

TECH CONFERENCE

# DotNet 2020

#DotNet2020

## ML.NET: how to use .NET to implement machine learning!



# What is Machine Learning?



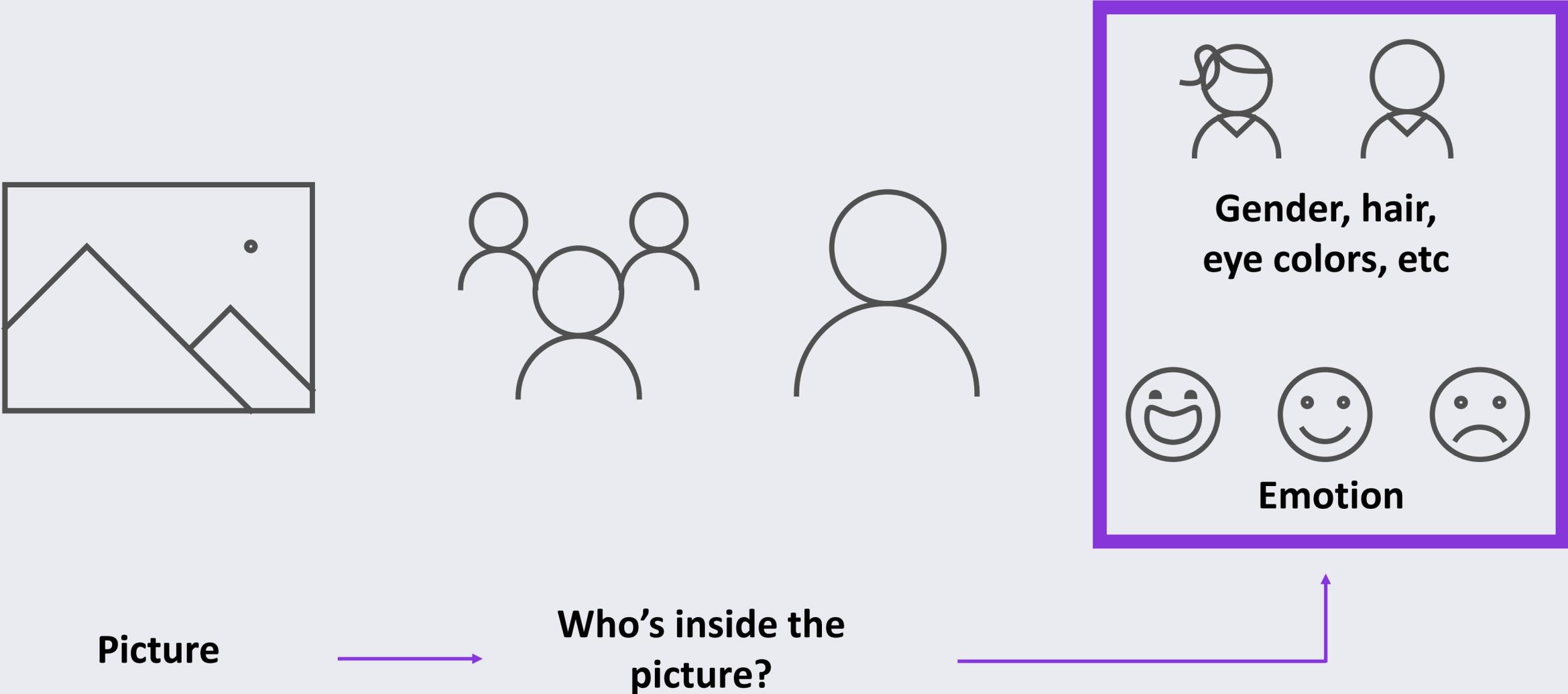


“The goal of machine learning is  
to program computers  
to use **example data** or **past experience**  
to solve a given problem.”

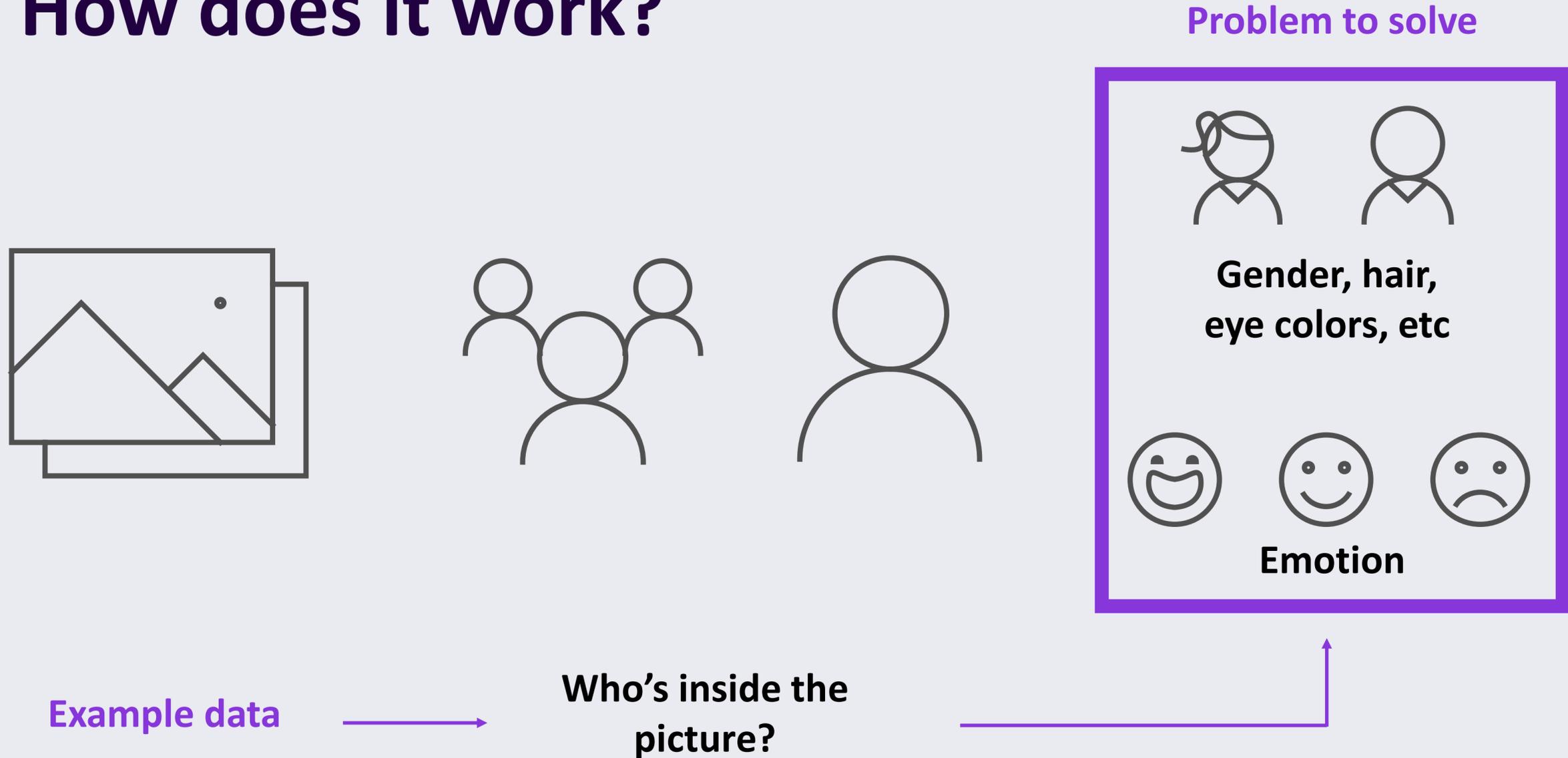
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*Introduction to Machine  
Learning, 2nd Edition, MIT  
Press*

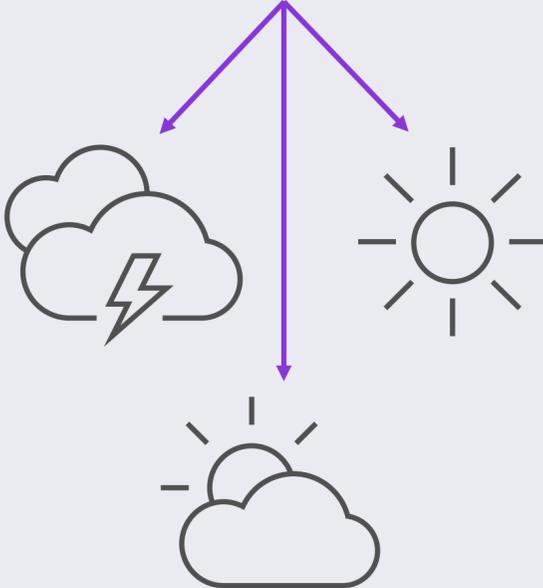
# How does it work?



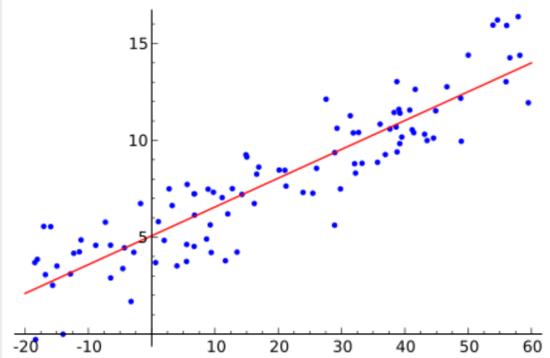
# How does it work?



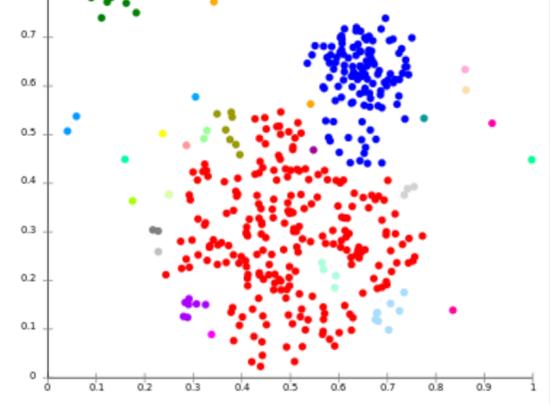
# Different ML scenarios



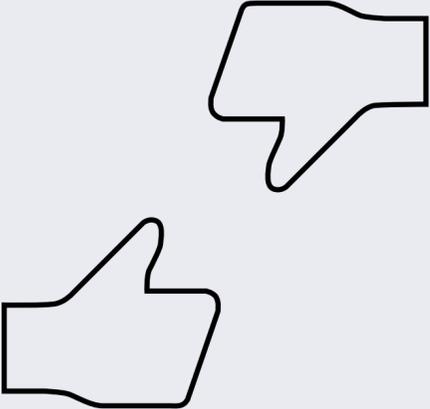
Classification



Regression

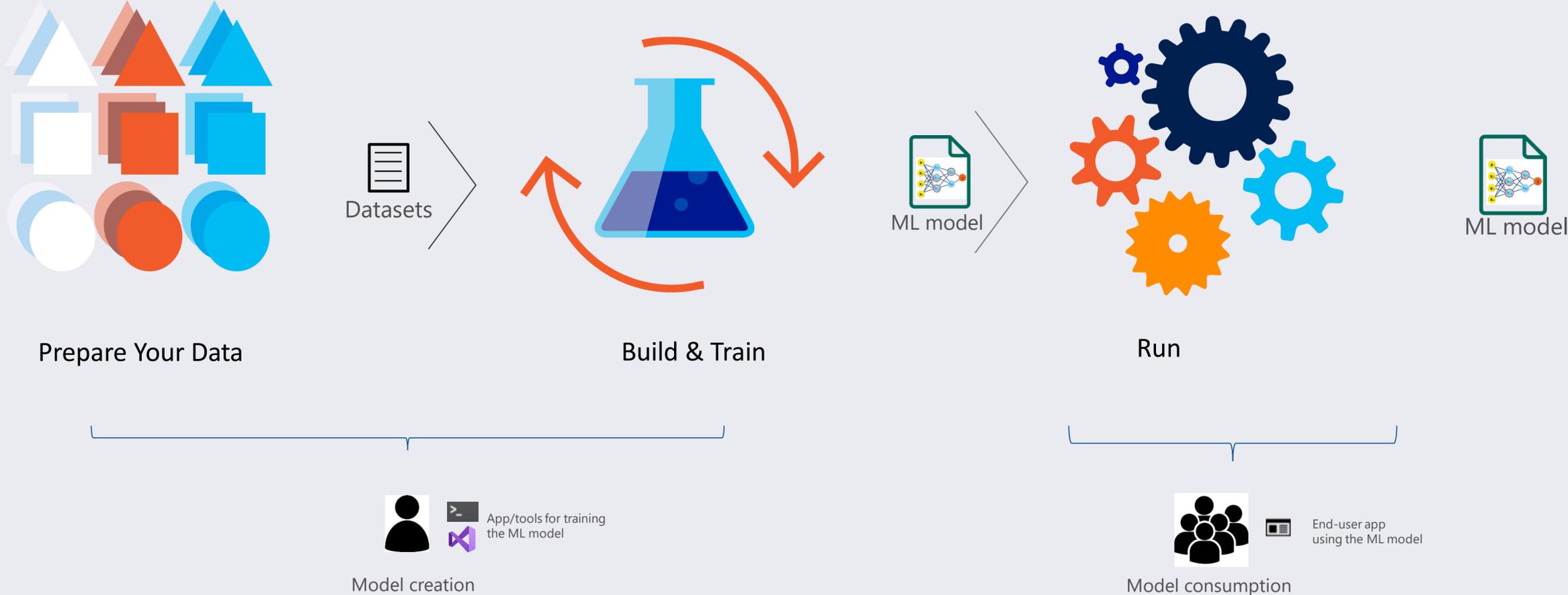


Clustering



Recommendation

# Machine Learning workflow



# So does machine learning require skills?

## Languages



## Frameworks



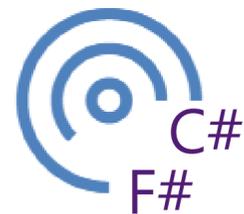
# ML.NET





## What it is?

An open source and cross-platform machine learning framework



Built for .NET  
developers



Custom ML made  
easy with tools



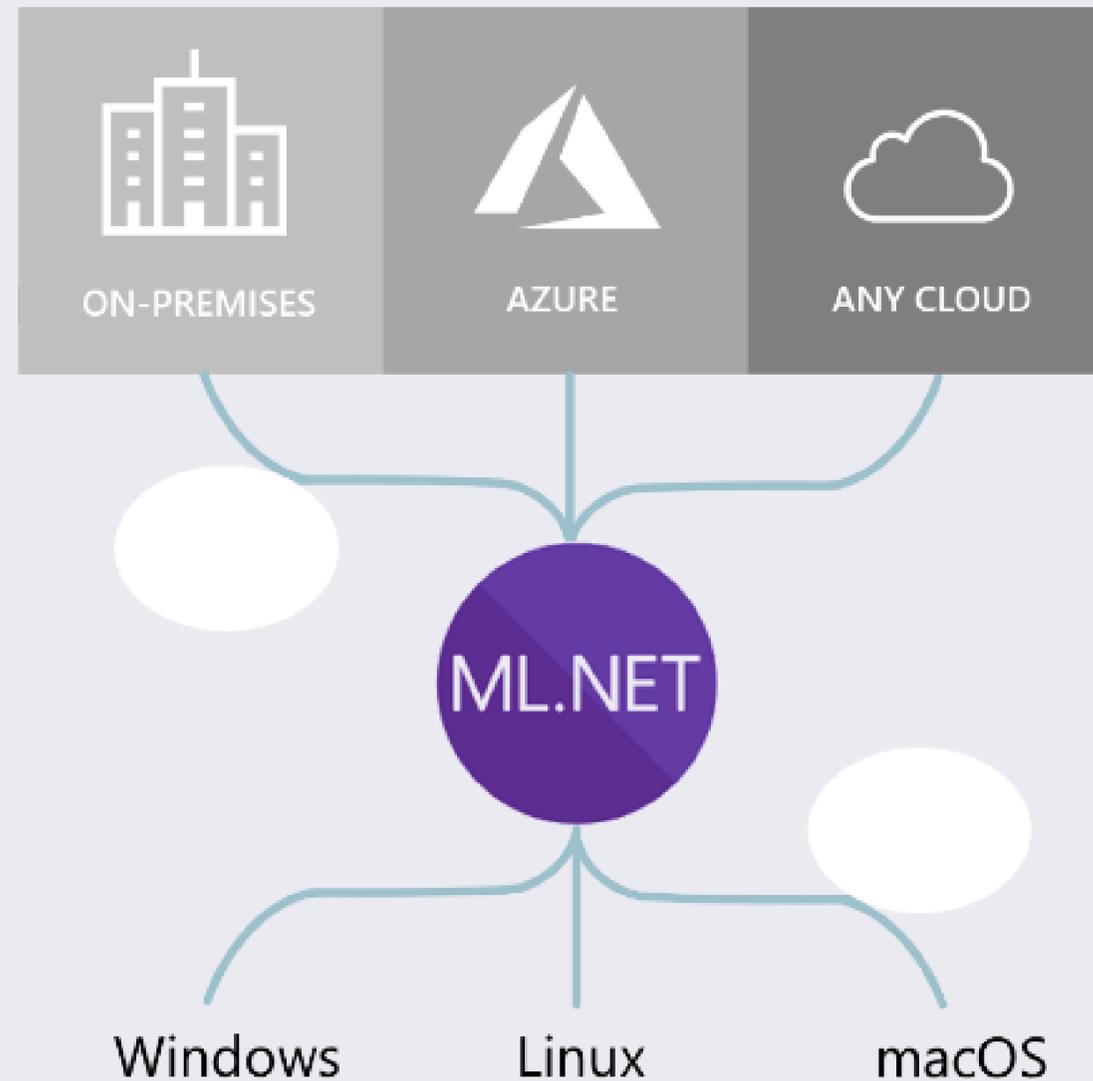
Extended with  
TensorFlow & more



Trusted &  
proven at scale



# ML.NET runs anywhere





# ML for all .NET developers!

Tools and features to help devs to easily build, train and deploy high-quality custom ML models!



## Sentiment analysis

Analyze the sentiment of customer reviews using a binary classification algorithm.

[Sentiment analysis sample >](#)



## Product recommendation

Recommend products based on purchase history using a matrix factorization algorithm.

[Product recommendation sample >](#)



## Price prediction

Predict taxi fares based on distance traveled etc. using a regression algorithm.

[Price prediction sample >](#)



## Customer segmentation

Identify groups of customers with similar profiles using a clustering algorithm.

[Customer segmentation sample >](#)



## GitHub labeler

Suggest the GitHub label for new issues using a multi-class classification algorithm.

[GitHub labeler sample >](#)



## Fraud detection

Detect fraudulent credit card transactions using a binary classification algorithm.

[Fraud detection sample >](#)



## Spam detection

Flag text messages as spam using a binary classification algorithm.

[Spam detection sample >](#)



## Image classification

Classify images (e.g. broccoli vs pizza) using a TensorFlow deep learning algorithm.

[Image classification sample >](#)



## Sales forecasting

Forecast future sales for products using a regression algorithm.

[Sales forecasting sample >](#)



## Three ways to use ML.NET



ML.NET  
**API**  
(Code)



ML.NET  
**Model Builder**  
(Visual Studio UI)



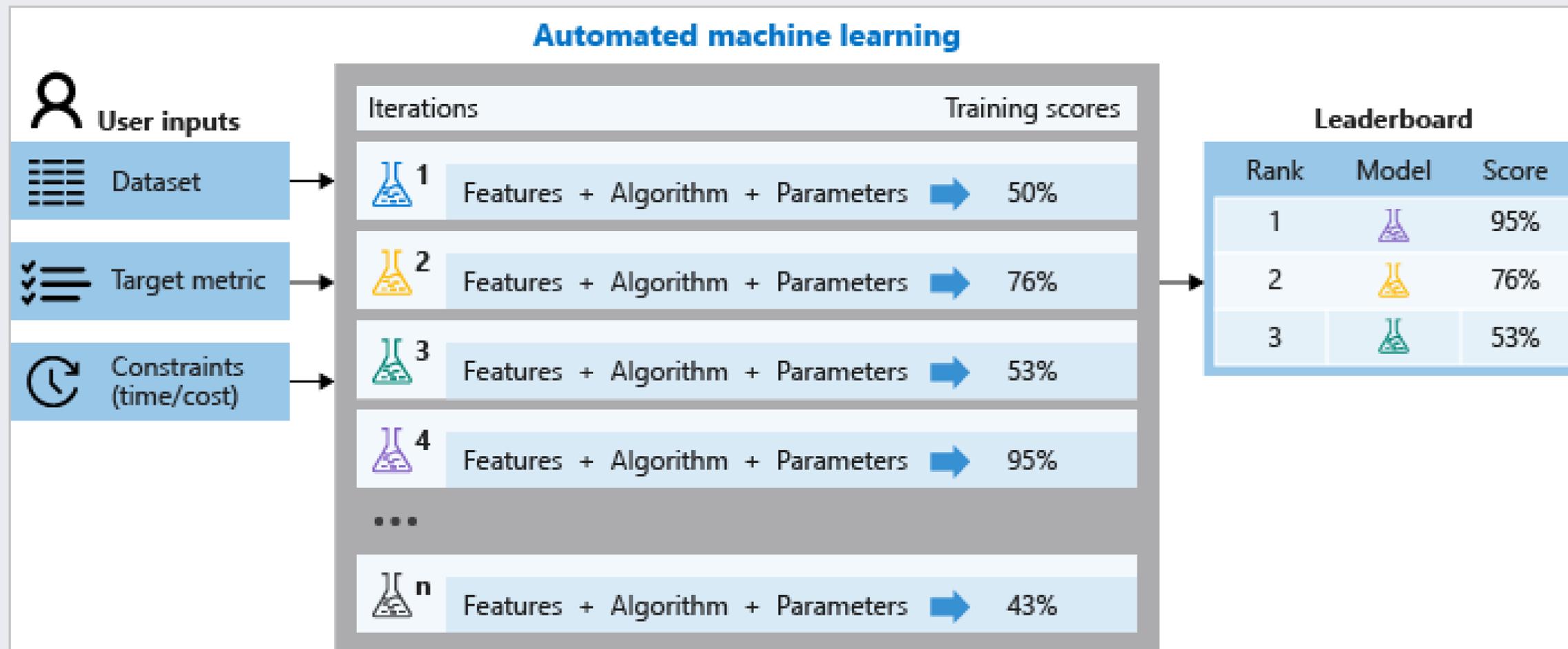
ML.NET  
**CLI**  
(Command-Line  
Interface)

# Model Builder



# AutoML

Automates the process of building best performing models



# Model Builder

## UI in Visual Studio that uses AutoML

The screenshot displays the Model Builder interface in Visual Studio. On the left, a vertical navigation pane lists six steps: 1. Scenario (highlighted in blue), 2. Environment, 3. Data, 4. Train, 5. Evaluate, and 6. Code. The main area is titled "Train with your data" and includes a sub-header "The following scenarios use Automated ML to train and pick the best model for your data." with a link to "Learn more about training with your own data in Model Builder." Below this, four scenario cards are shown:

- Text classification:** Icon of two buckets. Description: "Classify text data into 2+ categories, e.g. predict if comments are positive or negative sentiments." Platform: Local ML.
- Value prediction:** Icon of a house with a price tag. Description: "Predict a numeric value from your data (regression), e.g. predict the price of a house based on features like size, location, etc." Platform: Local ML.
- Image classification:** Icon of three images. Description: "Classify images into 2+ categories, e.g. predict whether an image is of a dog or a cat." Platforms: Azure ML, Local ML.
- Recommendation:** Icon of a bar chart with stars. Description: "Produce a list of suggested items for a particular user, e.g. recommend products." Platform: Local ML.

Below these is a section titled "Limited scenarios" with the sub-header "The following scenarios are not yet supported by Automated ML, so walkthroughs with an example dataset and pre-defined training code are provided." and a link to "Learn more about examples in Model Builder." This section contains four more scenario cards:

- Anomaly detection:** Icon of a line graph with a magnifying glass. Description: "Detect abnormalities or outliers in data. This example detects spikes in shampoo sales."
- Forecasting:** Icon of a line graph with a plus sign. Description: "Predict future values based on previously observed time series values. This example predicts bike rental service demand."
- Clustering:** Icon of scattered data points. Description: "Identify groups of related items without any pre-existing labels or categories. This example divides a set of iris flowers into different groups."
- Object detection:** Icon of an image with bounding boxes around objects. Description: "Detect and identify objects in images. This example detects objects (such as boats, people, and sofas) in images and draws bounding boxes."

# Model Builder demo



# ML.NET CLI



# ML.NET CLI

```
λ mlnet classification --dataset "wiki-train-data.tsv" --label-col 0 --has-header true --train-time 10
```

```
Start Training
```

	Trainer	MicroAccuracy	MacroAccuracy	Duration	#Iteration
1	AveragedPerceptronOva	0.7434	0.7062	7.8	1

```
=====Experiment Results=====
```

```
| Summary
```

```
| ML Task: multiclass-classification  
| Dataset: C:\Users\guscianc\source\repos\DotNetConfDemo\CliDemo\wiki-train-data.tsv  
| Label : Sentiment  
| Total experiment time : 7.8075637 Secs  
| Total number of models explored: 1
```

```
| Top 1 models explored
```

	Trainer	MicroAccuracy	MacroAccuracy	Duration	#Iteration
1	AveragedPerceptronOva	0.7434	0.7062	7.8	1

```
Code Generated
```

```
Generated C# code for model consumption:
```

```
Check out log file for more information:
```

```
Exiting ...
```

```
C:\Users\guscianc\source\repos\DotNetConfDemo\CliDemo
```

# ML CLI demo





# Guenda Sciancalepore

Cloud Solution Architect – Data & AI

I work for Microsoft since four years, currently as a Cloud Solution Architect focused on AI & ML helping partners developing innovative solutions and products.

I'm based in Italy, in the beautiful Milan.

[@guenda\\_s](#)

[www.linkedin.com/in/guenda-sciancalepore](https://www.linkedin.com/in/guenda-sciancalepore)

Thanks and ...  
See you soon!

Thanks also to the sponsors.  
Without whom this would not have been possible.

plain concepts 



# Far far away, behind the word mountains.

Far far away, behind the word mountains, far from the countries Vokalia and Consonantia, there live the blind texts. Separated they live in Bookmarksgrove right at the coast of the Semantics, a large language ocean.

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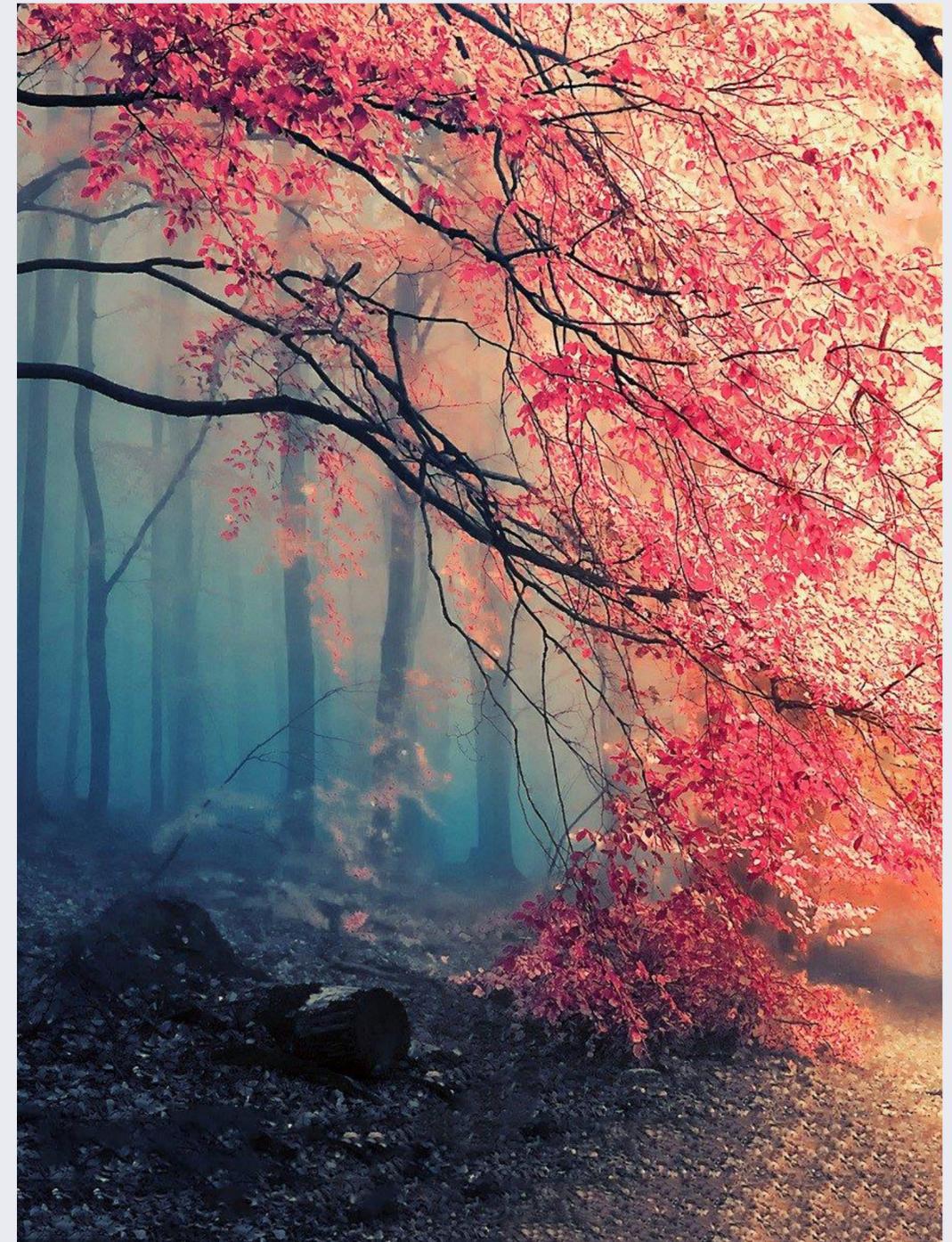
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**DotNet2020**

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**Far far away, behind the word mountains.**

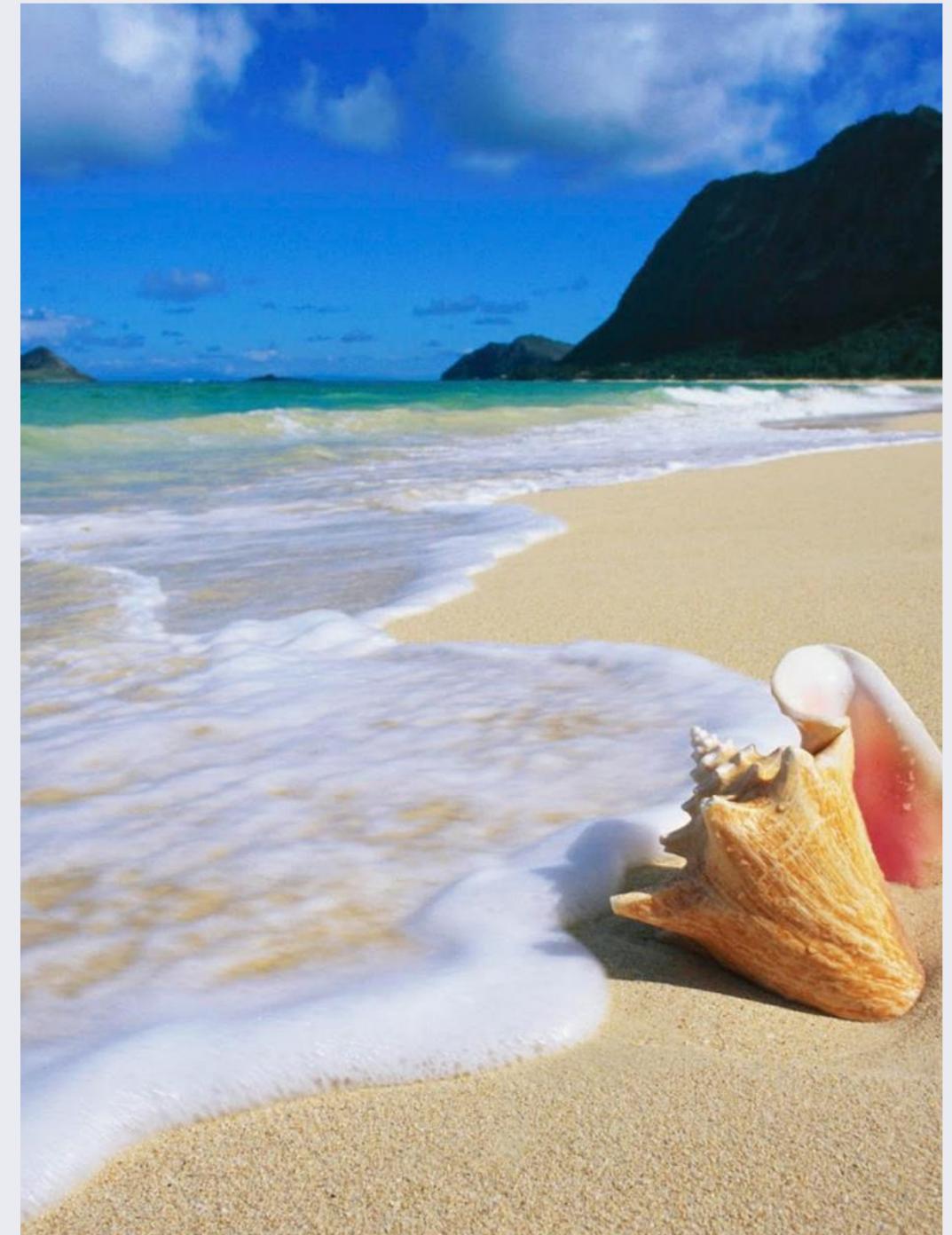
**Vokalia and Consonantia.**

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### Vokalia and Consonantia.

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```
/*
 * C# Program to Perform Unboxing Operation
 */
using System;
class sample
{
    int data;
    void insert(object x)
    {
        data = (int)x * 5;
    }
    object delete()
    {
        data=0;
        return (object)data;
    }
    public static void Main()
    {
        sample s = new sample();
        s.insert(10);
        Console.WriteLine("Data : {0}", s.data);
        Console.WriteLine("Data : {0}", s.delete());
        Console.ReadLine();
    }
}
```

# Questions & Answers





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---

Marco Minnemann

# Github Issue Classifier



# The goal

dotnet / corefx

Watch 1,567 Star 13,864 Fork 3,983

Code Issues 2,209 Pull requests 58 Projects 0 Wiki Insights

## IsolatedStorage fails on Mac if ~/.local/share directory does not exist #29354

New issue

Open jasongin opened this issue 5 days ago · 13 comments

 jasongin commented 5 days ago

**Repro steps:**

1. Start with a clean Mac OS machine, or at least a clean user account on Mac that does not have any `~/.local/share` directory created yet.
2. From a .NET Core app, call `IsolatedStorageFile.GetUserStoreForAssembly()`

**Result**

**Assignees**

 maryamariyan

**Labels**

- area-System.IO
- bug
- os-mac-os-x

# GitHub Issue Classifier

[Features](#)

Title

IsolatedStorage fails on Mac if ~/.local/share directory does not exist #29354

Description

jasongin commented 5 days ago

**Repro steps:**

1. Start with a clean Mac OS machine, or at least a clean user account on Mac that does not have any `~/.local/share` directory created yet.
2. From a .NET Core app, call `IsolatedStorageFile.GetUserStoreForAssembly()`

**Result**

The screenshot shows the GitHub interface for the repository 'dotnet/corefx'. At the top, there are statistics for Watch (1,567), Star (13,864), and Fork (3,983). Below these are navigation tabs for Code, Issues (2,209), Pull requests (58), Projects (0), Wiki, and Insights. The main content area displays the issue title 'IsolatedStorage fails on Mac if ~/.local/share directory does not exist #29354' and a comment from 'jasongin' opened 5 days ago with 13 comments. The comment includes repro steps and a result section. On the right side, there are sections for Assignees (maryamariyan), Labels (area-System.IO, bug, os-mac-os-x), and a 'New issue' button.

## GitHub Issue Classifier

Labels

The screenshot shows a GitHub issue page for the repository 'dotnet/corefx'. The issue title is 'IsolatedStorage fails on Mac if ~/.local/share directory does not exist #29354'. The issue is open, was created by 'jasongin' 5 days ago, and has 13 comments. The issue description includes 'Repro steps' and 'Result'. The 'Labels' section on the right lists 'area-System.IO', 'area-System.IO', 'bug', and 'os-mac-os-x'. The 'area-System.IO' label is highlighted with a yellow box.

dotnet / corefx

Watch 1,567 Star 13,864 Fork 3,983

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**Result**

Assignees: maryamariyan

Labels: area-System.IO, area-System.IO, bug, os-mac-os-x

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See you soon!

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