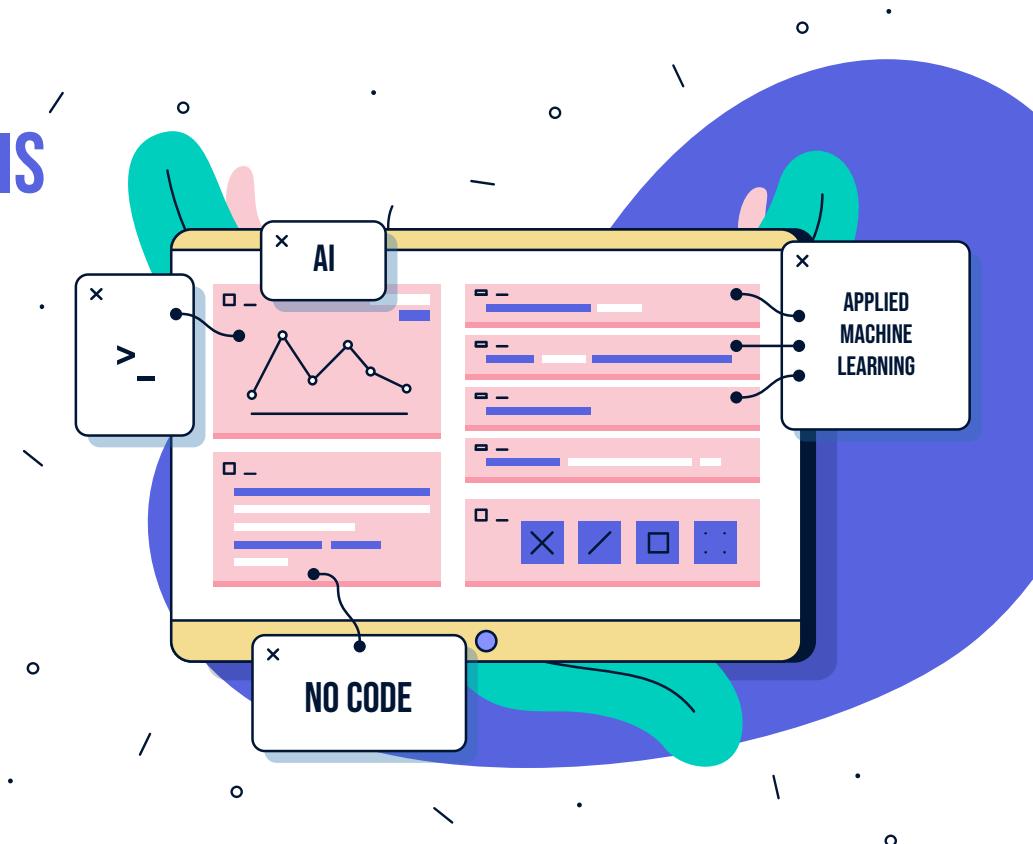


BEYOND SENTIMENT ANALYSIS REAL TIME OBJECT DETECTION WITH **ML.NET**

NDC MELBOURNE 2022



ARAFAT TEHSIN

MICROSOFT MVP - AI
SOLUTION ARCHITECT - EY

 @arafattehsin  github.com/arafattehsin

 arafattehsin.com/blog



GLOBAL AI
THE PODCAST



AGENDA



01.

PROJECTION OF AI

Why and why now?

02.

ML.NET

Scenarios

03.

CLI

SentimentAnalyzer
Demo

04.

MODEL BUILDER

Real-time object
detector
Demo



It's not enough just to sort of have AI capability that we can exercise — you also need the ability to democratize it so that every business can truly benefit from it.

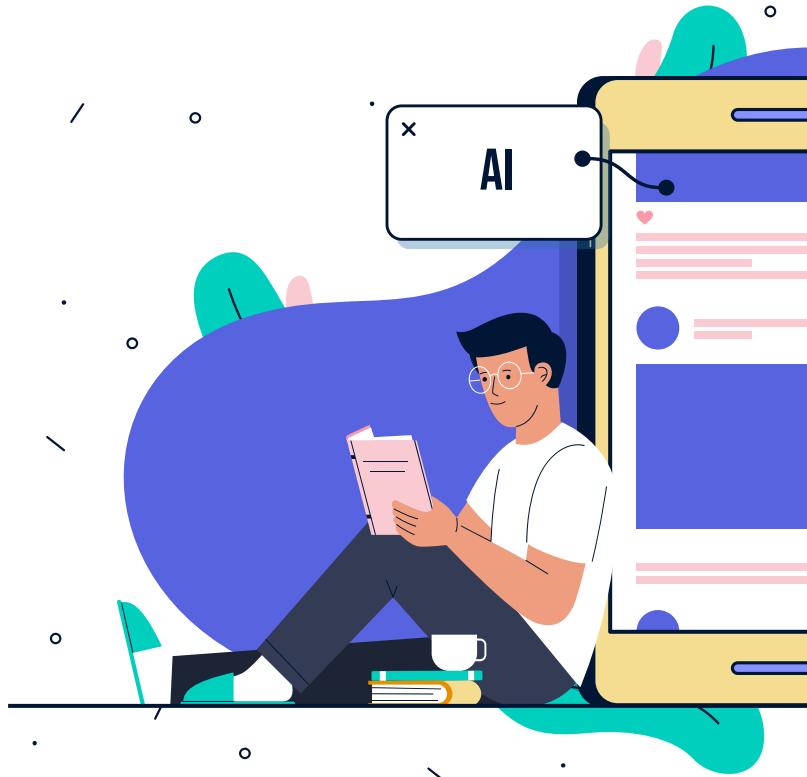
—SATYA NADELLA

01.

PROJECTION OF

AI

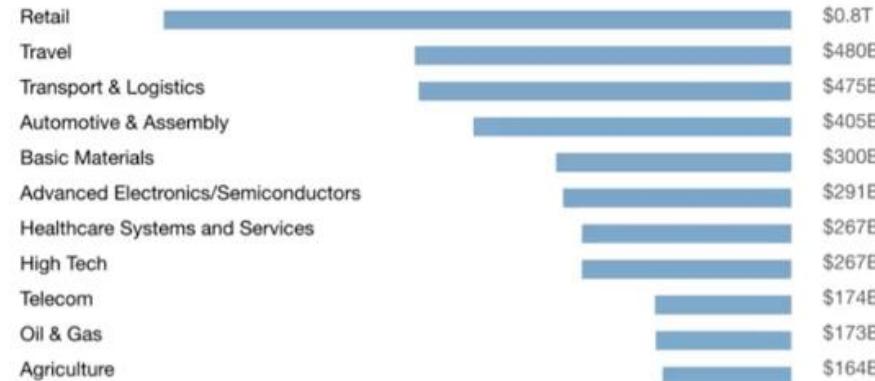
Why and why now?



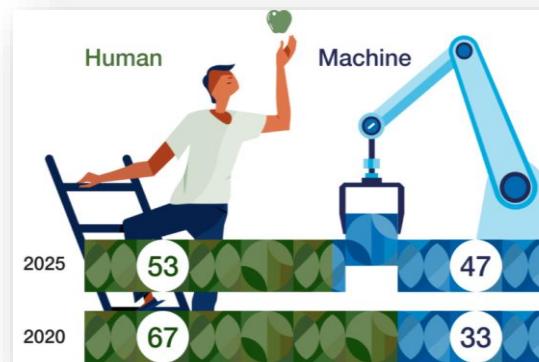
PROJECTION OF AI

AI value creation
by 2030

\$13
trillion



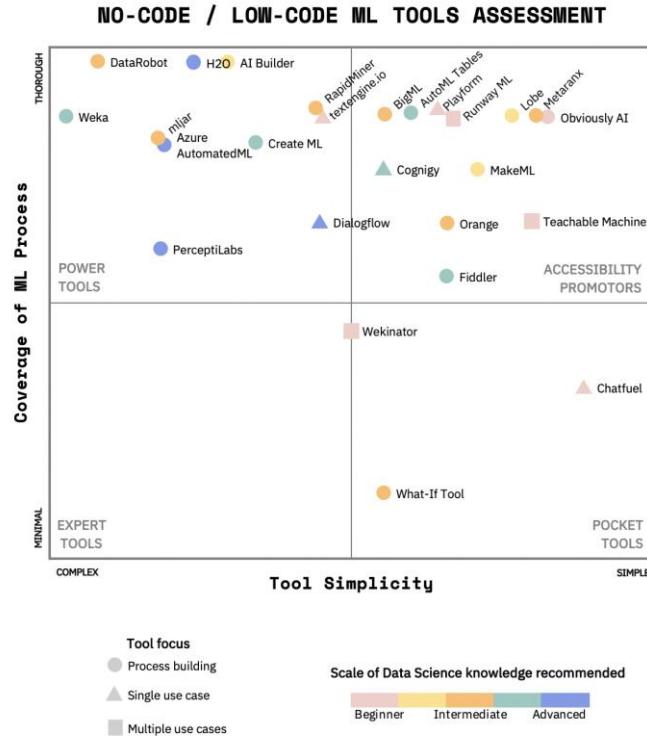
Rate of Automation



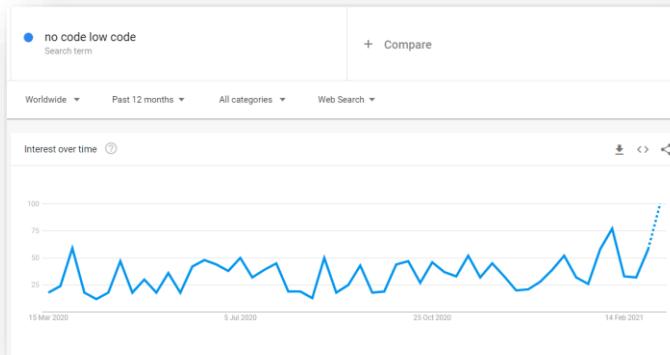
CLOUD AI DEVELOPER LEADERS



NO-CODE / LOW-CODE AI LANDSCAPE



By 2023, over 50 percent of medium to large enterprises will have adopted an LCAP as one of their strategic application platforms.



02.

OPENSOURCE ML.NET

FOR ALL .NET DEVELOPERS



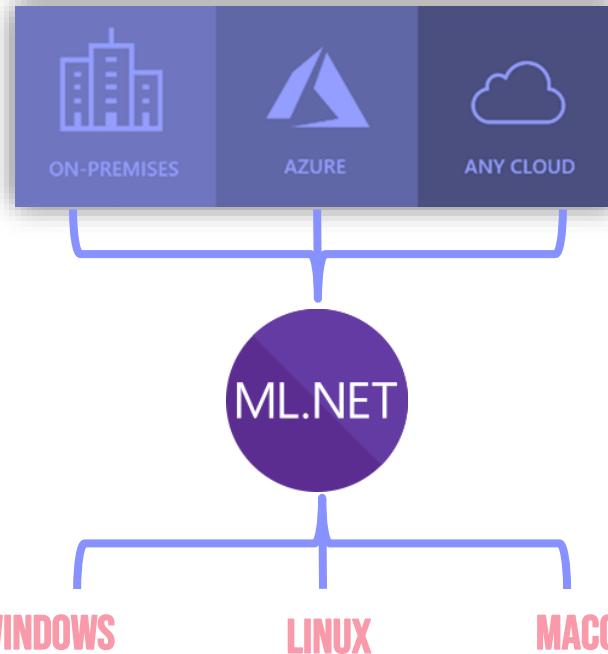
MICROSOFT AI STACK



	AZURE ML	ML.NET	COGNITIVE SERVICES	LOBE	AI BUILDER	WINML
Create & Train Custom Models	Yes	Yes	Yes	Yes (Preview)	Yes	No
Model Consumption	Web API, ONNX	API, TensorFlow, ONNX, ML.NET	API / SDK	API (Local) / ONNX / TensorFlow / Core ML etc.	Power Platform	ONNX
Level of ML knowledge	Beginner to intermediate	Beginner	Not required to beginner	Not required	Not required	Not required

PRO CODE → LOW CODE → NO CODE

WHAT IS ML.NET



AN OPEN SOURCE AND CROSS-PLATFORM MACHINE LEARNING FRAMEWORK FOR .NET

BUILT FOR .NET DEVELOPERS

UTILISE THE EXISTING C# OR F# SKILLS TO INTEGRATE MACHINE LEARNING INTO YOUR .NET APPS



NO DATASCIENCE OR SOPHISTICATED ML EXPERTISE IS REQUIRED

YOU MAY WANT TO USE THIS

- WANT TO STAY IN .NET ECOSYSTEM
- WANT TO TRAIN A CUSTOM MODEL WITHOUT LOW-LEVEL COMPLEXITIES
- WANT TO CONSUME A PRE-TRAINED MODEL (ONNX RUNTIME OR TENSORFLOW)

POSSIBILITIES WITH ML.NET



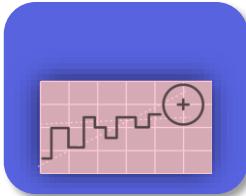
CLASSIFICATION

- Sentiment Analysis
- Eligibility or Non-eligibility
- Will customer buy or not?
- Which type of transaction is this?



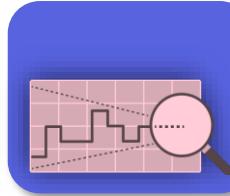
REGRESSION

- Predicting the price of fuel
- How many houses are going to go on rent this month?



FORECASTING

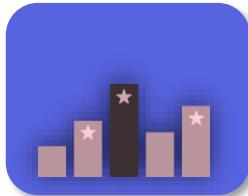
- Categories of products to be purchased
- Manufacturing flow management
- Weather forecasting



ANOMALY DETECTION

- Data center temperature
- Intrusion or fraud detection in the transactions

POSSIBILITIES WITH ML.NET



RECOMMENDATION

- List of the new retail products
- Smartphone applications
- Popular web services



RANKING

- Search capabilities
- Automatic synonym implementation

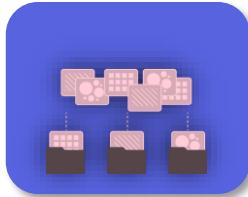
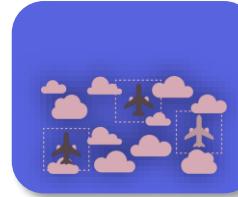


IMAGE CLASSIFICATION

- Front or back side of the ID
- Type of desserts
- Broken swings in park



OBJECT DETECTION

- Number of people in a café
- Types of flowers

WHAT TOOLS DO I HAVE?



MODEL BUILDER

GUI - NO/LOW CODE

ML.NET CLI

TERMINAL

AUTOML.NET API

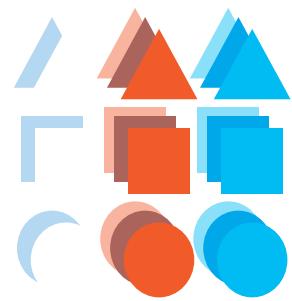
(Microsoft.ML.AutoML)

ML.NET API

(Microsoft.ML)



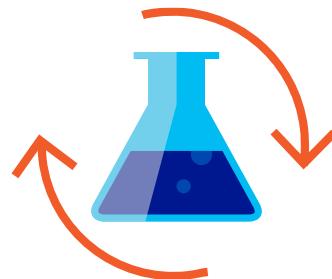
MACHINE LEARNING WORKFLOW



PREPARE YOUR DATA



Datasets



BUILD & TRAIN



ML
model



RUN



ML
model



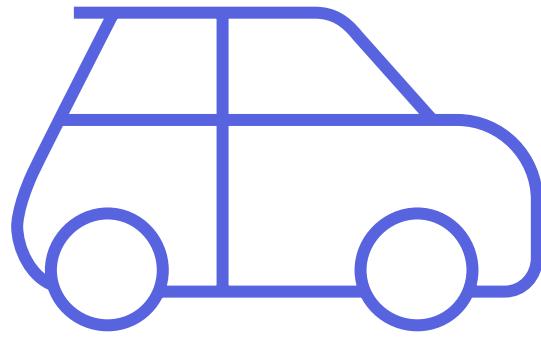
App/tools for
training
the ML model

MODEL CREATION



End-user app
using the ML model

MODEL CONSUMPTION



HOW MUCH IS THIS CAR WORTH?

TYPICAL MODEL CREATION

WHICH FEATURES?

MILEAGE

CONDITION

CAR BRAND

YEAR OF MAKE

REGULATIONS

...

GRADIENT BOOSTED

NEAREST NEIGHBORS

SVM

BAYESIAN REGRESSION

LGBM

...

WHICH ALGORITHM?

PARTITIONER 1

PARTITIONER 2

PARTITIONER SPLIT

PARTITIONER LEAF

OTHERS

WHICH PARAMETERS?

PARAMETER 1

PARAMETER 2

PARAMETER SPLIT

PARAMETER LEAF

PARAMETER OTHERS

30%
MODEL

TYPICAL MODEL CREATION

WHICH FEATURES?

MILEAGE
CONDITION
CAR BRAND
YEAR OF MAKE
REGULATIONS
...

WHICH ALGORITHM?

GRADIENT BOOSTED
NEAREST NEIGHBORS
SVM
BAYESIAN REGRESSION
LGBM
...

WHICH PARAMETERS?

NEIGHBORS
WEIGHTS
MINSAMPLES SPLIT
MIN SAMPLES LEAF
OTHERS

30%
MODEL

ITERATE

AUTOML MODEL CREATION

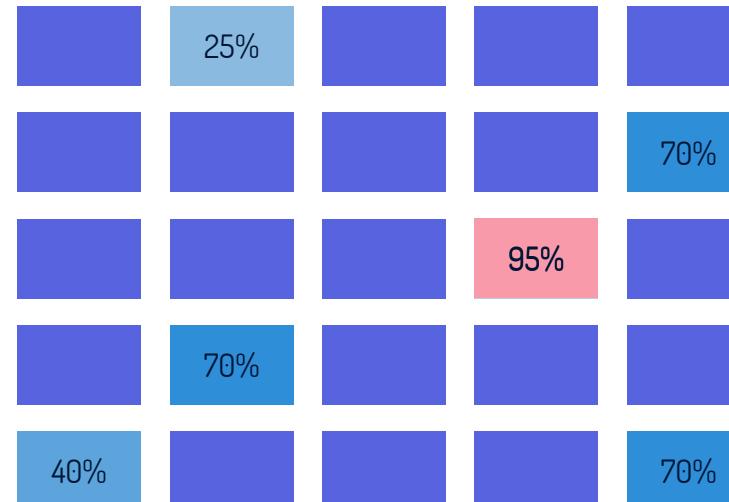
Input

101010
010101
101010
Enter data

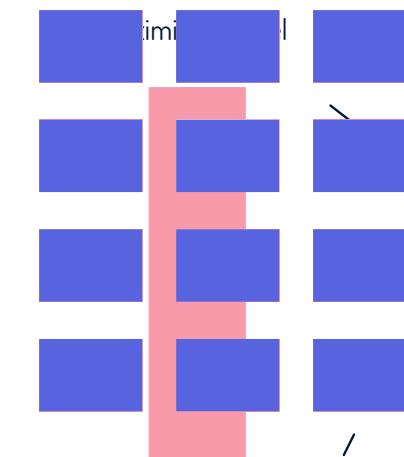
Define goals

Apply constraints

Intelligently test multiple models in parallel



Output

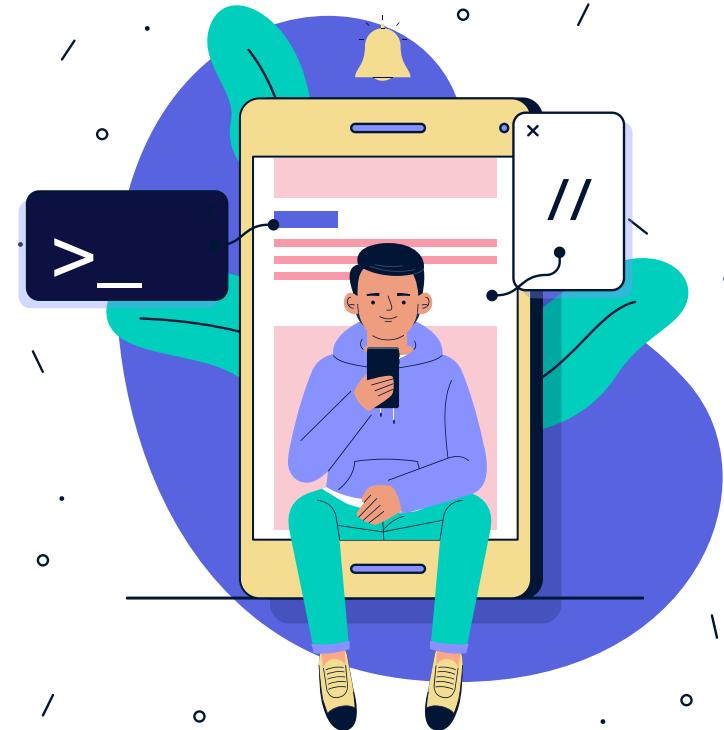


03.

ML.NET

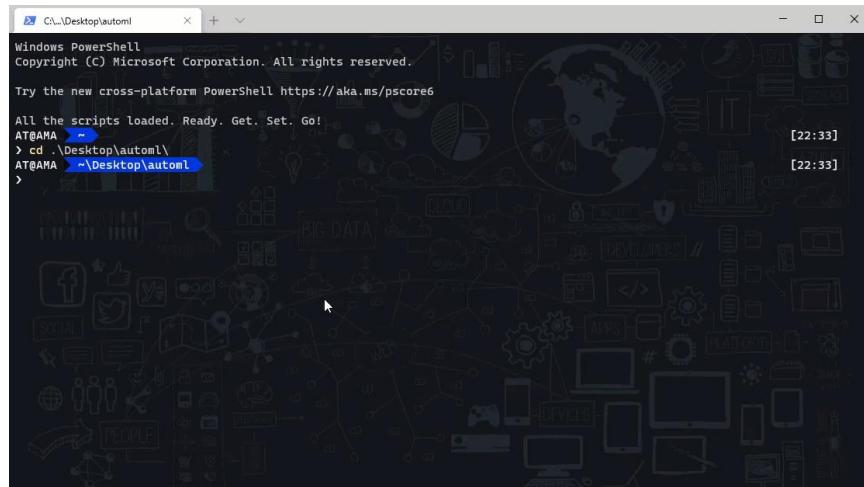
CLI

Cross Platform (Windows,
Linux and MacOS)



ML.NET CLI

- USE THE CLI TO EASILY BUILD CUSTOM ML MODELS WITH AUTO ML
- REMOVES THE OVERHEAD OF IMPLEMENTATION, FEATURE ENGINEERING AND TWEAKING OF HYPERPARAMETERS
- CROSS PLATFORM (WINDOWS, LINUX, MACOS)
- GENERATE CODE FOR TRAINING & CONSUMPTION



SentimentAnalyzer 1.2.3

17K+ downloads

BotBuilderCommunity and many more..



ML.NET CLI

CROSS PLATFORM WITH AUTOML

/demo

Sentiment Analysis is not the end of
the world. There's so much beyond
that.

—A FRIEND

04.

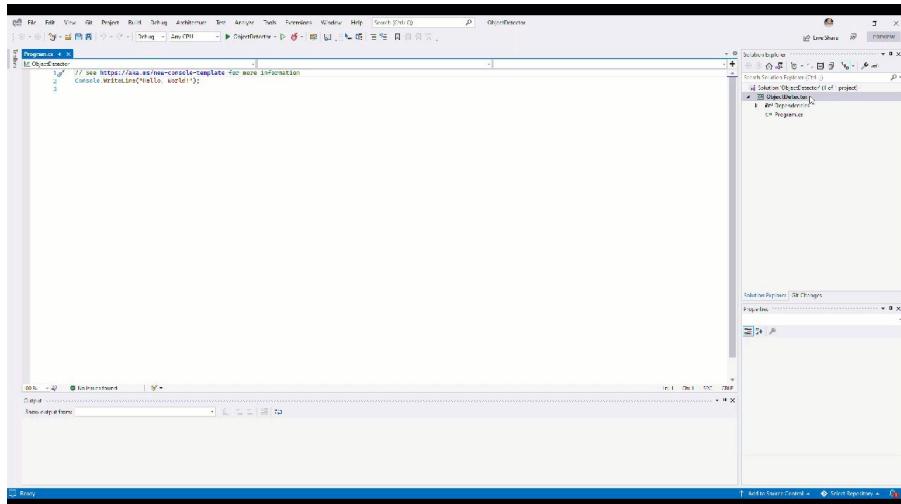
ML.NET MODEL BUILDER

Build production ready
models



MODEL BUILDER

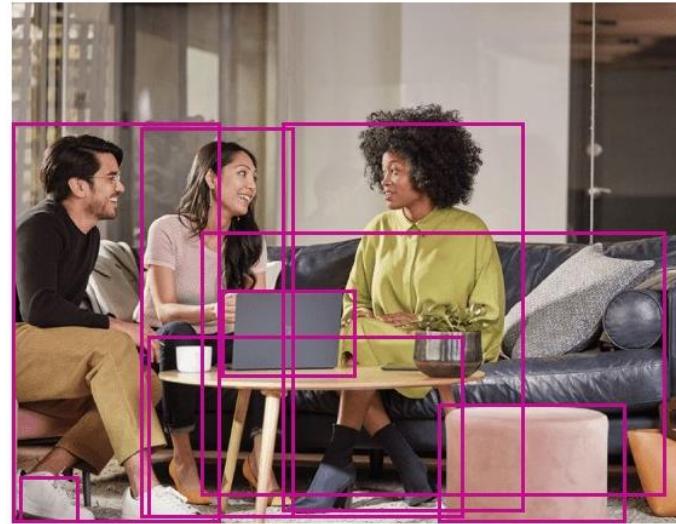
- NO-CODE WAY TO BUILD CUSTOM ML MODELS WITH AUTOML
- CONFIG BASED TRAINING WITH GENERATED CODE-BEHIND FILES
- .MBCONFIG SOLVES MANY PROBLEMS
- UTILIZES AZURE ML STUDIO EXPERIMENTS FOR RESOURCE INTENSIVE OPERATIONS



OBJECT DETECTION WITH ML.NET



COMPUTER VISION PROBLEM TO LOCATE AND CATEGORIZE OBJECT IN IMAGES / FRAMES



OBJECT DETECTION WITH ML.NET



ADDRESS ALL COMMON USE-CASES

Scenario

Select a scenario

Train with your data
The following scenarios use Automated ML to train and pick the best model for your data.
[Learn more about training with your own data in Model Builder.](#)

 Data classification Classify tabular data into 2+ categories, e.g. predict if comments are positive or negative sentiments. Local	 Value prediction Predict a numeric value from your data (regression), e.g. predict the price of a house based on features like size, location, etc. Local	 Image classification Classify images into 2+ categories, e.g. predict whether an image is of a dog or a cat. Azure Local	 Recommendation Produce a list of suggested items for a particular user, e.g. recommend products. Local	 Object detection Detect and identify objects in images, e.g. detect cars in an image and draw bounding boxes around each car. Azure
---	---	--	--	---


Forecasting
Predict future values based on previously observed time series values.

[Local](#) [Preview](#)

Limited scenarios

The following scenarios are not yet supported by Automated ML, so walkthroughs with an example dataset and pre-defined training code are provided.
[Learn more about examples in Model Builder.](#)

 Feedback



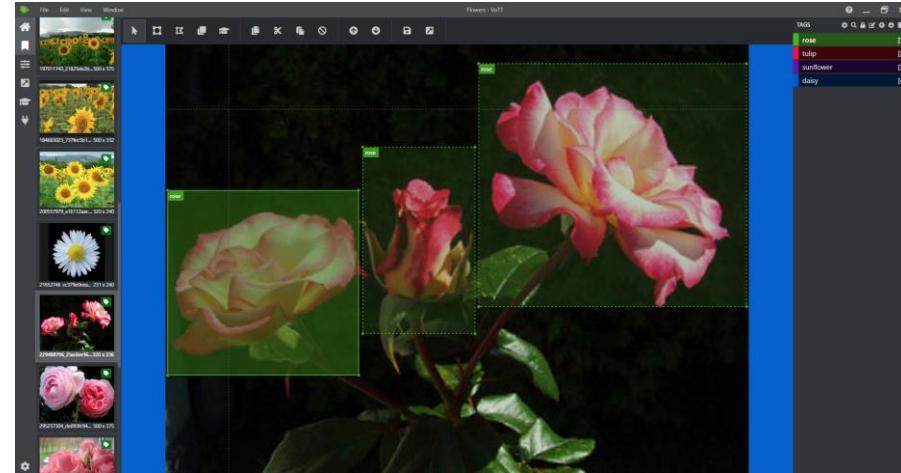


BUT FIRST...

LET'S TALK ABOUT TAGGING

VOTT (VISUAL OBJECT TAGGING TOOL)

- AN OPEN SOURCE IMAGE / VIDEO TAGGING TOOL
- ORIGINALLY DEVELOPED BY MICROSOFT CSE TEAM
- MULTIPLE EXPORT PROVIDER OPTIONS
- WORKS FOR WEB / LOCAL





ML.NET MODEL BUILDER

GUI TO BUILD MODELS

/demo

RESOURCES



 **SENTIMENTANALYZER REPO** - <https://github.com/arafattehsin/SentimentAnalyzer>

 **BLOG POST** - <https://www.arafattehsin.com/beyond-sentiment-analysis-object-detection-with-ml-net/>

 **OBJECT DETECTION WITH ML.NET (DOCS)** - <https://docs.microsoft.com/en-us/dotnet/machine-learning/tutorials/object-detection-model-builder>

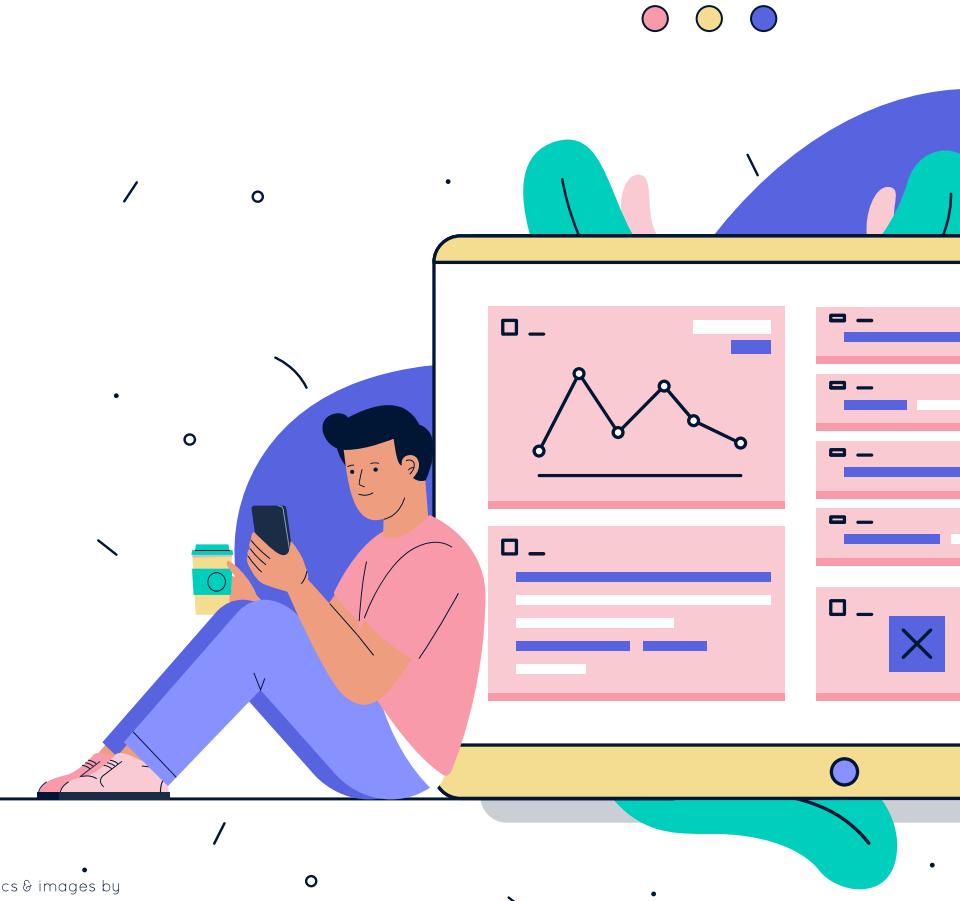
THANKS!

Do you have any questions?

You can find me at

 @arafattehsin

 arafat@outlook.com



FEATURES OF THE TOPIC



VENUS

Venus is the second planet from the Sun



MARS

Despite being red, Mars is a cold place

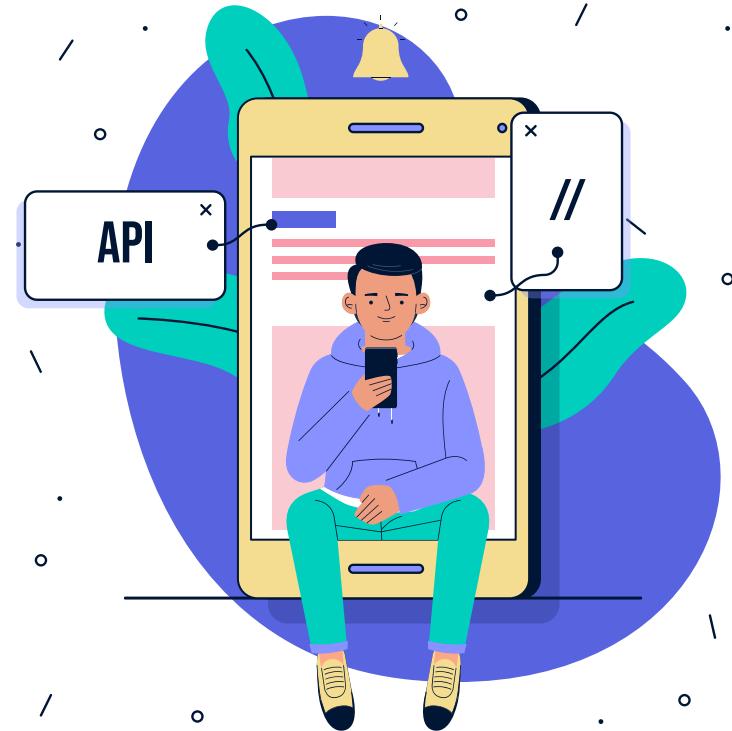


JUPITER

Jupiter is a gas giant and the biggest planet



AWESOME WORDS



EXAMPLES



MERCURY

Mercury is the smallest planet

MARS

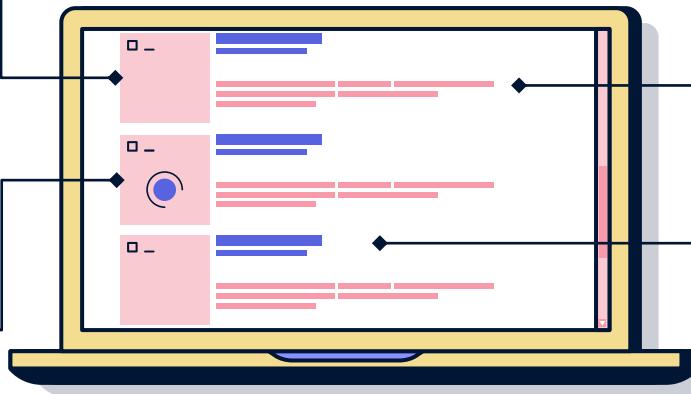
Mars is a very cold place

VENUS

Venus has a beautiful name

JUPITER

Jupiter is the biggest planet



RECOMMENDATIONS



MERCURY

Mercury is the closest planet to the Sun



VENUS

It's the second planet from the Sun



MARS

Despite being red, Mars is a cold place



JUPITER

It's the biggest planet in the Solar System



SATURN

Saturn is the ringed one and a gas giant



NEPTUNE

It's the farthest planet from the Sun





4,498,300,000

Big numbers catch your audience's attention

A TIMELINE



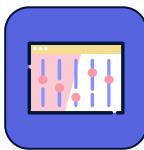
Mercury is the
smallest planet

MERCURY



Mars is a very
cold place

MARS



1

VENUS

Venus has a
beautiful name



2

JUPITER

Jupiter is the
biggest planet

3

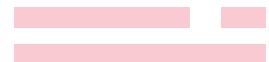


MARS

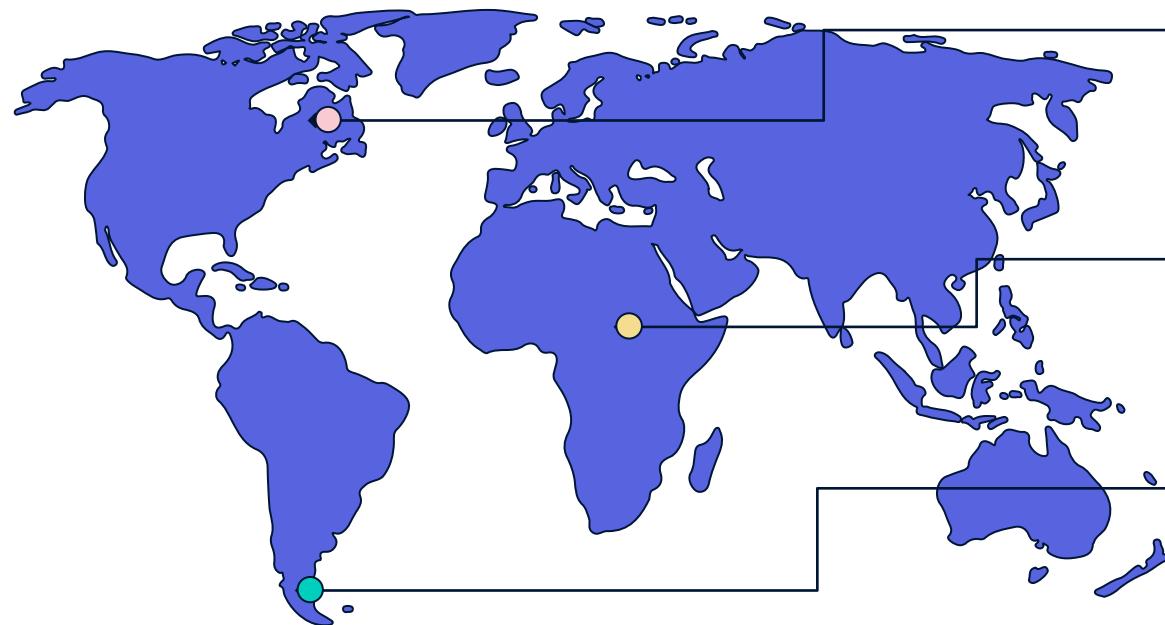
4

NEPTUNE

Neptune is the
farthest planet



THIS IS A MAP



JUPITER

Jupiter is the biggest planet

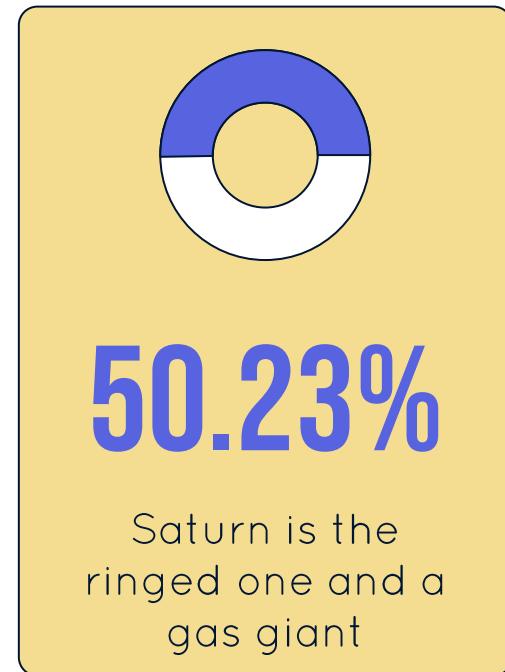
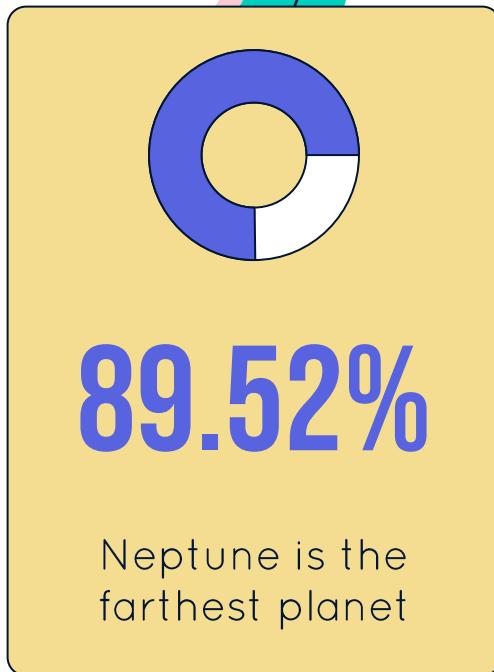
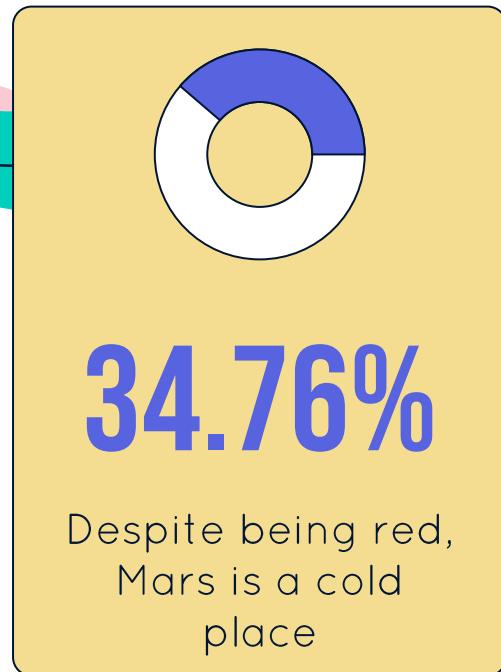
MERCURY

Mercury is a small planet

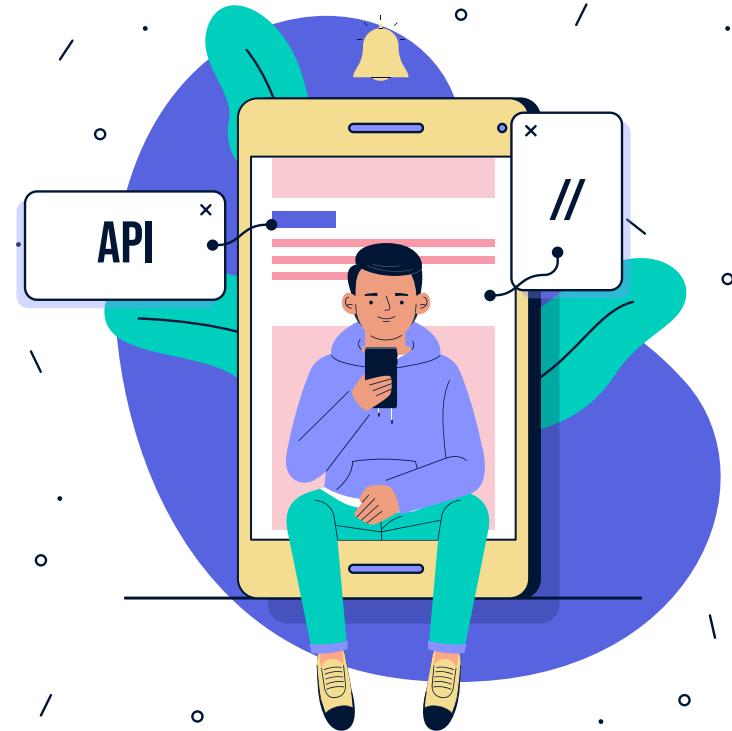
MARS

Mars is a very cold place





AWESOME WORDS



THIS IS A GRAPH



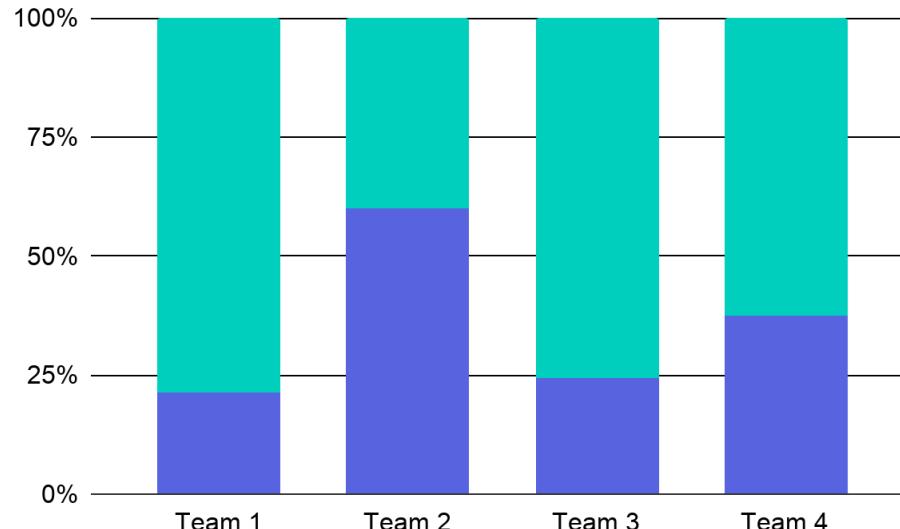
MERCURY

Mercury is the smallest planet

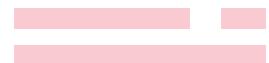


MARS

Mars is a very cold place



To modify this graph, click on it, follow the link, change the data and paste the new graph here



A TABLE



	VENUS	NEPTUNE	MARS
MERCURY	0.38	0.09	9.8
JUPITER	0.11	0.53	0.38
SATURN	95.2	9.4	1.16



A PICTURE IS WORTH A THOUSAND WORDS



OUR SERVICES



0\$

You can explain your product or your service

- Characteristic
- Characteristic
- Characteristic

FREE

60\$

You can explain your product or your service

- Characteristic
- Characteristic
- Characteristic

PRO

80\$

You can explain your product or your service

- Characteristic
- Characteristic
- Characteristic

PREMIUM



MULTIMEDIA



Insert your multimedia content here

Venus has a beautiful name and is the second planet from the Sun. It's terribly hot—even hotter than Mercury—and its atmosphere is extremely poisonous

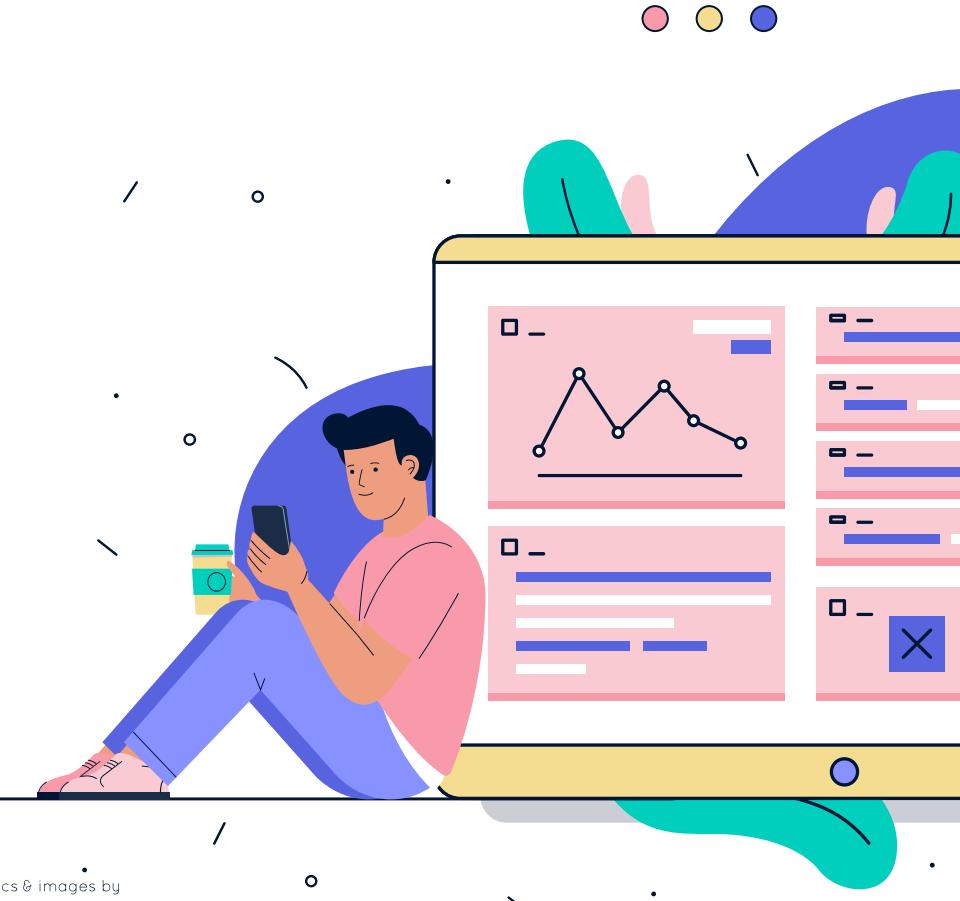
THANKS!



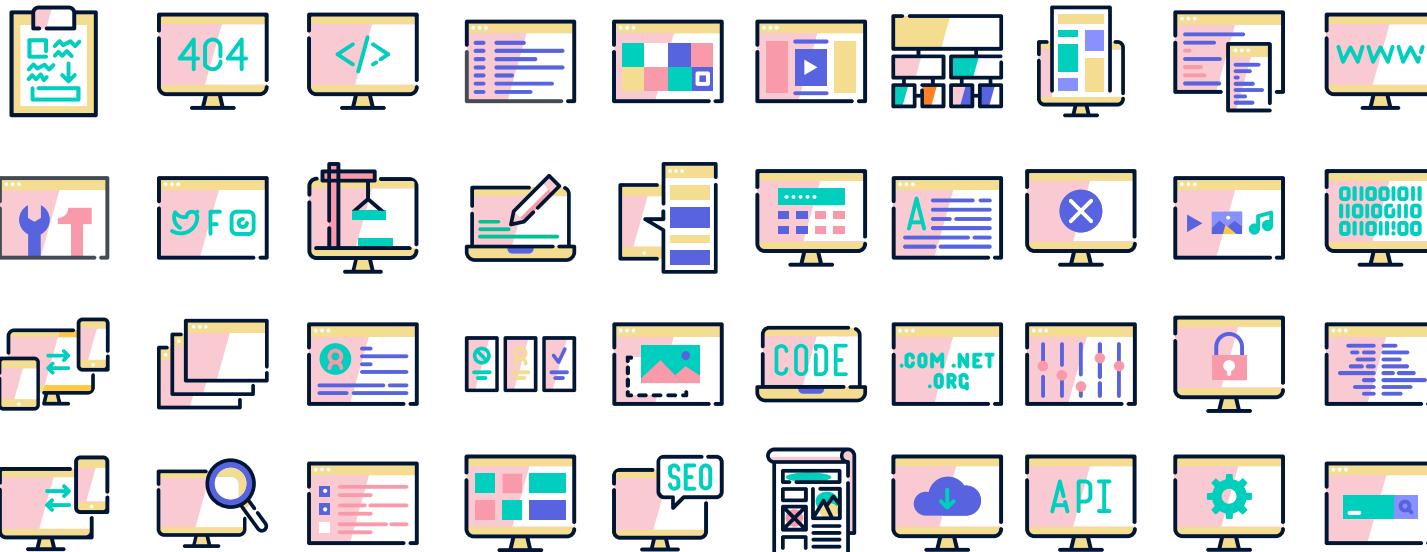
Do you have any questions?
addyouremail@freepik.co
m +91 620 421 838
yourcompany.com

Please keep this slide for attribution

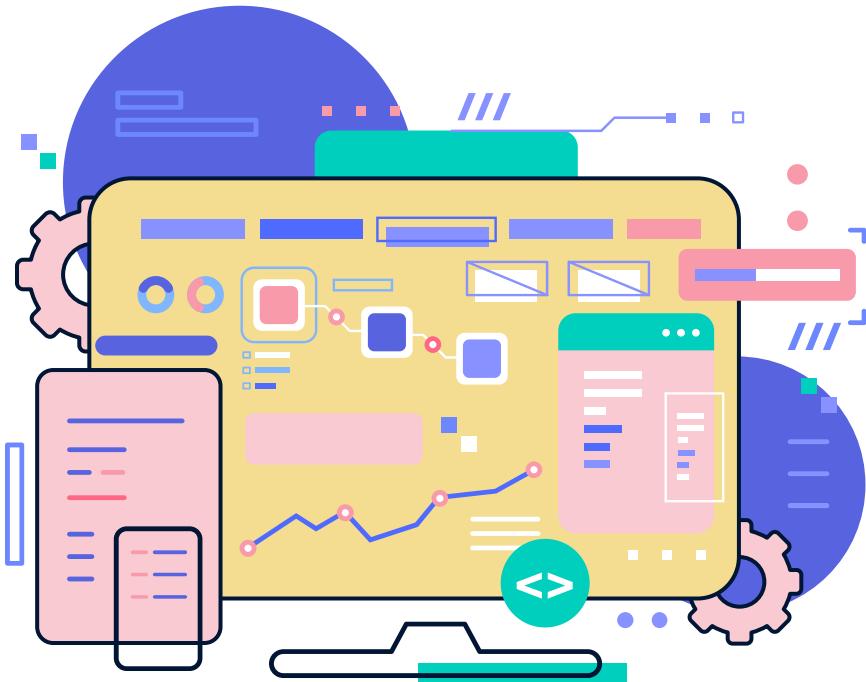
CREDITS: This presentation template was created by [Slidesgo](#), including icons by [Flaticon](#), infographics & images by [Freepik](#)



ICONS



ALTERNATIVE RESOURCES



RESOURCES



VECTOR

- Ui and ux app development concept
- App development illustration
- New app development on desktop illustrated
- Fomo vs jomo illustration concept
- Fomo vs jomo illustration concept

PHOTO

- Young network engineers with a laptop medium shot
- Network engineer on server room with a laptop medium shot

ICON

- Programming Icon Pack



AGENDA



- • Projection of AI
- • The No-code/low-code AI Landscape
- • ML.NET
 - Scenarios
 - CLI
 - Model Builder
- • Demos
 - SentimentAnalyzer
 - Real time Object Detection



Instructions for use (free users)

In order to use this template, you must credit Slidesgo by keeping the Thanks slide.

You are allowed to:

- Modify this template.
- Use it for both personal and commercial purposes.

You are not allowed to:

- Sublicense, sell or rent any of Slidesgo Content (or a modified version of Slidesgo Content).
- Distribute this Slidesgo Template (or a modified version of this Slidesgo Template) or include it in a database or in any other product or service that offers downloadable images, icons or presentations that may be subject to distribution or resale.
- Use any of the elements that are part of this Slidesgo Template in an isolated and separated way from this Template.
- Delete the “Thanks” or “Credits” slide.
- Register any of the elements that are part of this template as a trademark or logo, or register it as a work in an intellectual property registry or similar.

For more information about editing slides, please read our FAQs or visit Slidesgo School:

<https://slidesgo.com/faqs> and <https://slidesgo.com/slidesgo-school>

Instructions for use (premium users)

In order to use this template, you must be a Premium user on [Slidesgo](#).

You are allowed to:

- Modify this template.
- Use it for both personal and commercial purposes.
- Hide or delete the “Thanks” slide and the mention to Slidesgo in the credits.
- Share this template in an editable format with people who are not part of your team.

You are not allowed to:

- Sublicense, sell or rent this Slidesgo Template (or a modified version of this Slidesgo Template).
- Distribute this Slidesgo Template (or a modified version of this Slidesgo Template) or include it in a database or in any other product or service that offers downloadable images, icons or presentations that may be subject to distribution or resale.
- Use any of the elements that are part of this Slidesgo Template in an isolated and separated way from this Template.
- Register any of the elements that are part of this template as a trademark or logo, or register it as a work in an intellectual property registry or similar.

For more information about editing slides, please read our FAQs or visit Slidesgo School:

<https://slidesgo.com/faqs> and <https://slidesgo.com/slidesgo-school>

Fonts & colors used

This presentation has been made using the following fonts:

Bebas Neue

(<https://fonts.google.com/specimen/Bebas+Neue>)

Quicksand

(<https://fonts.google.com/specimen/Quicksand>)

#ffffff

#011635

#f99aaa

#f9cad2

#f4dc90

#00cfbe

#8791ff

#5863e0

Stories by Freepik

Create your Story with our illustrated concepts. Choose the style you like the most, edit its colors, pick the background and layers you want to show and bring them to life with the animator panel! It will boost your presentation. Check out [How it Works](#).



Pana



Amico



Bro



Rafiki



Cuate

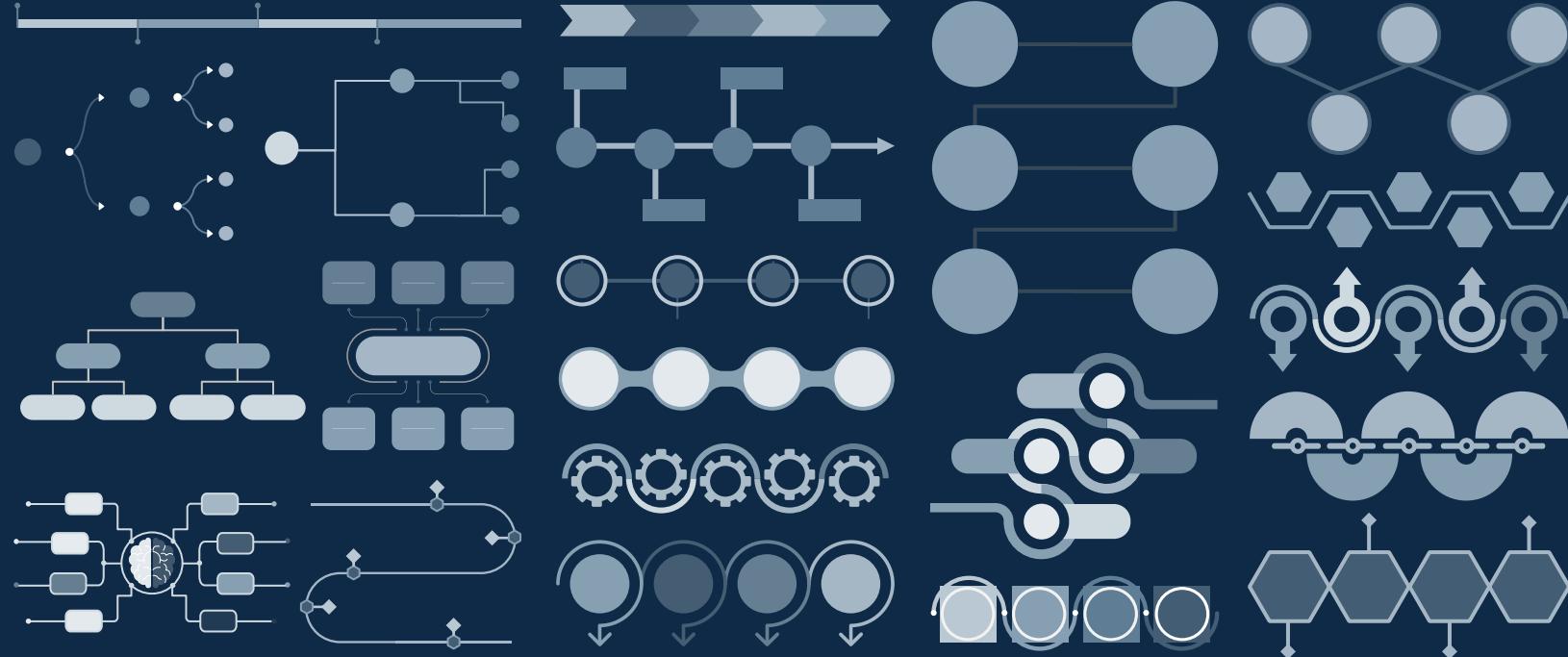
Use our editable graphic resources...

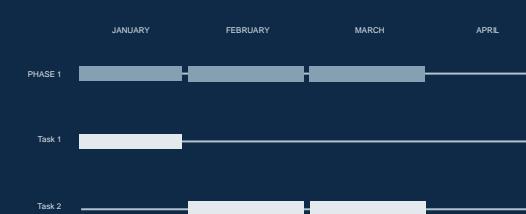
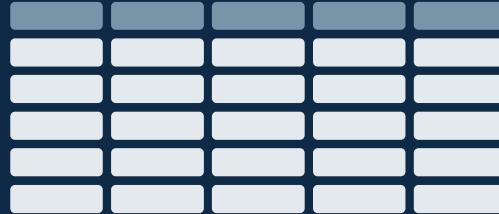
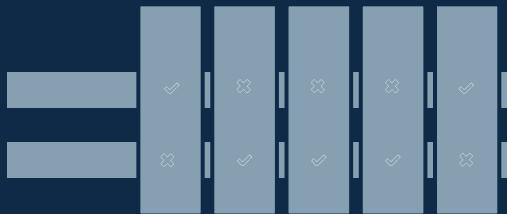
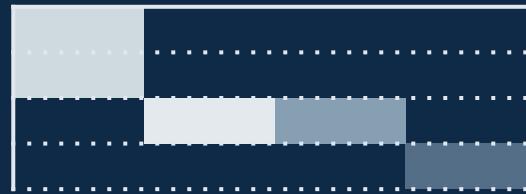
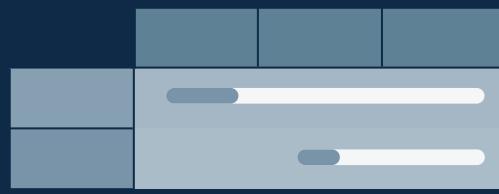
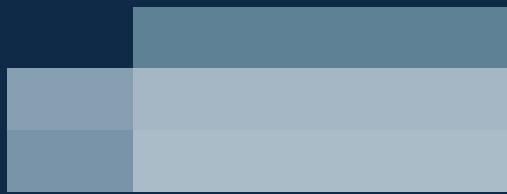
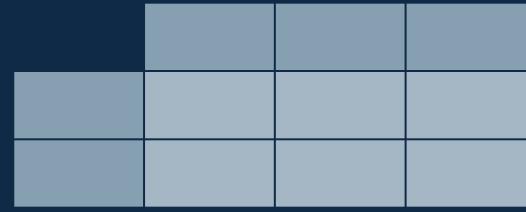
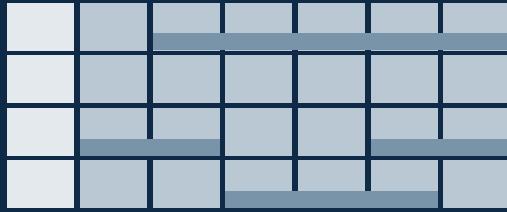
You can easily resize these resources without losing quality. To change the color, just ungroup the resource and click on the object you want to change. Then, click on the paint bucket and select the color you want.

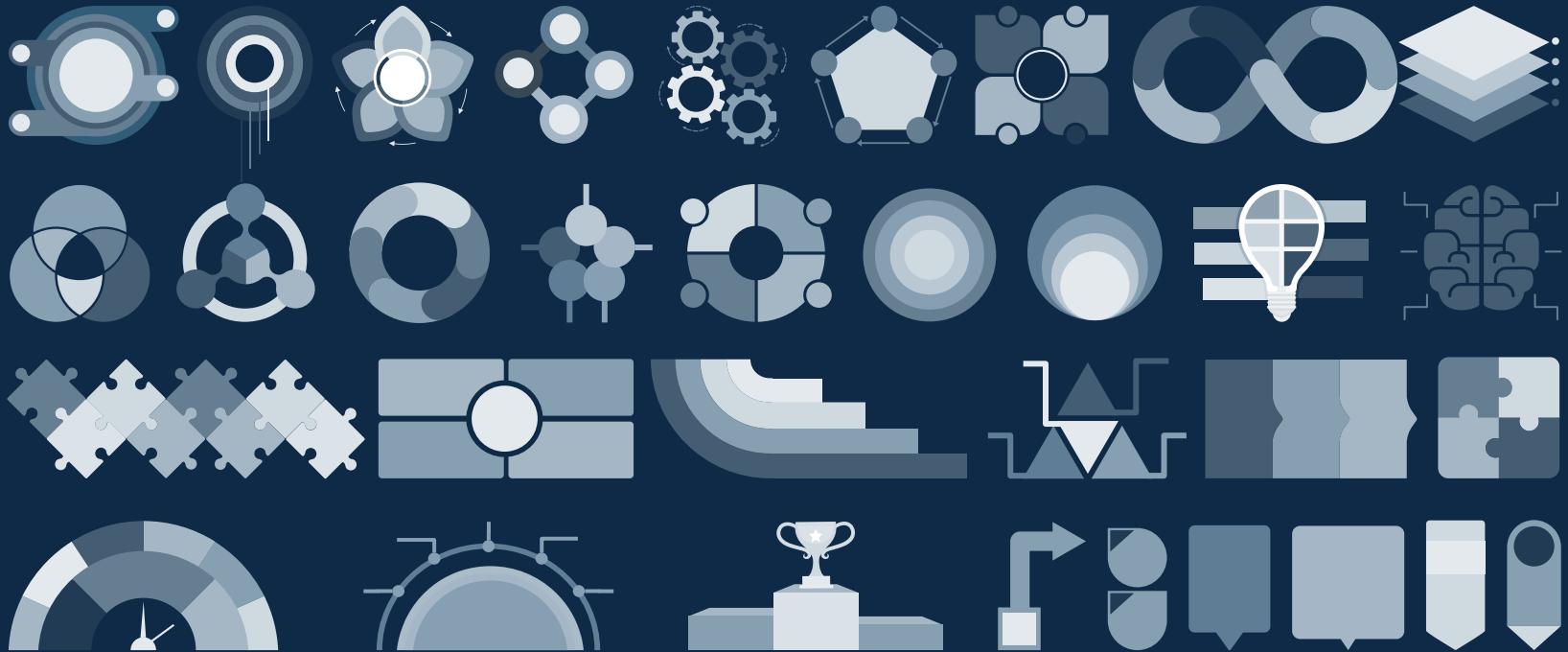
Group the resource again when you're done. You can also look for more infographics on Slidesgo.

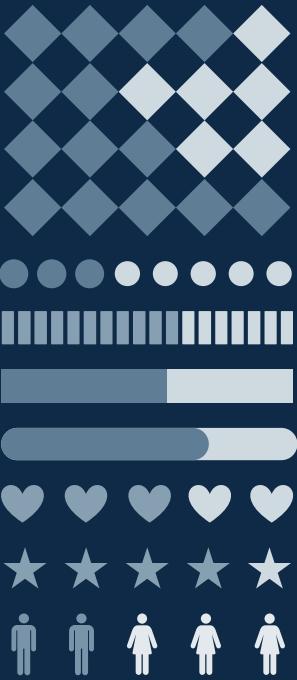
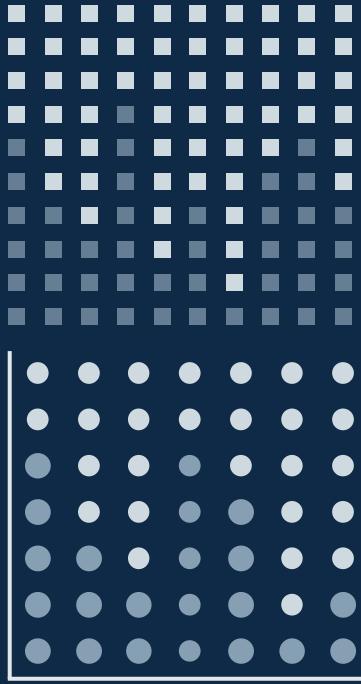












...and our sets of editable icons

You can resize these icons without losing quality.

You can change the stroke and fill color; just select the icon and click on the paint bucket/pen.

In Google Slides, you can also use Flaticon's extension, allowing you to customize and add even more icons.



Educational Icons



Medical Icons



Business Icons



Teamwork Icons



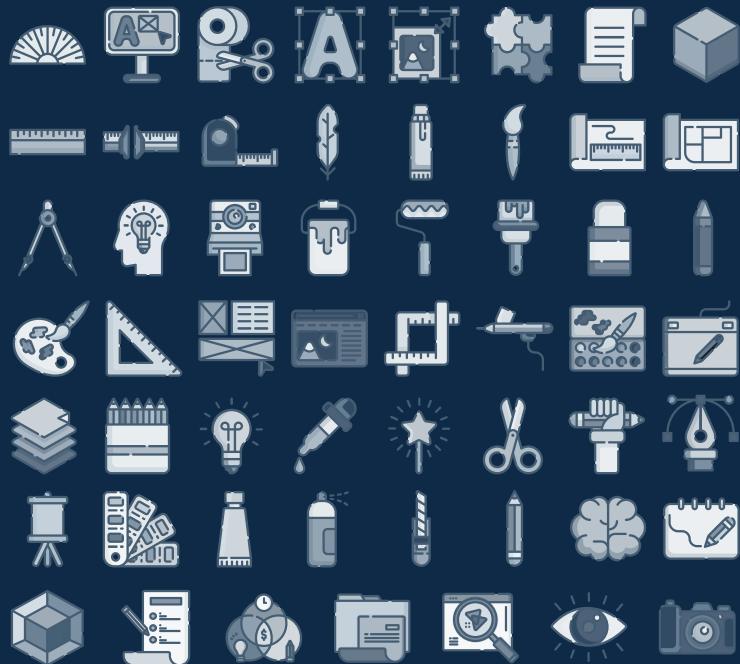
Help & Support Icons



Avatar Icons



Creative Process Icons



Performing Arts Icons



Nature Icons



SEO & Marketing Icons



