplicate data
- Inconsistent data
- Noise
- Outliers


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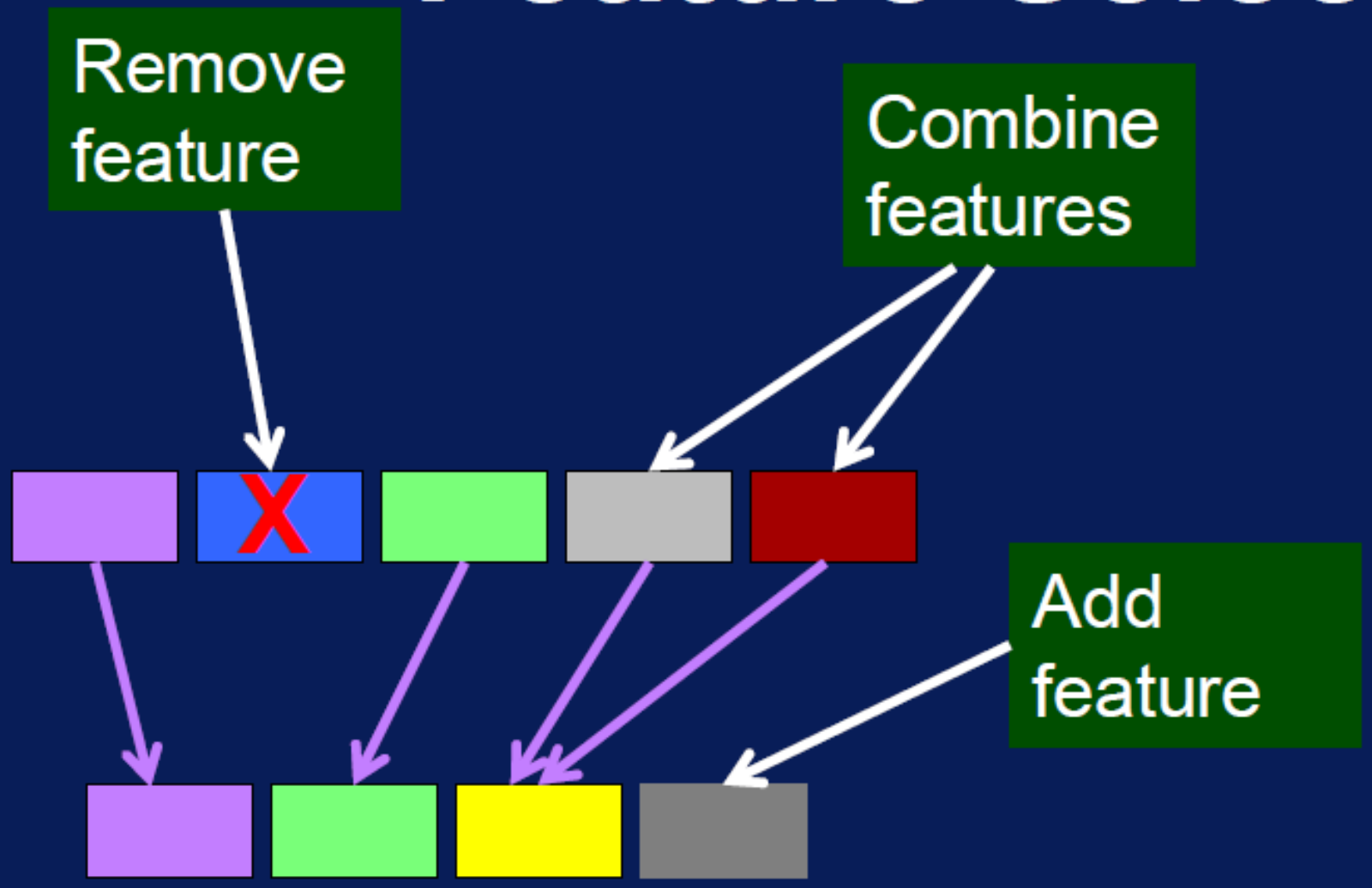
# Feature Selection

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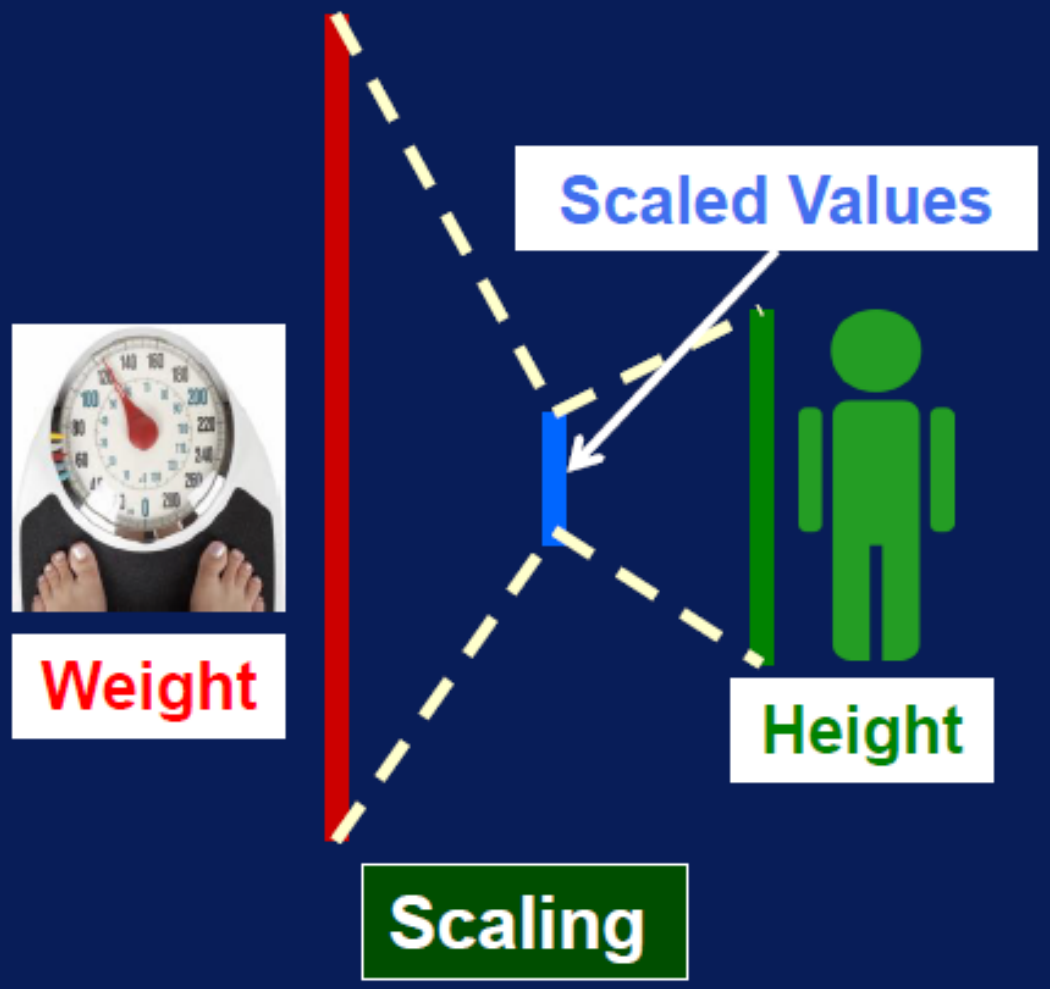
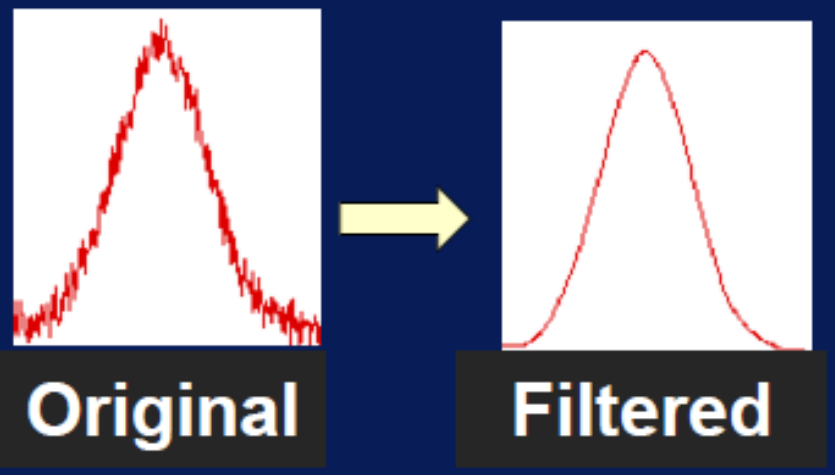
# Feature Transformation




3D

2D

Dimensionality Reduction

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ACQUIRE PREPARE **ANALYZE** REPORT ACT

Goals:

- Build model
- Evaluate results

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# Analyze

Select technique

Build model

Evaluate

Classification
Regression
Cluster Analysis
Association
Analysis


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# Analyze

Select technique

↓

Build model

↓

Evaluate results

ACQUIRE → PREPARE → ANALYZE → **REPORT** → ACT

# Goal: Communicate results and recommend actions

# Present Report


with

using

tableau

Google Developers CHARTS

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ACQUIRE → PREPARE → ANALYZE → REPORT → **ACT**

Goal: Determine actions based on insights

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# Act

Determine action

↓

Implement

↓

Assess impact

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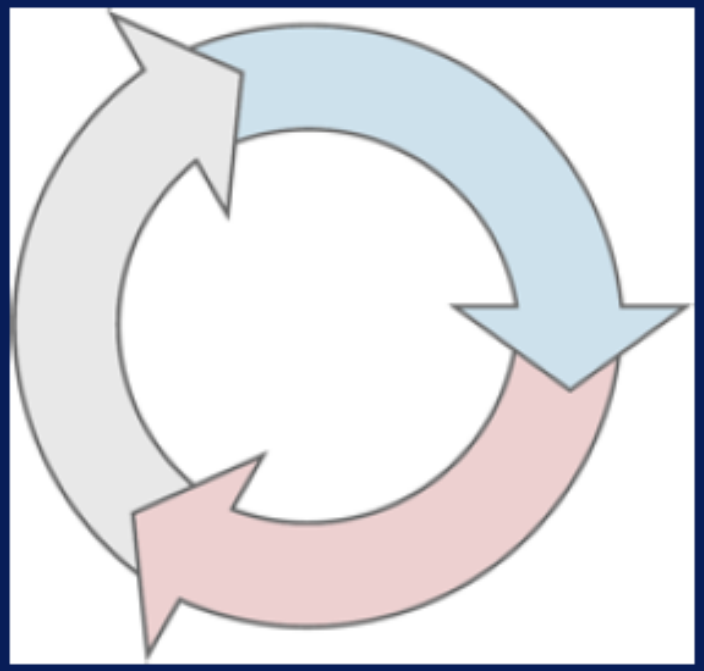
ACQUIRE → PREPARE → ANALYZE → REPORT → ACT



# Iterative process

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