

# Build Data & AI Applications in .NET

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# .NET



# Hello

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# Agenda

Data / AI workflows and ecosystem

.NET Ecosystem

Interactive Computing

Data Analytics

Machine Learning

Advanced Topics

# Code & Slides

[bit.ly/techcon2020dotnet](https://bit.ly/techcon2020dotnet)

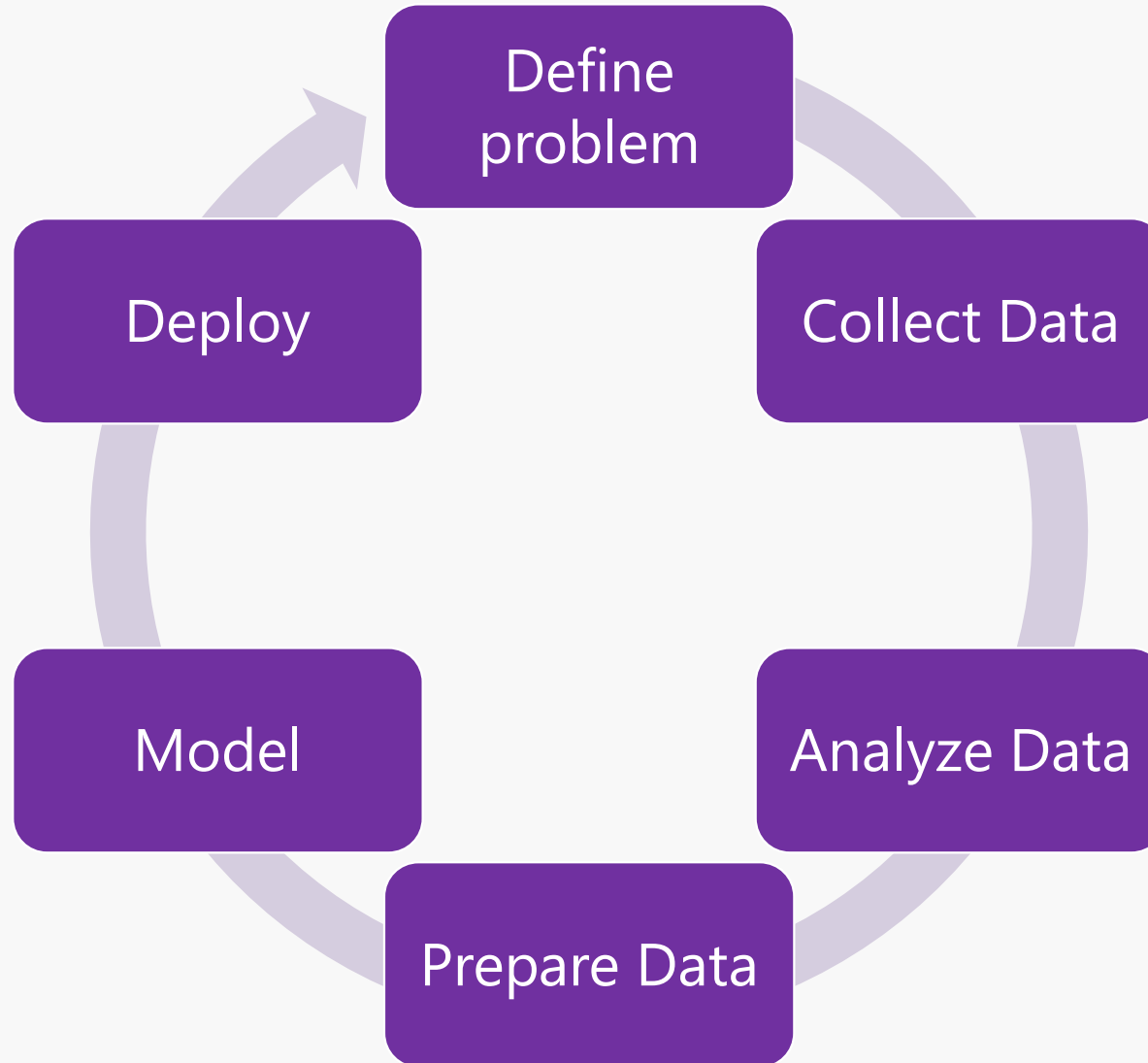
.NET



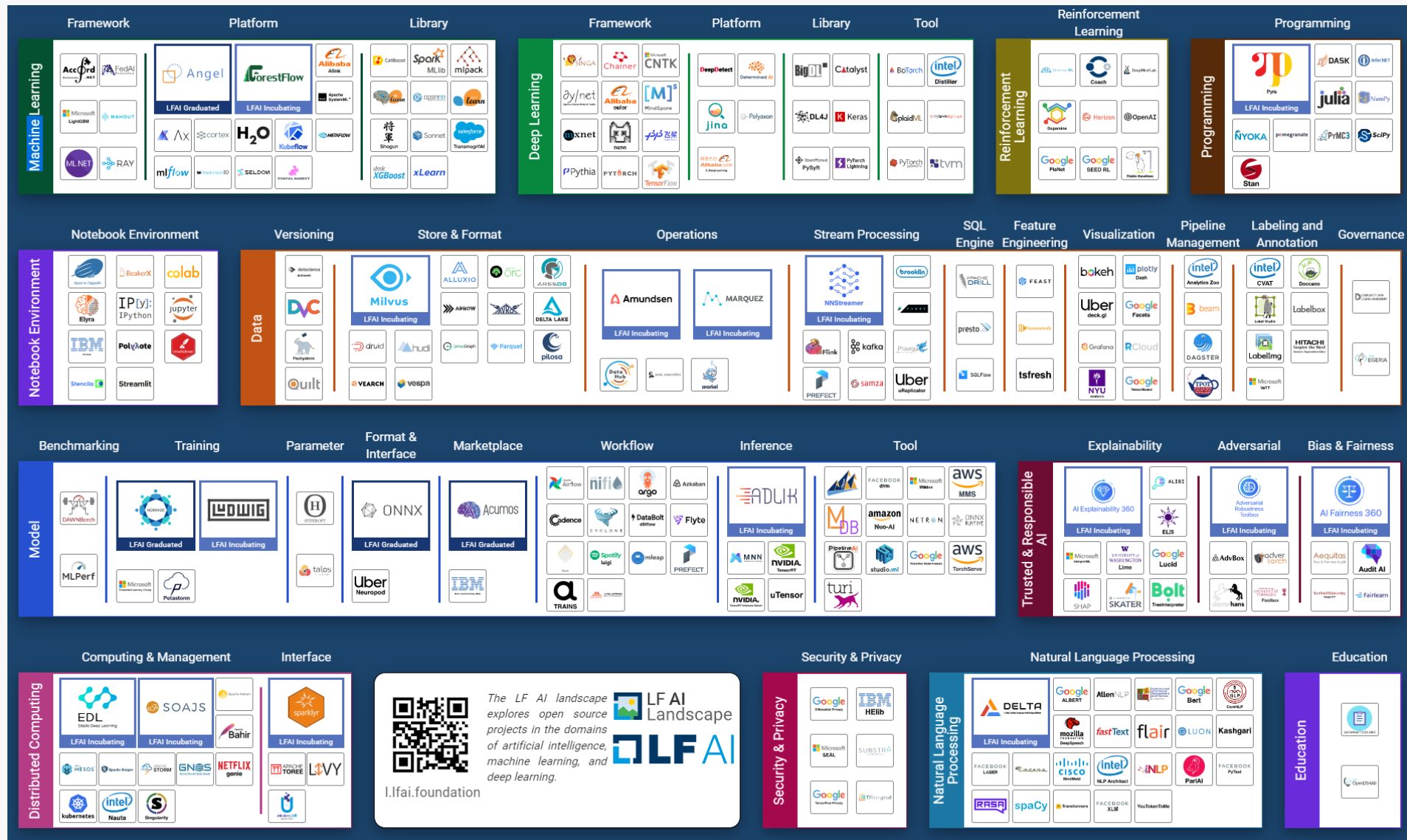
# Data / AI workflows and ecosystem



# Data & AI Workflow



# AI Ecosystem



# .NET Ecosystem





# Your platform for building **anything**



.NET



Visual Studio

Visual Studio for Mac

Visual Studio Code

Command Line

Your editor

# Interactive computing

.NET



# What do you want out of a computing environment for experimentation?

Interactive

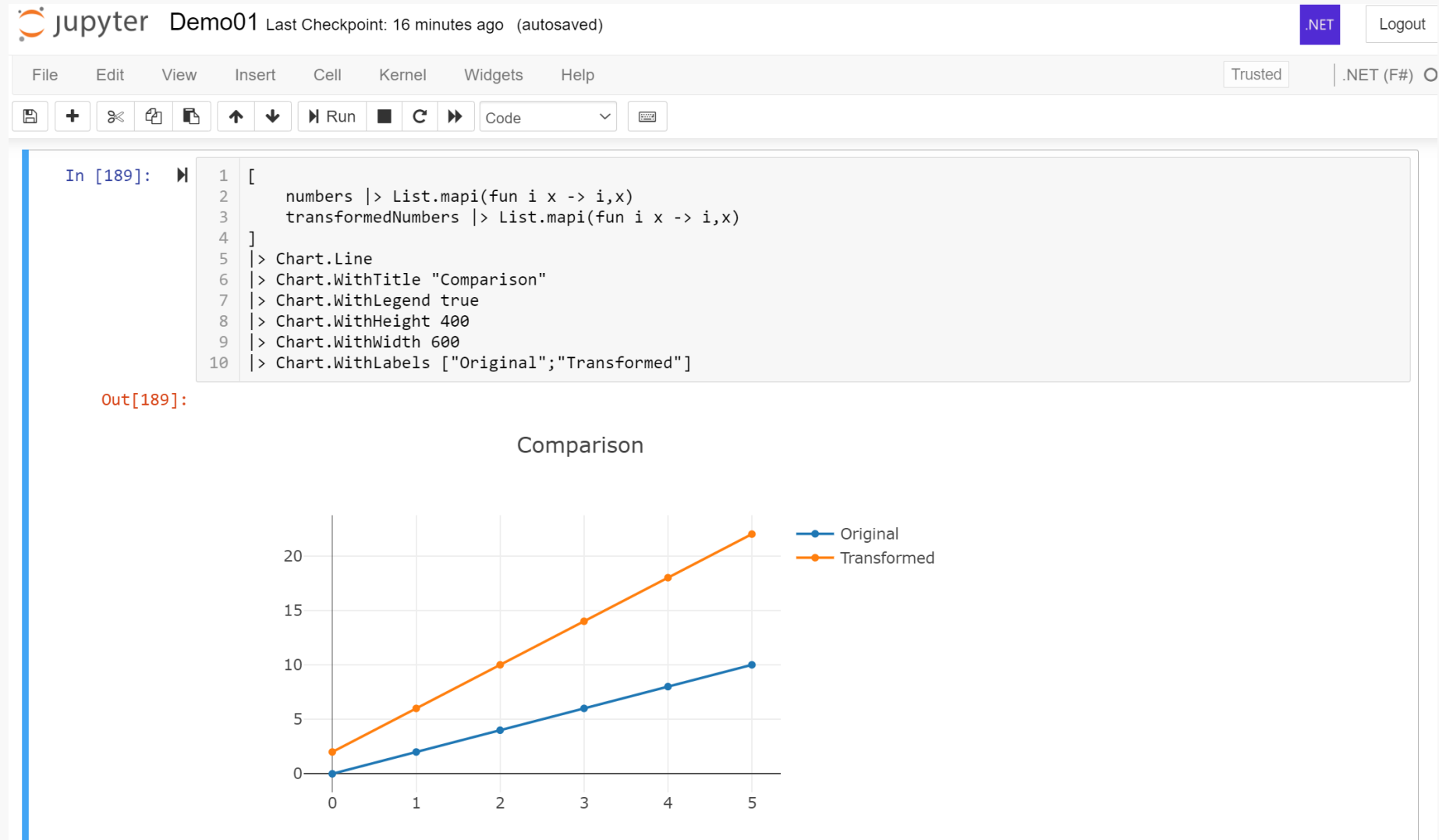
Reproducible

Documented

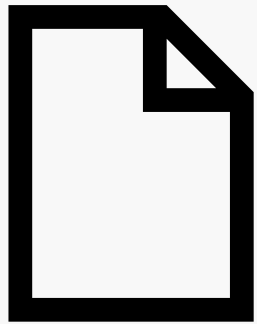
Collaborative

Extensible

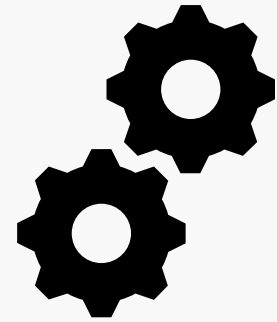
# Jupyter Notebooks



# Interactive Computing Standard



Notebook  
Document  
Format



Kernel

# .NET Interactive

C#/F#/PowerShell Kernel

Open Source

Cross Platform

.NET Standard

Interactive

# .NET Interactive Demo



# Data analytics

Share

Share

Share

Share

Share

Share

Share

.NET





# 3 Vs

Variety

Velocity

Volume

# Data Variety

Socket

Text File

JSON

Blob

Database (SQL/NoSQL)

# Data Velocity

Batch

Streaming

# Apache Spark

SQL

Streaming

Machine  
Learning

Graph

Apache Spark

# Extending Apache Spark

PySpark

SparkR

.NET for  
Apache Spark

Many more...

Spark Interop Layer

JVM (Java/Scala API)

Apache Spark Core

# .NET for Apache Spark

Open Source

Cross-Platform

.NET Standard

Extensible

Distributed

# .NET for Apache Spark Demo

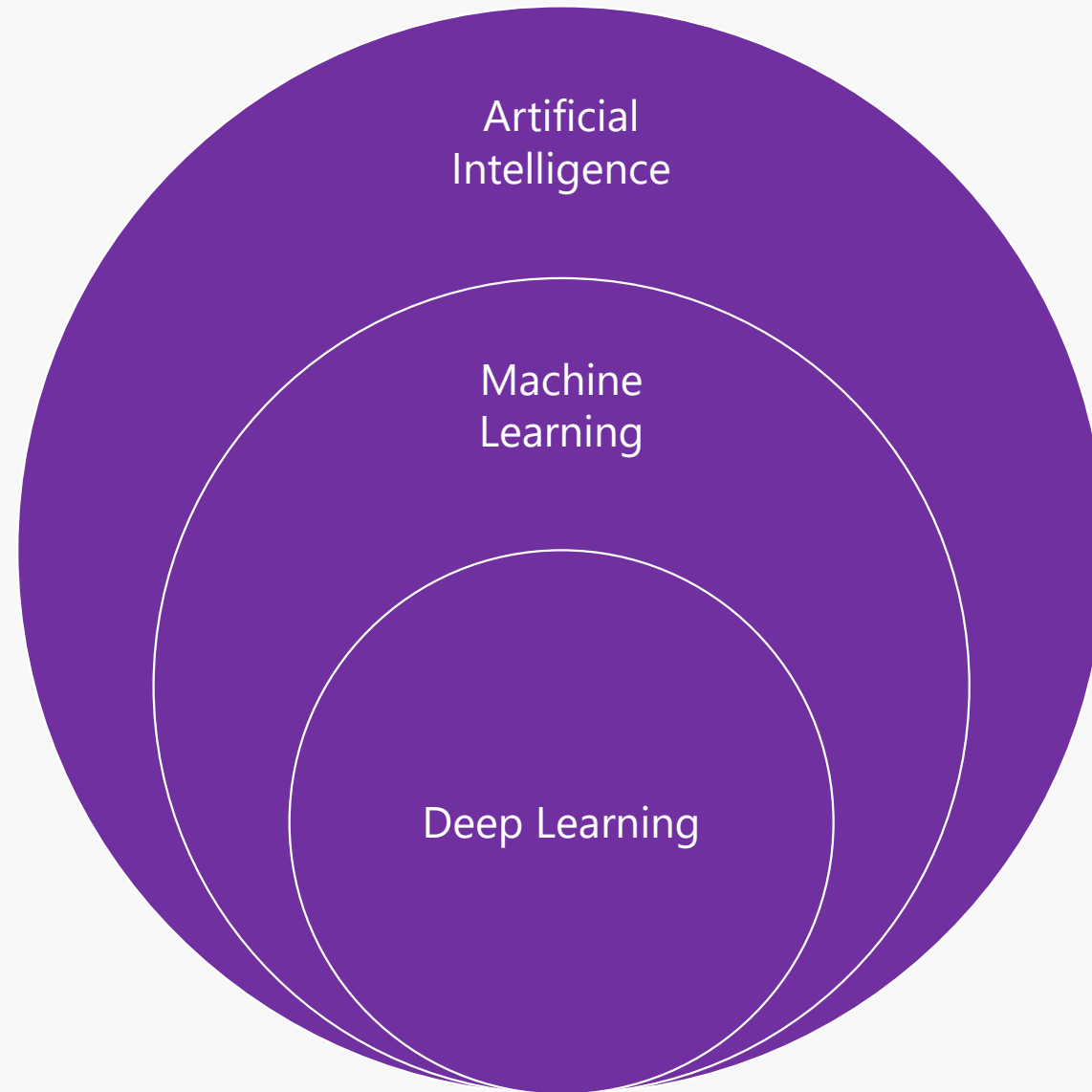


# Machine learning





# What is Machine Learning?



# What is a model?



$f(x)$

True

False

# Machine Learning for .NET Developers

Prebuilt models\*

Automated Machine Learning (Auto ML)

Custom models

# ML.NET

Open Source

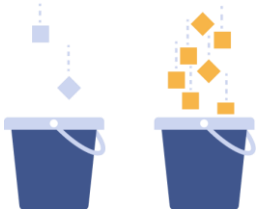
Cross-Platform

.NET Standard

Proven & Extensible

# ML.NET Tasks

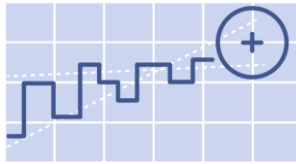
**Classification**



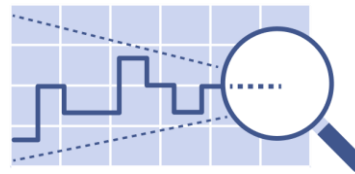
**Regression**



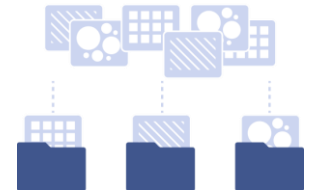
**Forecasting**



**Anomaly detection**



**Image classification**



**Ranking**



**Clustering**



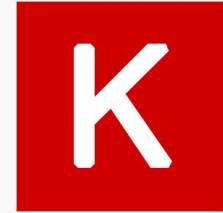
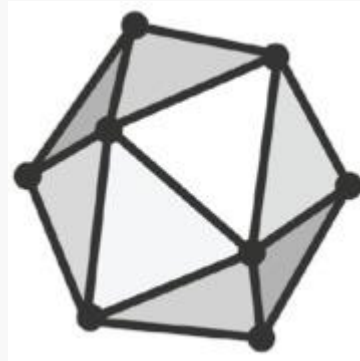
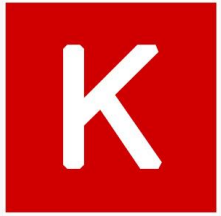
**Recommendation**



**Object detection**



# Open Neural Network Exchange (ONNX)



# Work with ML.NET

**Model Builder**



**ML.NET CLI**



**AutoML.NET API**

(Microsoft.ML.AutoML)

**ML.NET API**

(Microsoft.ML)



# Deployment

Desktop

Web

Mobile\*



# Model Builder Demo



# ML.NET Demo



# Advanced topics

.NET



# Next Steps

Personalized models

Machine Learning Operations (MLOps)

Fairness & interpretability

Privacy

Security

# Resources

.NET for Apache Spark Docs [bit.ly/dotnetsparkdocs](http://bit.ly/dotnetsparkdocs)

ML.NET Docs [bit.ly/mlnetdocs](http://bit.ly/mlnetdocs)

ML.NET Case studies [bit.ly/mlnetcaseestudies](http://bit.ly/mlnetcaseestudies)

ML.NET Workshop [aka.ms/mlnet-workshop-content](http://aka.ms/mlnet-workshop-content)

ML.NET Repo [bit.ly/dotnetml](http://bit.ly/dotnetml)

.NET Interactive Repo [bit.ly/dotnetinteractive](http://bit.ly/dotnetinteractive)

.NET for Apache Spark Repo [bit.ly/dotnetspark](http://bit.ly/dotnetspark)

# Questions

Stack

Flow

Tools

Cloud

Security

Performance

Cost

.NET



# Thank you

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