Microsoft

Introduction to Artificial Intelligence

on Microsoft Azure

Paige Bailey

Sr. Cloud Developer Advocate

Work Experience

- Focus at Microsoft is *machine learning* and *artificial intelligence*.
- Prior to joining Microsoft, was a *data scientist* and *geophysical application developer* in the energy industry for 5 years.
- *GIS Technician* (Esri products) for two years.

Toolkit

- Python *(10 years)*
- R *(4 years)*
- Spark, Kafka, Hive, HBase *(2 years)*

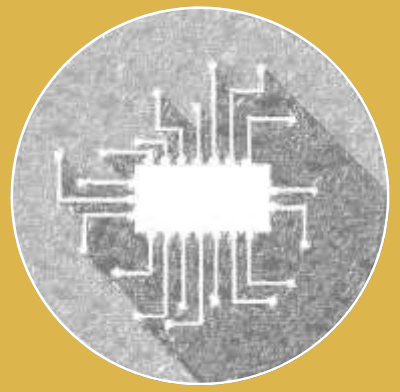
Location: *Austin, TX*

Twitter: *@DynamicWebPaige*

Microsoft | Data Platform

Microsoft

What is **Artificial Intelligence**?



How is it **used**?

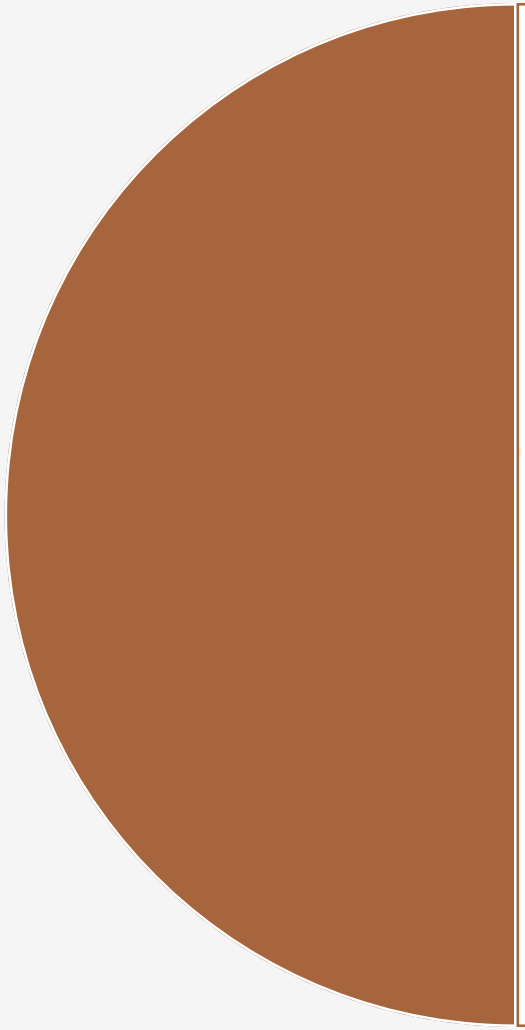
How can you **get started**?

Microsoft

What is

Artificial Intelligence?

Microsoft



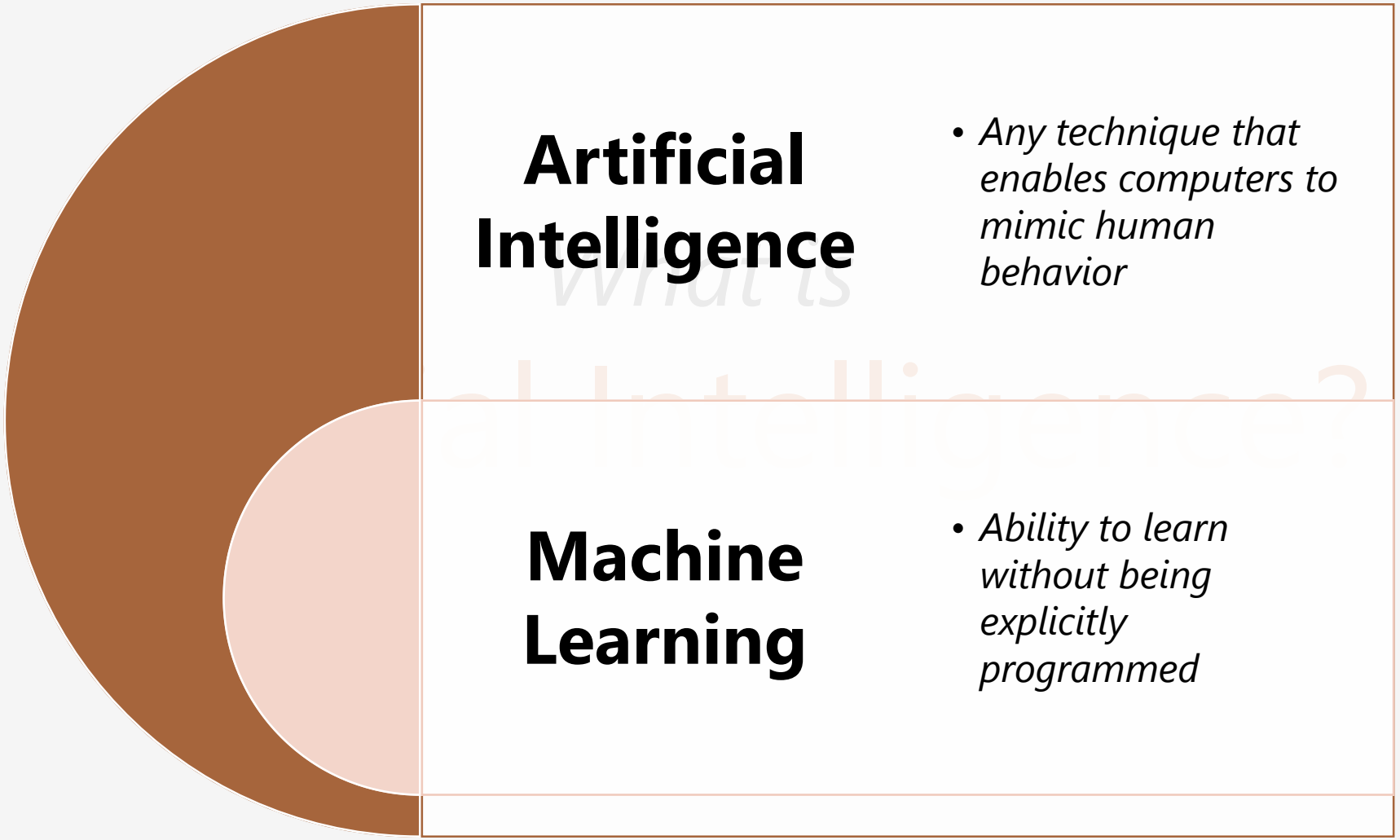
What is

Artificial Intelligence

artificial intelligence?

- *Any technique that enables computers to mimic human behavior*

Microsoft

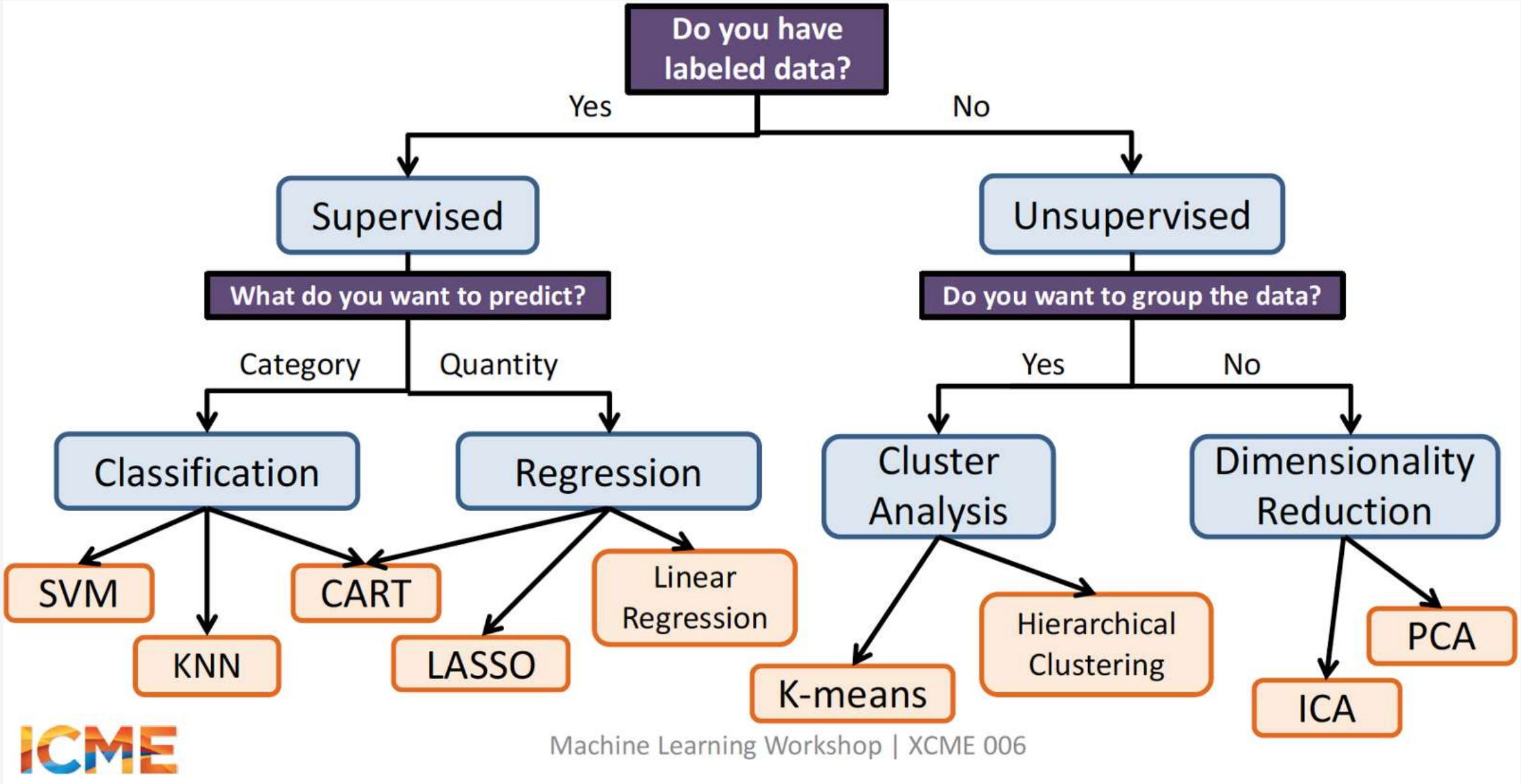


Artificial Intelligence

- *Any technique that enables computers to mimic human behavior*

Machine Learning

- *Ability to learn without being explicitly programmed*


Do you have labeled data?
Yes
No
Supervised
Unsupervised
What do you want to predict?
Do you want to group the data?
Category
Quantity
Yes
No
Classification
Regression
Cluster Analysis
Dimensionality Reduction
SVM
KNN
CART
LASSO
Linear Regression
K-means
Hierarchical Clustering
ICA
PCA
ICME
Machine Learning Workshop | XCME 006

Microsoft

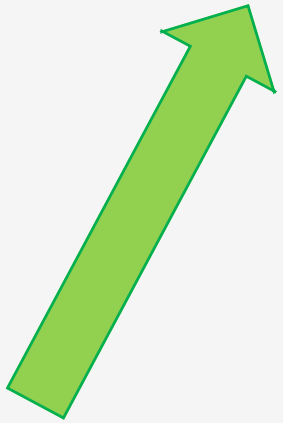
Let's try an

example.

Age	Has_Job	Owns_House	Credit_Rating	Education	Defaulted?
22	Yes	No	Good	Graduate	No
47	Yes	Yes	Poor	High School	No
35	Yes	No	Poor	High School	Yes
21	No	No	Good	College	Yes
50	Yes	Yes	Good	Graduate	No
42	Yes	No	Poor	Graduate	No
…	…	…	…	…	…
…	…	…	…	…	…

… and so on.

Age	Has_Job	Owns_House	Credit_Rating	Education	Defaulted?
22	Yes	No	Good	Graduate	No
47	Yes	Yes	Poor	High School	No
35	Yes	No	Poor	High School	Yes
21	No	No	Good	College	Yes
50	Yes	Yes	Good	Graduate	No
42	Yes	No	Poor	Graduate	No
…	…	…	…	…	…

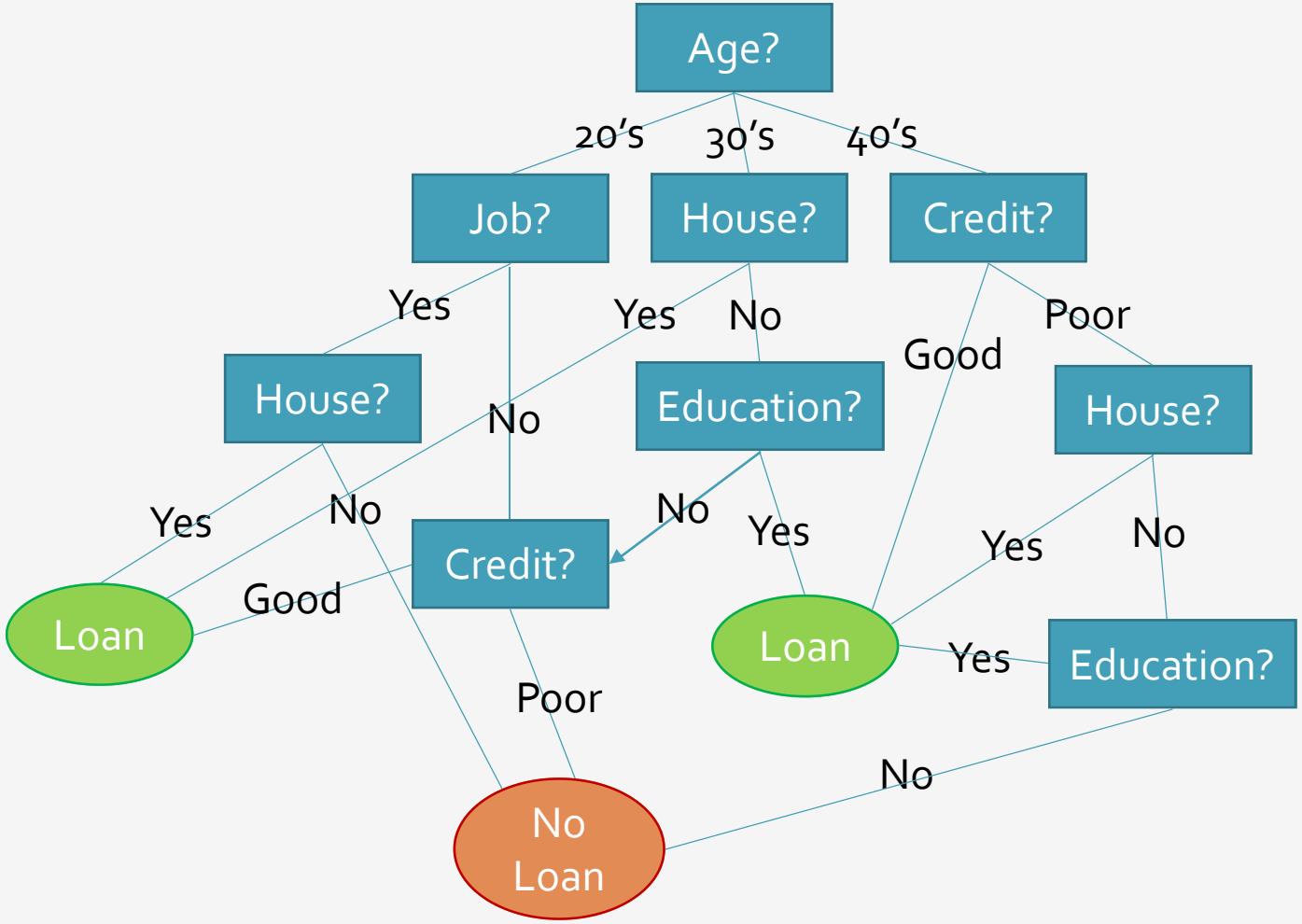


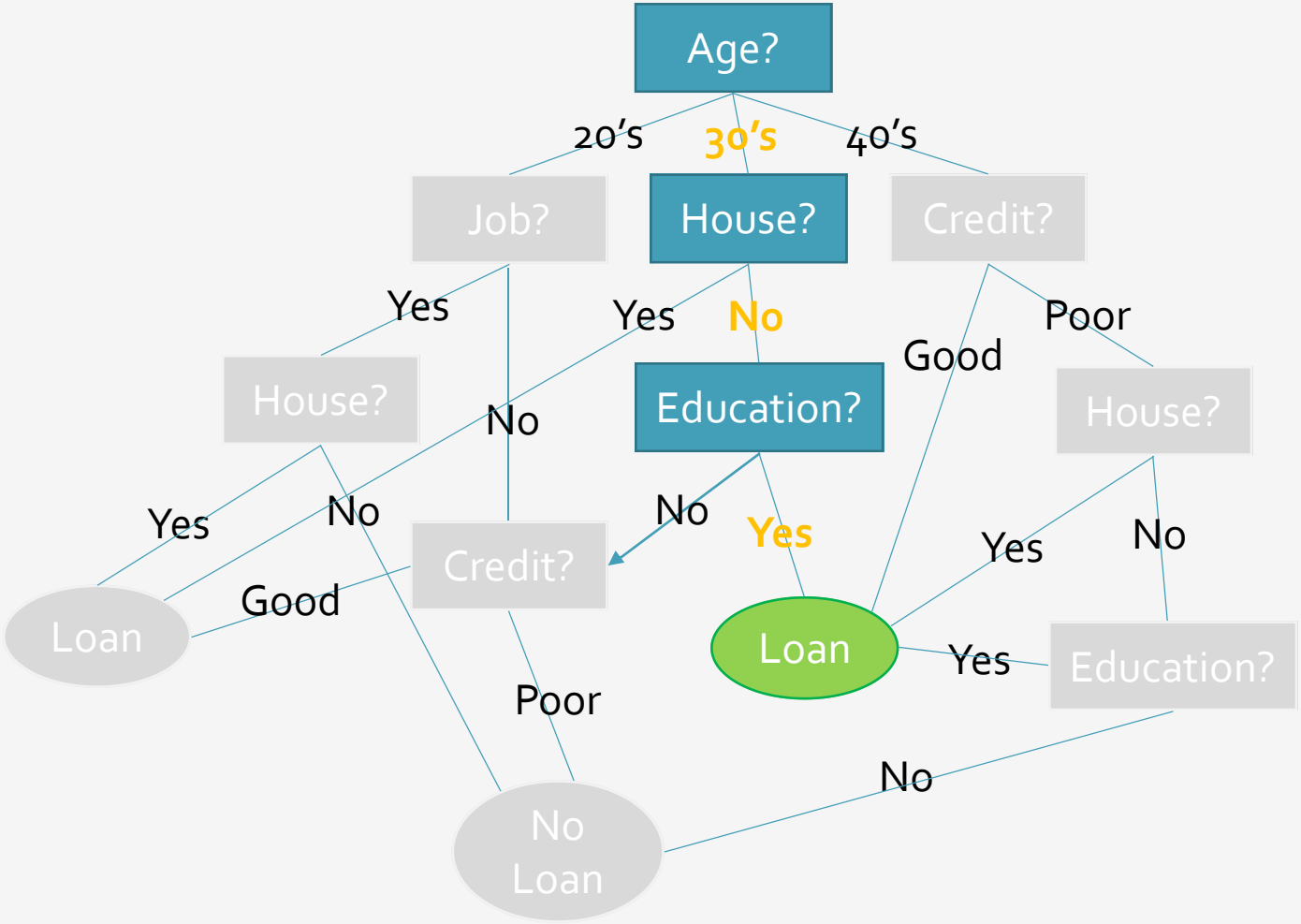
But if you're a loan-granter, all you really care about is this.

Age	Has_Job	Owns_House	Credit_Rating	Education	Defaulted?
22	Yes	No	Good	Graduate	No
47	Yes	Yes	Poor	High School	No
35	Yes	No	Poor	High School	Yes
21	No	No	Good	College	Yes
50	Yes	Yes	Good	Graduate	No
42	Yes	No	Poor	Graduate	No
…	…	…	…	…	…

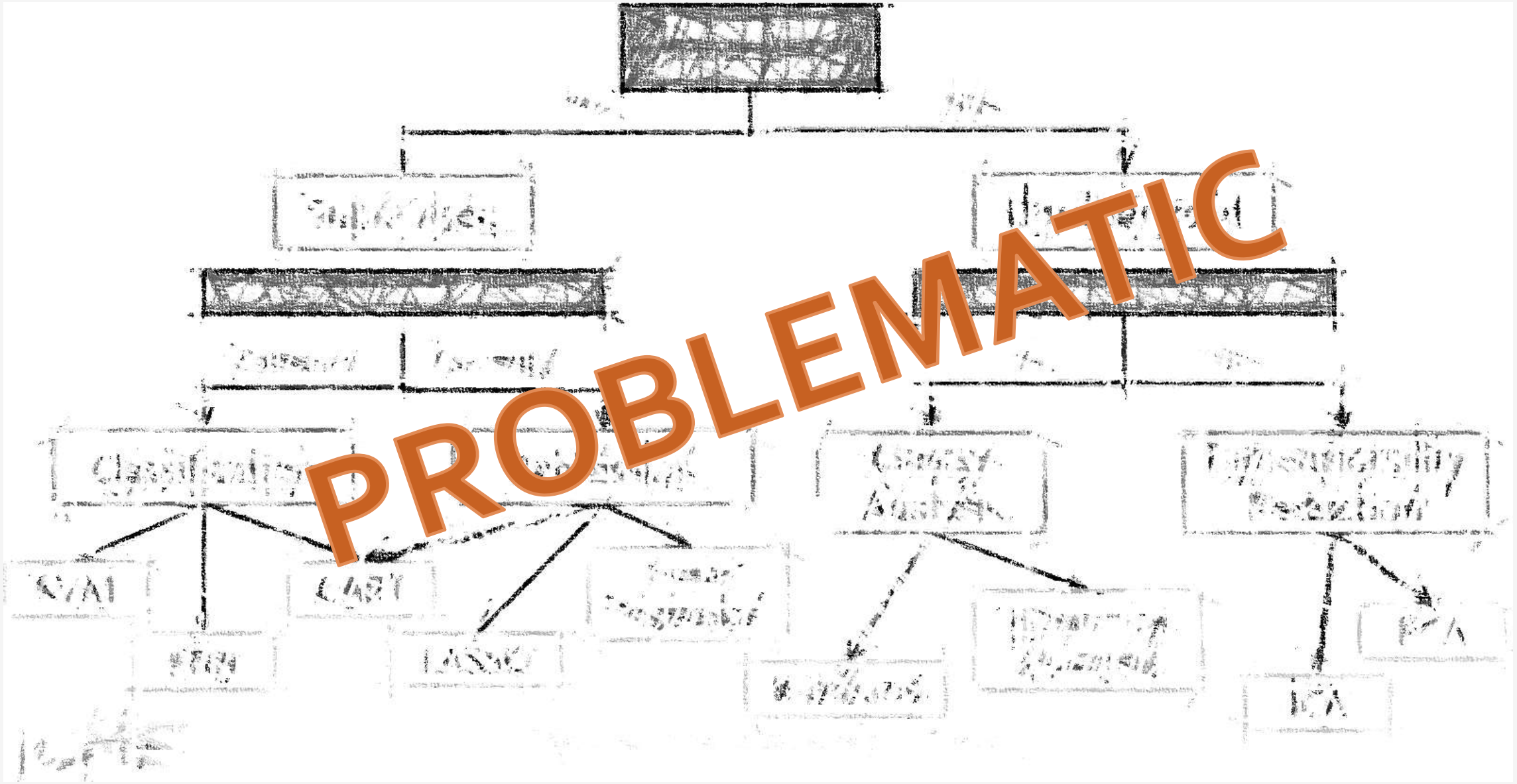
What is the likelihood of a default from this new potential customer?

35	Yes	No	Poor	College	?


Age?
20's
30's
40's
Job?
House?
Credit?
Yes
Yes
No
Poor
Good
House?
Education?
House?
No
Yes
No
No
Yes
Yes
No
Credit?
Good
Loan
Loan
Yes
Education?
Poor
No
No Loan



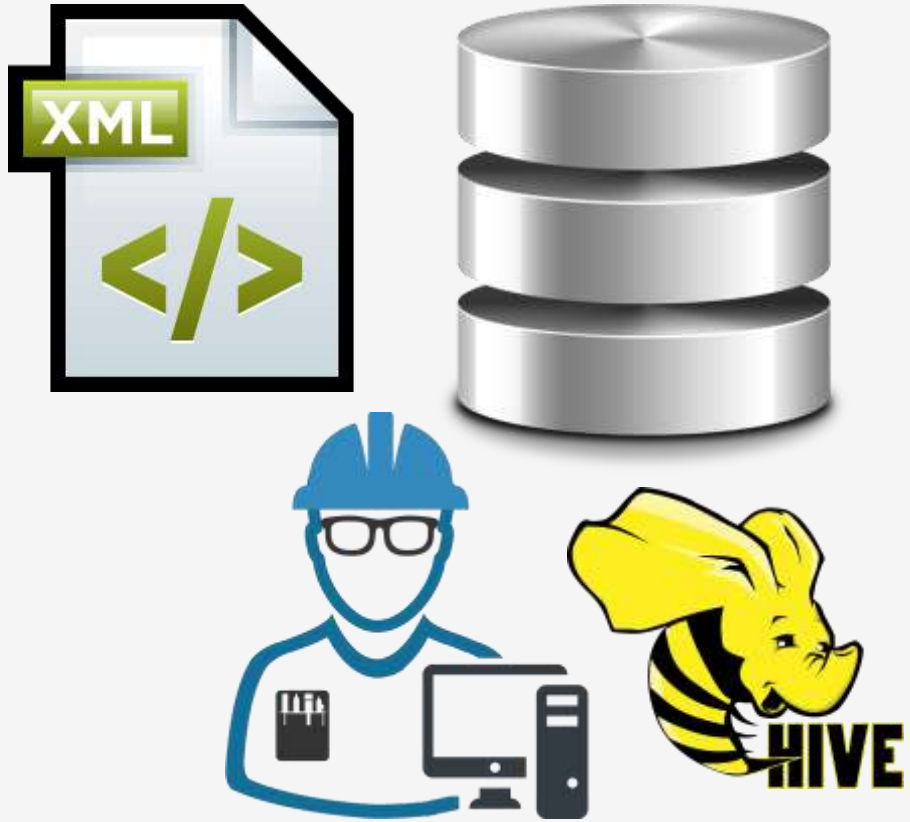
35	Yes	No	Poor	College	LOAN


PROBLEMATIC

Age	Has_Job	Owns_House	Credit_Rating	Education	Defaulted?
22	Yes	No	Good	Graduate	No
47.999999	NULL	fluffy bunny	BAD	High School	No
35	Yes	No	Poor	N/A	Yes
21	nope	No	GOOD	lolololololol	Yes
50	NULL	Yes	Good	Graduate	No
"42"	Yes	No	Poor	Graduate	Maybe
…	…	…	…	…	…
…	…	…	…	…	…

Data usually looks more like this.

Age	Has_Job	Education	Defaulted?
22	Yes	Graduate	No
47.999999	NULL	High School	No
35	Yes	N/A	Yes
21	nope	lolololololol	Yes
50	NULL	Graduate	No
“42”	Yes	Graduate	Maybe
…	…	…	…
…	…	…	…



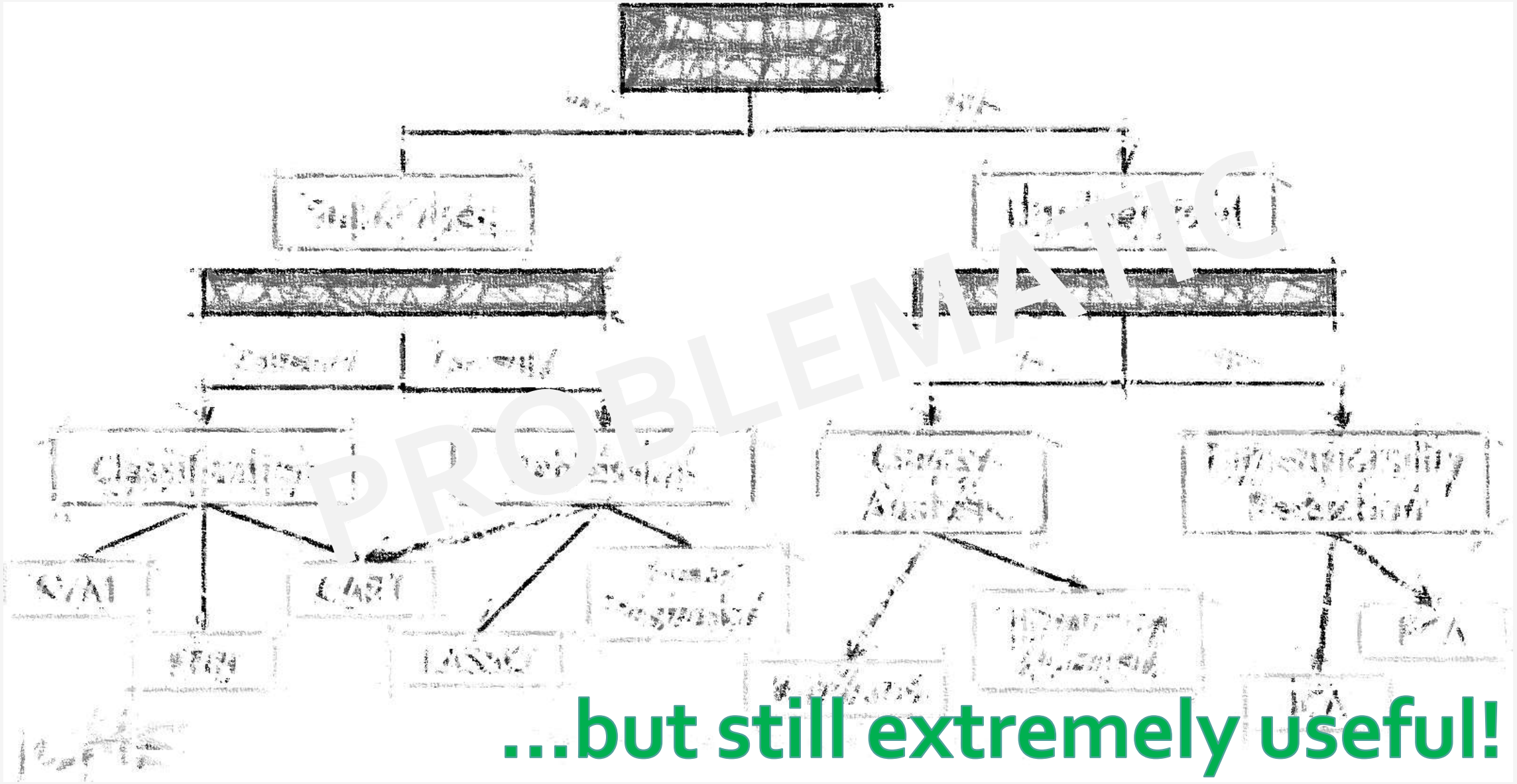
…and comes in a variety of sources.

Age	Has_Job	Account_$	Owns_House	Credit_Rating	Education	Defaulted?
22	Yes	$5000	No	Good	Graduate	No
47	Yes	$210	Yes	Poor	High School	No
35	Yes	-$129	No	Poor	High School	Yes
21	No	-$1900	No	Good	College	Yes
50	Yes	$920	Yes	Good	Graduate	No
42	Yes	$1232	No	Poor	Graduate	No
…	…		…	…	…	…
…	…		…	…	…	…

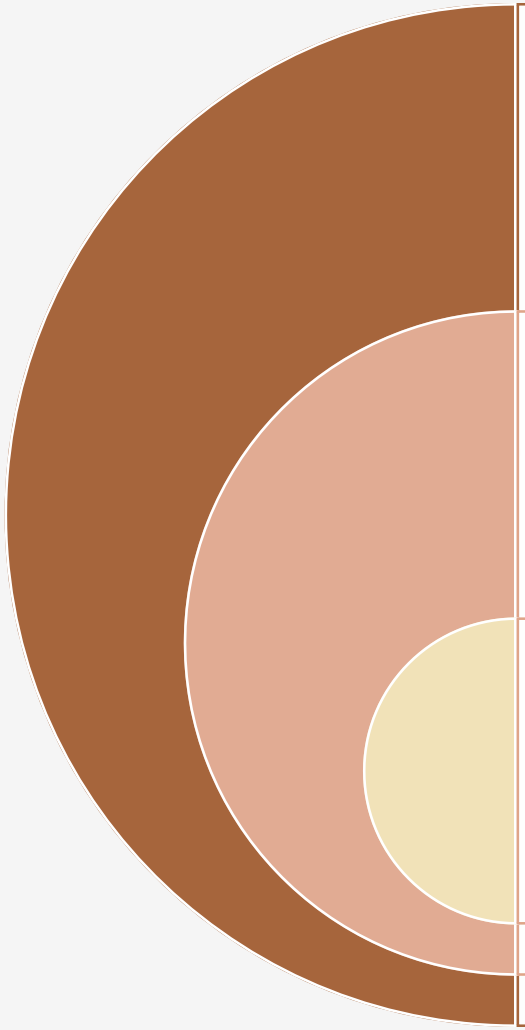
And what about other features, or combinations of features?

Traditional machine learning can be extremely effective, and requires less hardware than deep learning…

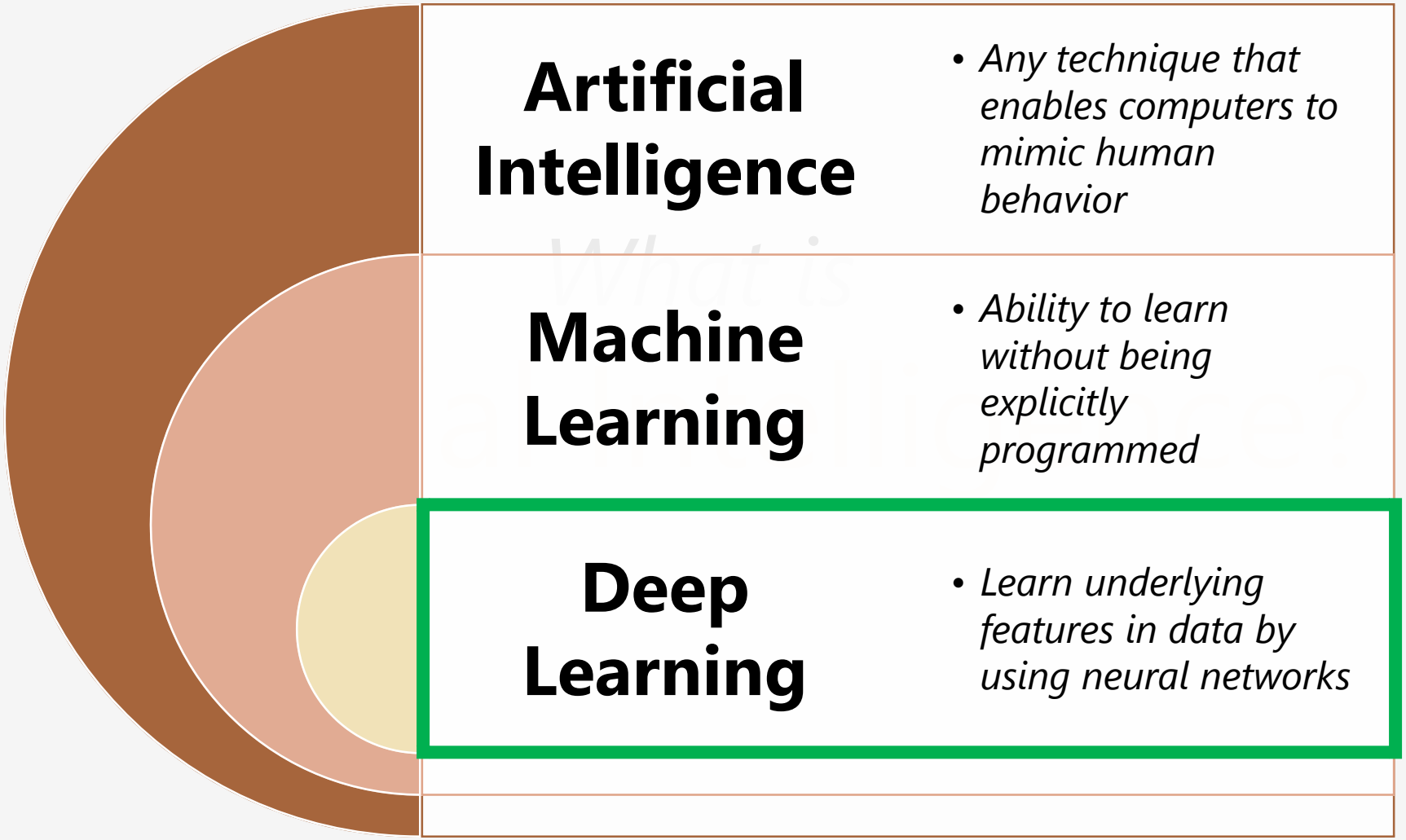
…but a lot of additional work up front, and behind the scenes. It's useful for well-defined, specific tasks where data is alphanumeric.



...but still extremely useful!



Artificial Intelligence	• *Any technique that enables computers to mimic human behavior*
Machine Learning	• *Ability to learn without being explicitly programmed*
Deep Learning	• *Learn underlying features in data by using neural networks*


Artificial Intelligence
• Any technique that enables computers to mimic human behavior
Machine Learning
• Ability to learn without being explicitly programmed
Deep Learning
• Learn underlying features in data by using neural networks

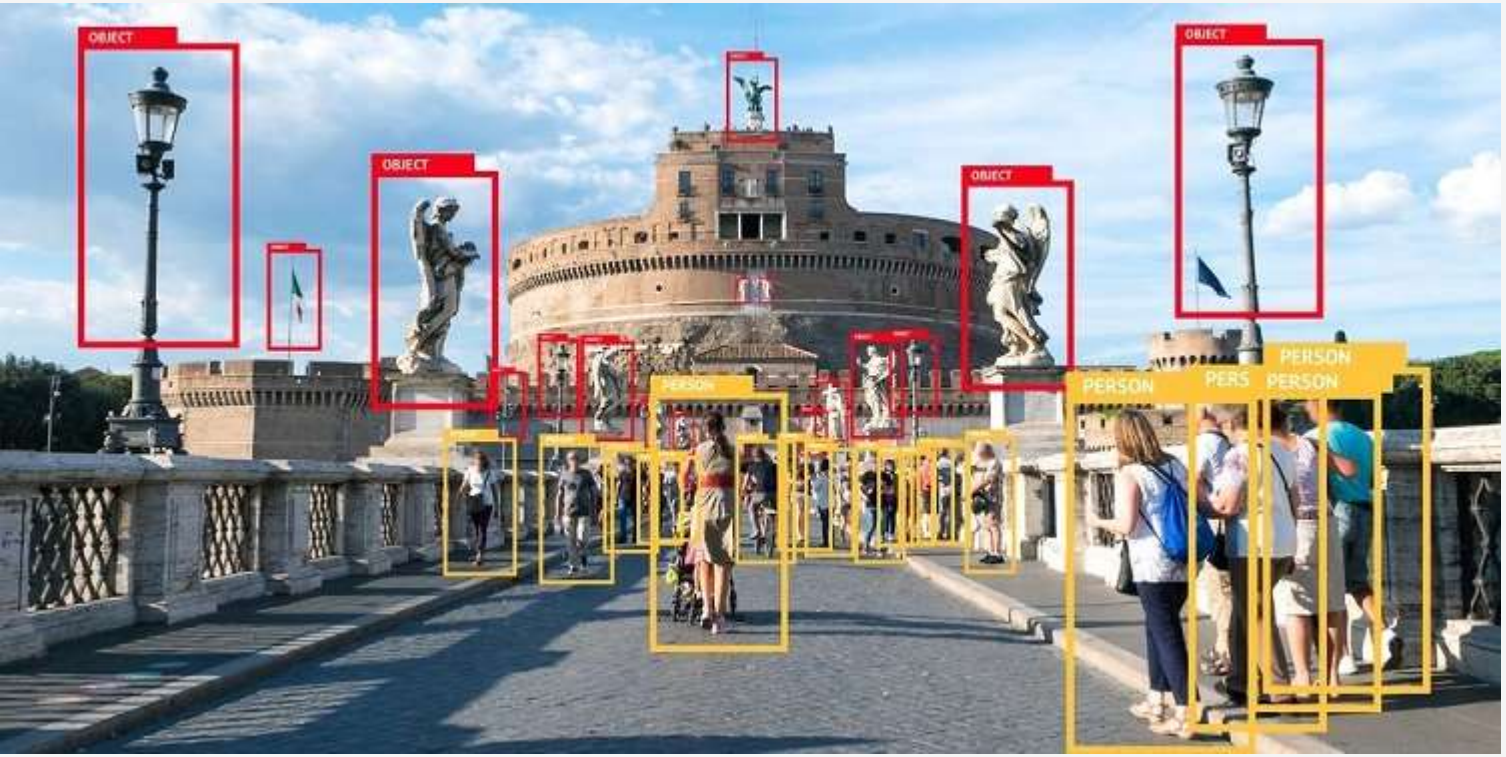
Microsoft

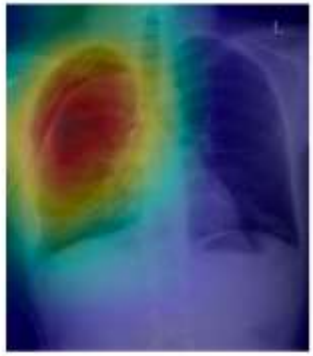
How is

Artificial Intelligence

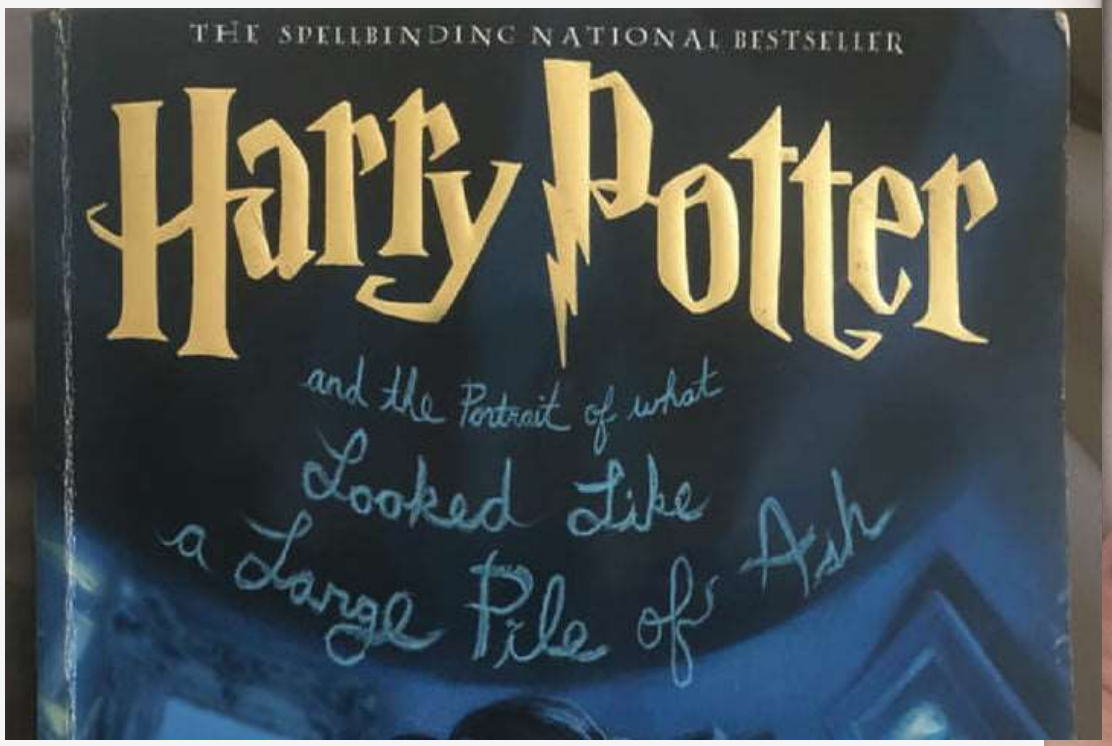
used?

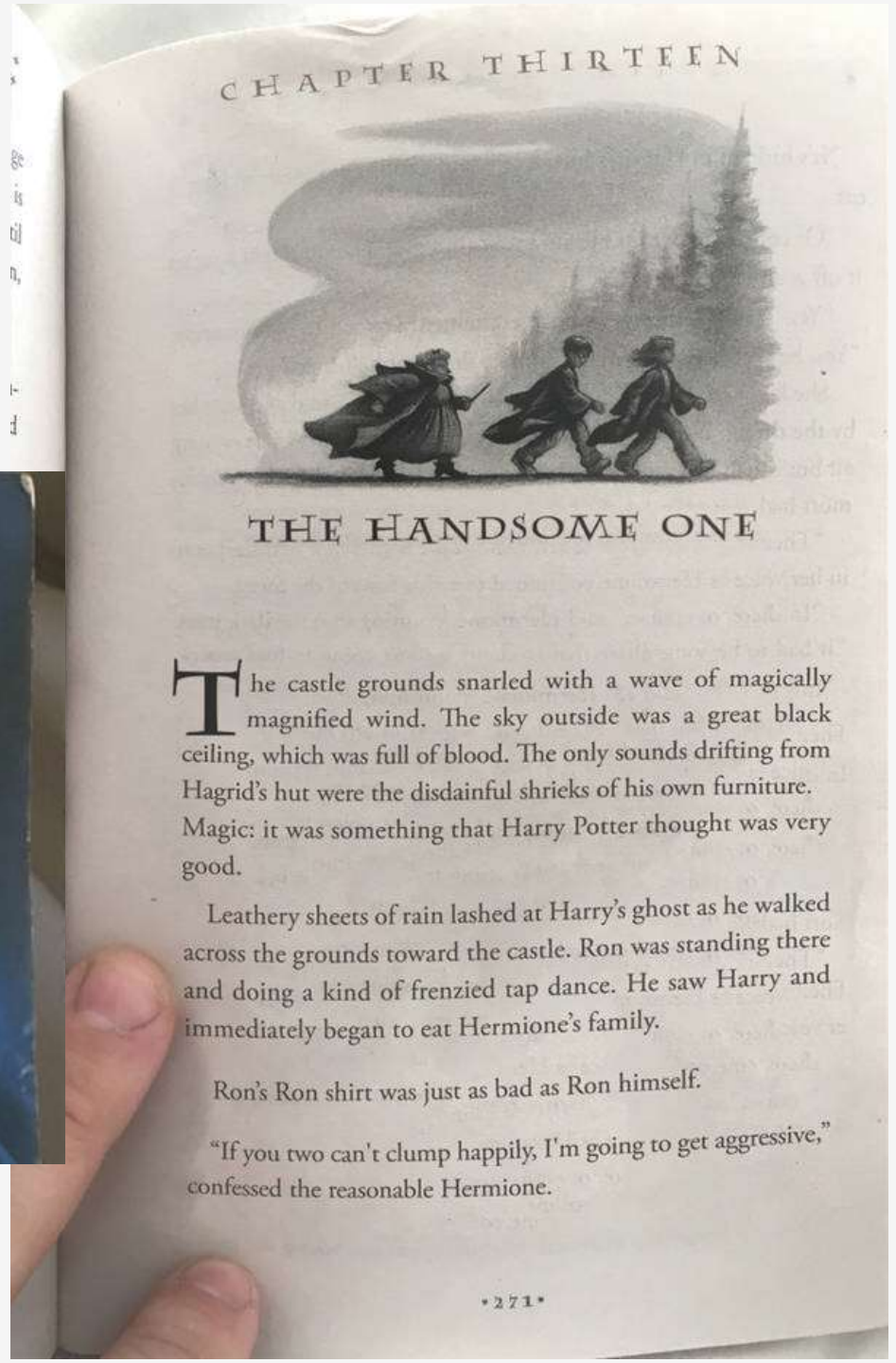
Images





Text





CHAPTER THIRTEEN

THE HANDSOME ONE

The castle grounds snarled with a wave of magically magnified wind. The sky outside was a great black ceiling, which was full of blood. The only sounds drifting from Hagrid's hut were the disdainful shrieks of his own furniture. Magic: it was something that Harry Potter thought was very good.

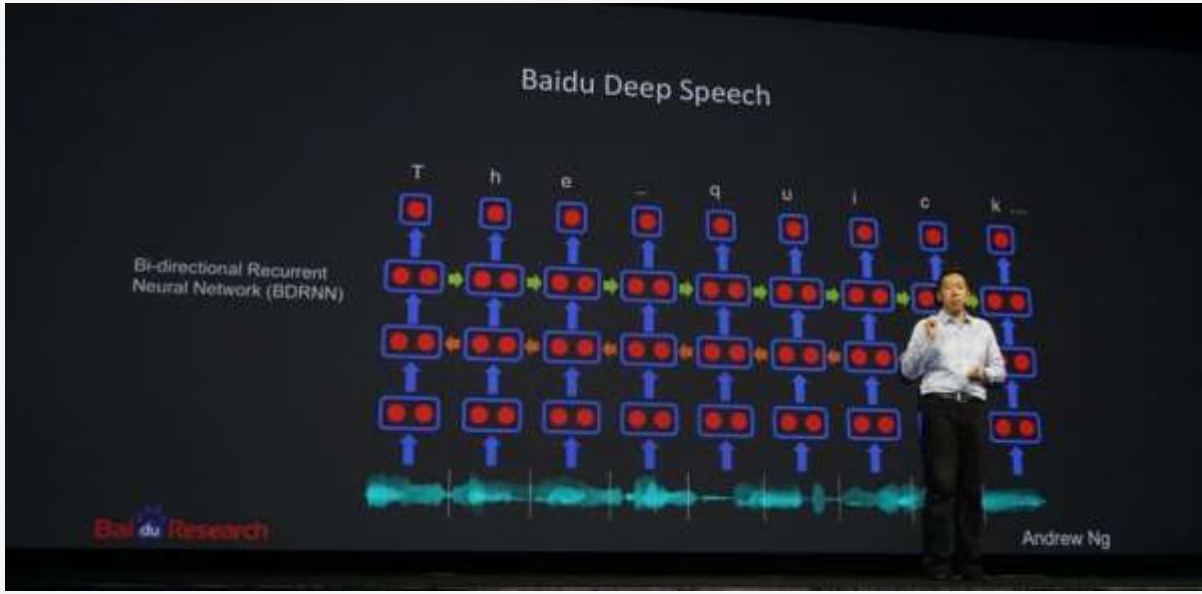
Leathery sheets of rain lashed at Harry's ghost as he walked across the grounds toward the castle. Ron was standing there and doing a kind of frenzied tap dance. He saw Harry and immediately began to eat Hermione's family.

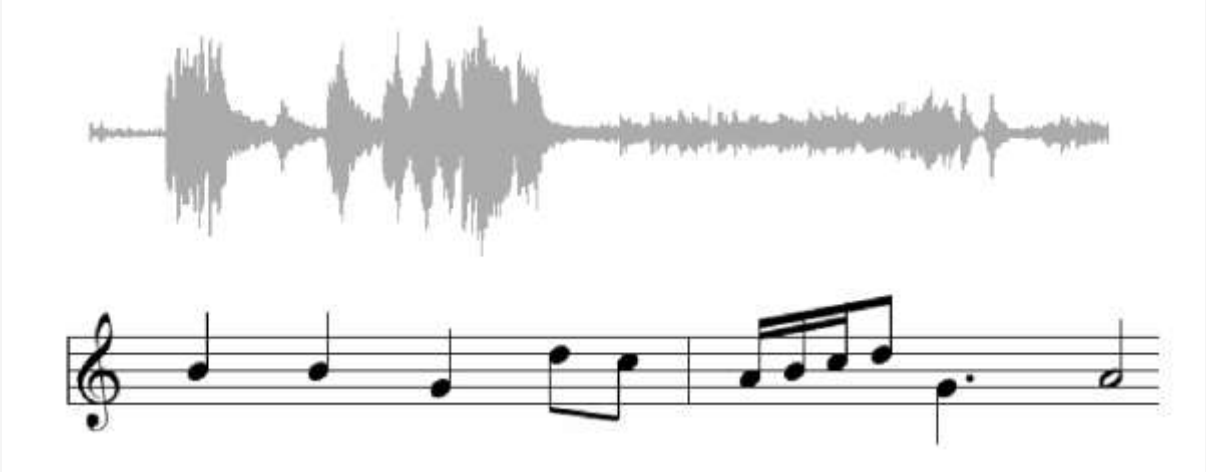
Ron's Ron shirt was just as bad as Ron himself.

"If you two can't clump happily, I'm going to get aggressive," confessed the reasonable Hermione.

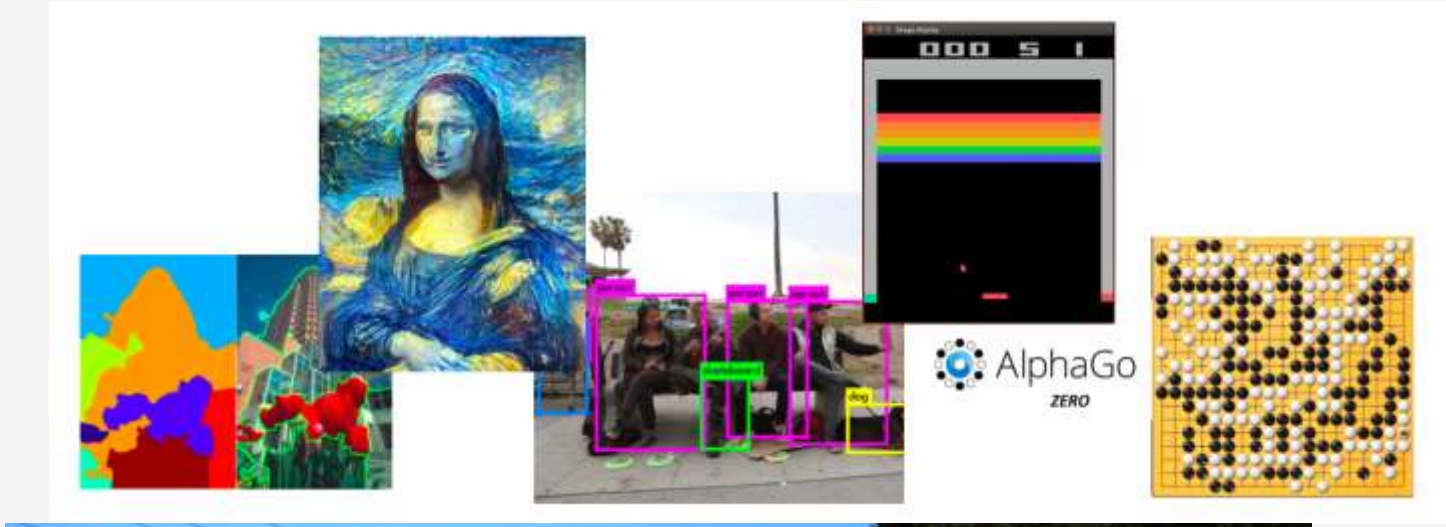
•271•

Sound


Baidu Deep Speech
Bi-directional Recurrent Neural Network (BDRNN)
T h e _ q u i c k _
Baidu Research
Andrew Ng



...and a whole heck of a lot more.



Why has **deep learning** *become so popular recently?*

Deep Learning can now be more accurate than humans.

- *Classifying images.*
- *Language translation.*
- *Voice and sound.*

Specialized hardware allows us to train large amounts of data in less time.

FPGAs

GPUs

ASICSs (Tensor Processing Units – TPUs)

We have lots and lots of data.

A ton of it!

And having access to large quantities of classified data is vital to the success of a deep learning project.

TensorFlow™

Microsoft

How can I get started with

Artificial Intelligence?

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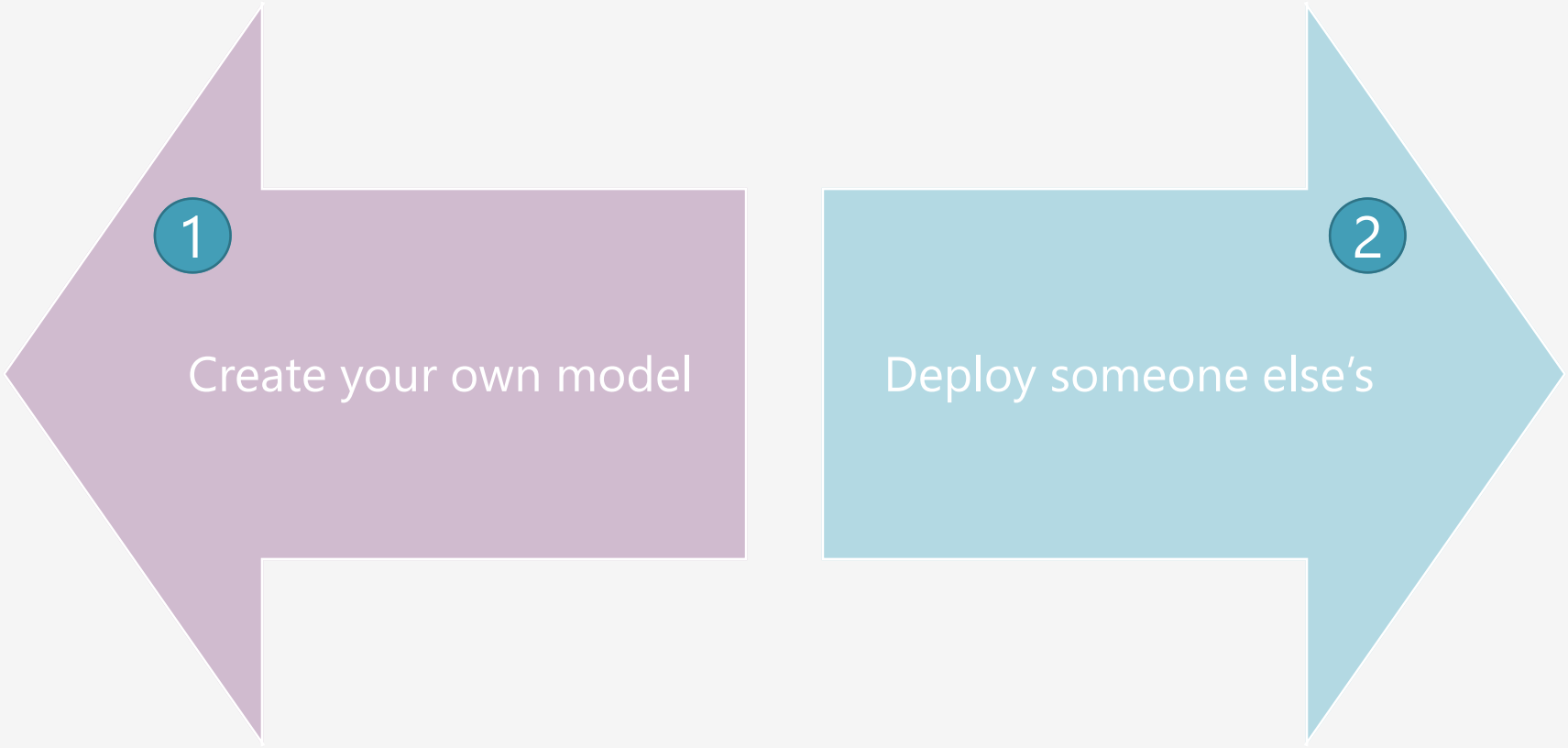
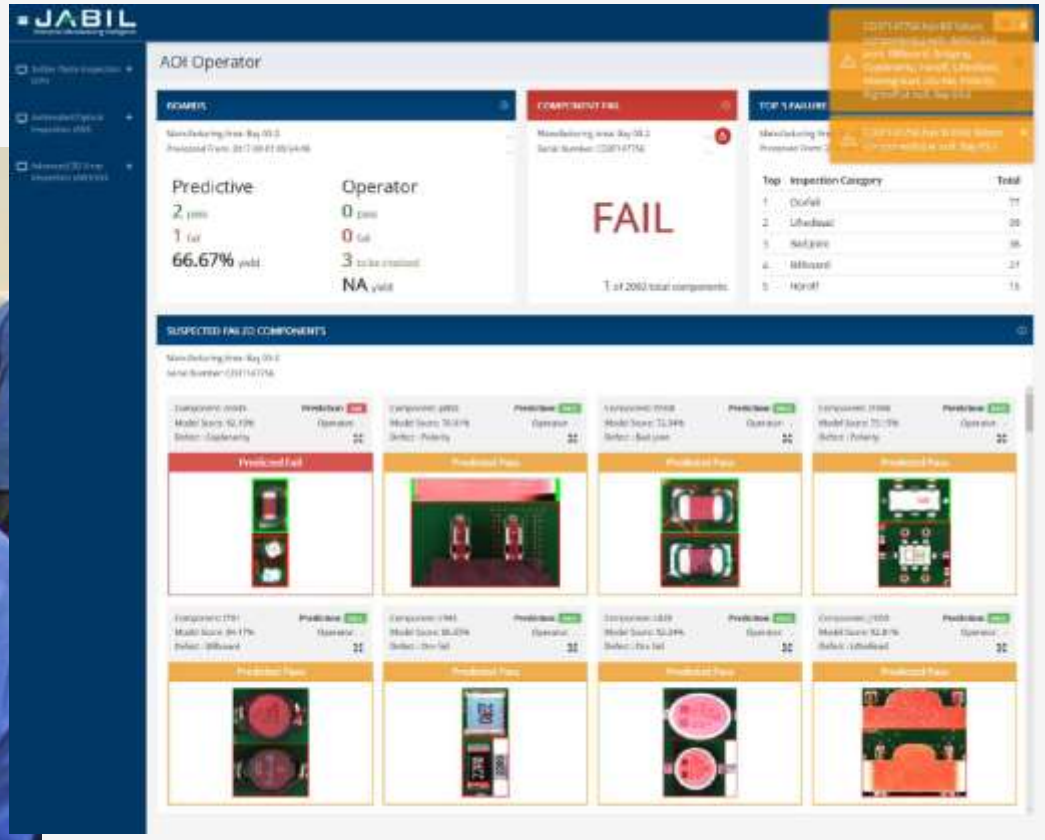


Microsoft

Creating Your Own Model

JABIL


JABIL
AOI Operator
Predictive
2
1
66.67%
Operator
0
0
3
NA
FAIL
1 of 2002 total components
Top
Inspection Category
Total
SUSPECTED FAILED COMPONENTS

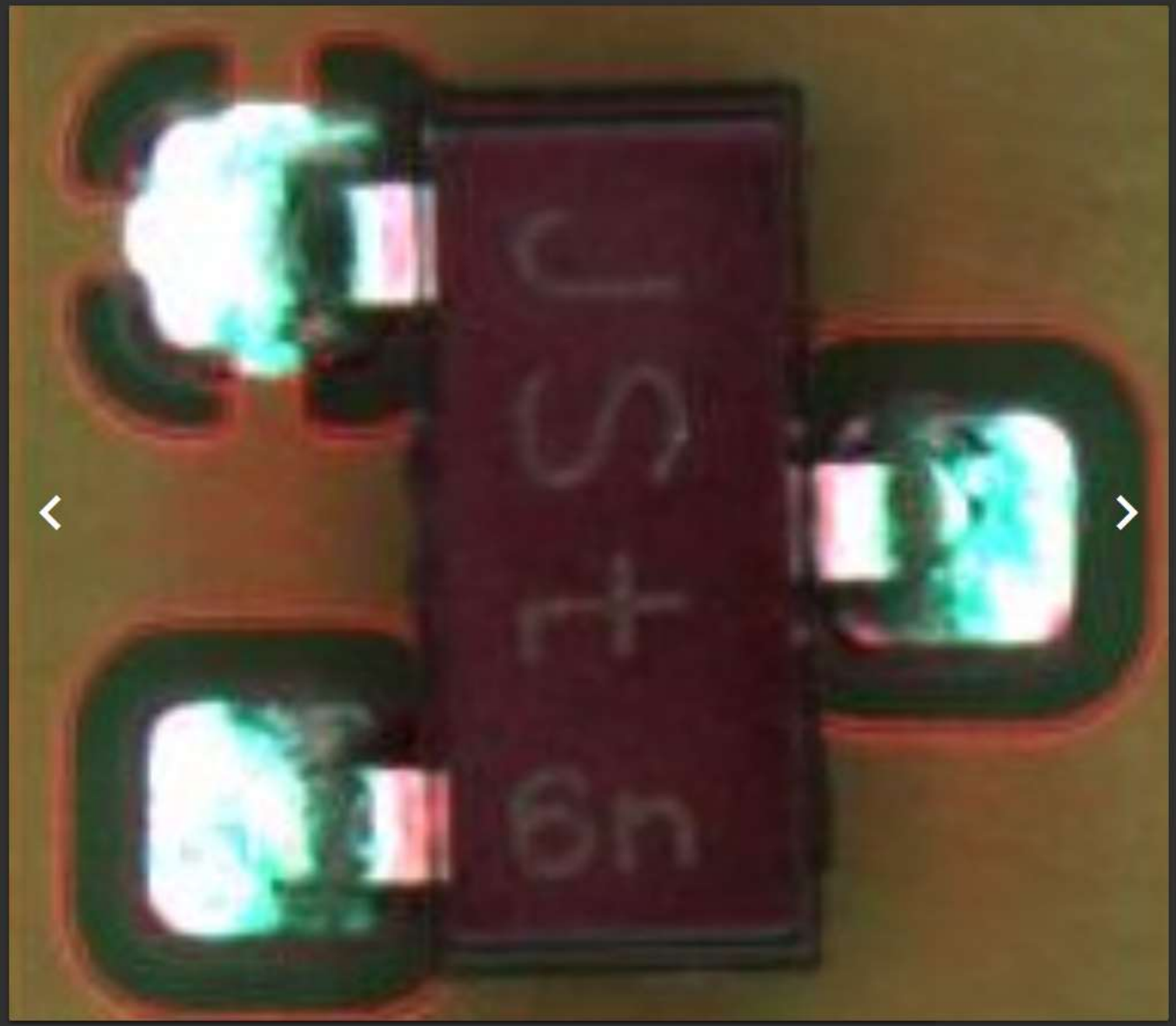
RKZ123610-1-2017-02-22

RKZ323220-1-2017-02-22

RYN901641-2-2017-04-01

RKZ123210-1-2017-05-10

Optical Image Analysis



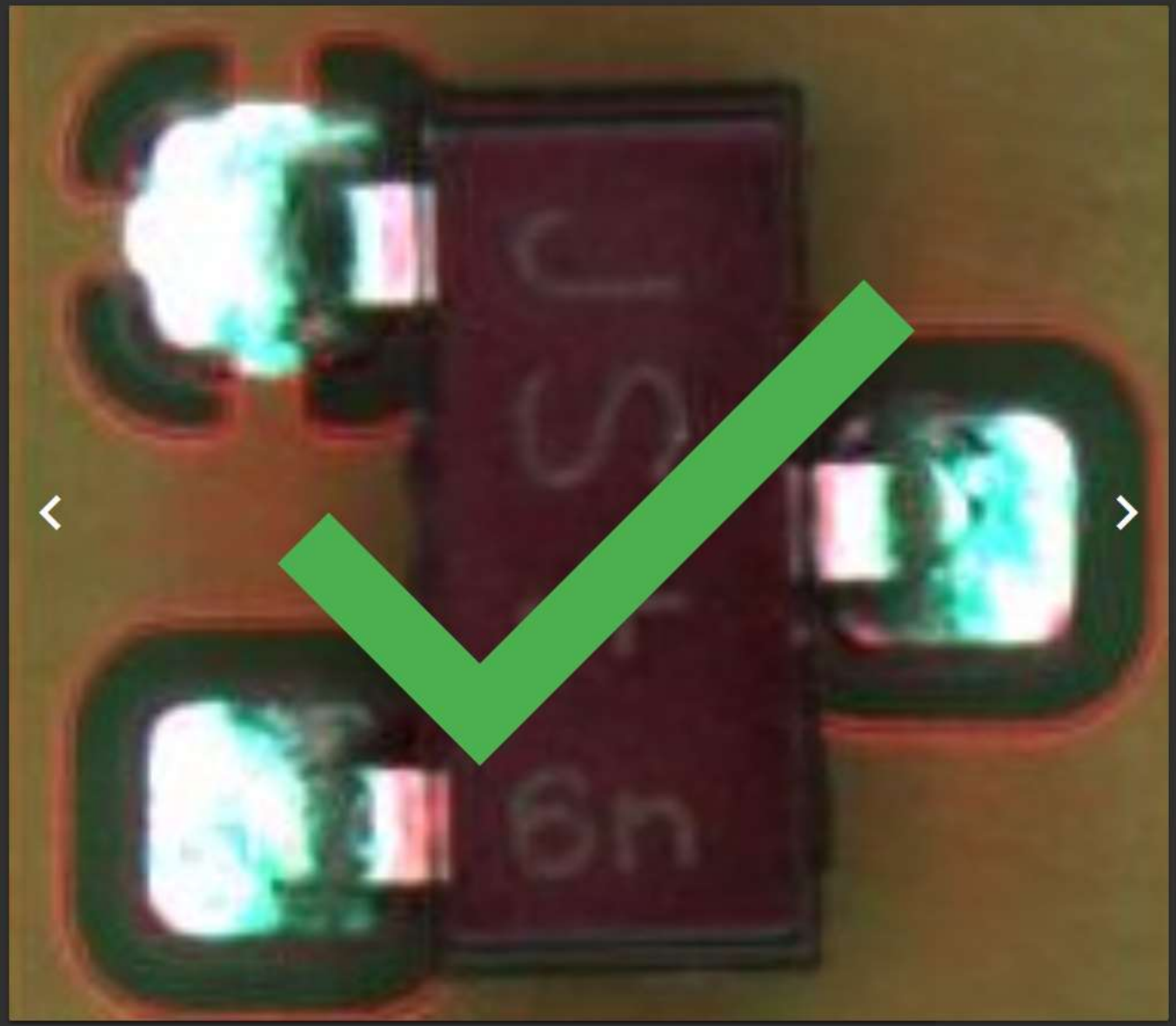
RKZ123610-1-2017-02-22

RKZ323220-1-2017-02-22

RYN901641-2-2017-04-01

RKZ123210-1-2017-05-10

Optical Image Analysis



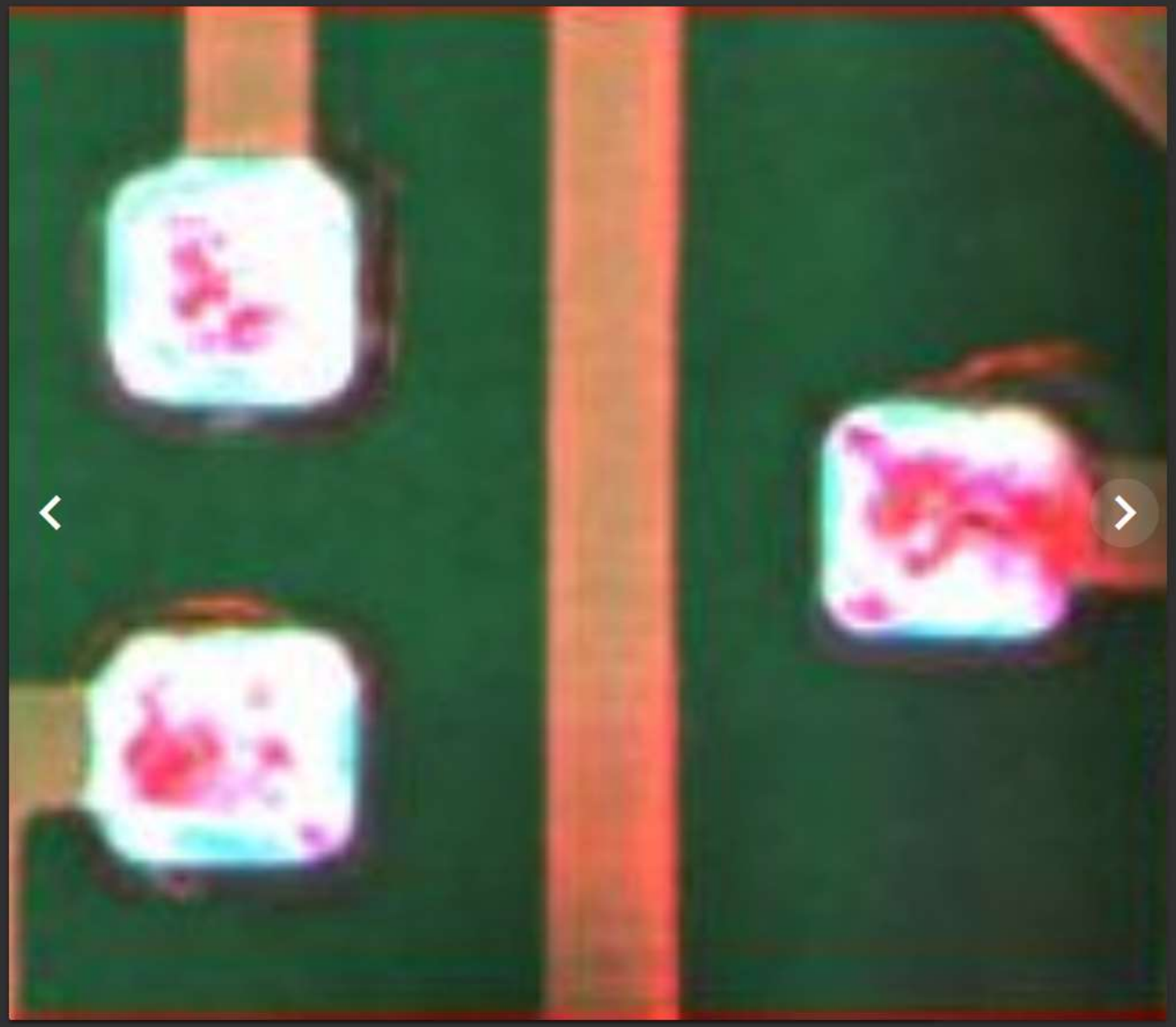
RKZ123610-1-2017-02-22

RKZ323220-1-2017-02-22

RYN901641-2-2017-04-01

RKZ123210-1-2017-05-10

Optical Image Analysis



RKZ123610-1-2017-02-22

RKZ323220-1-2017-02-22

RYN901641-2-2017-04-01

RKZ123210-1-2017-05-10

Optical Image Analysis

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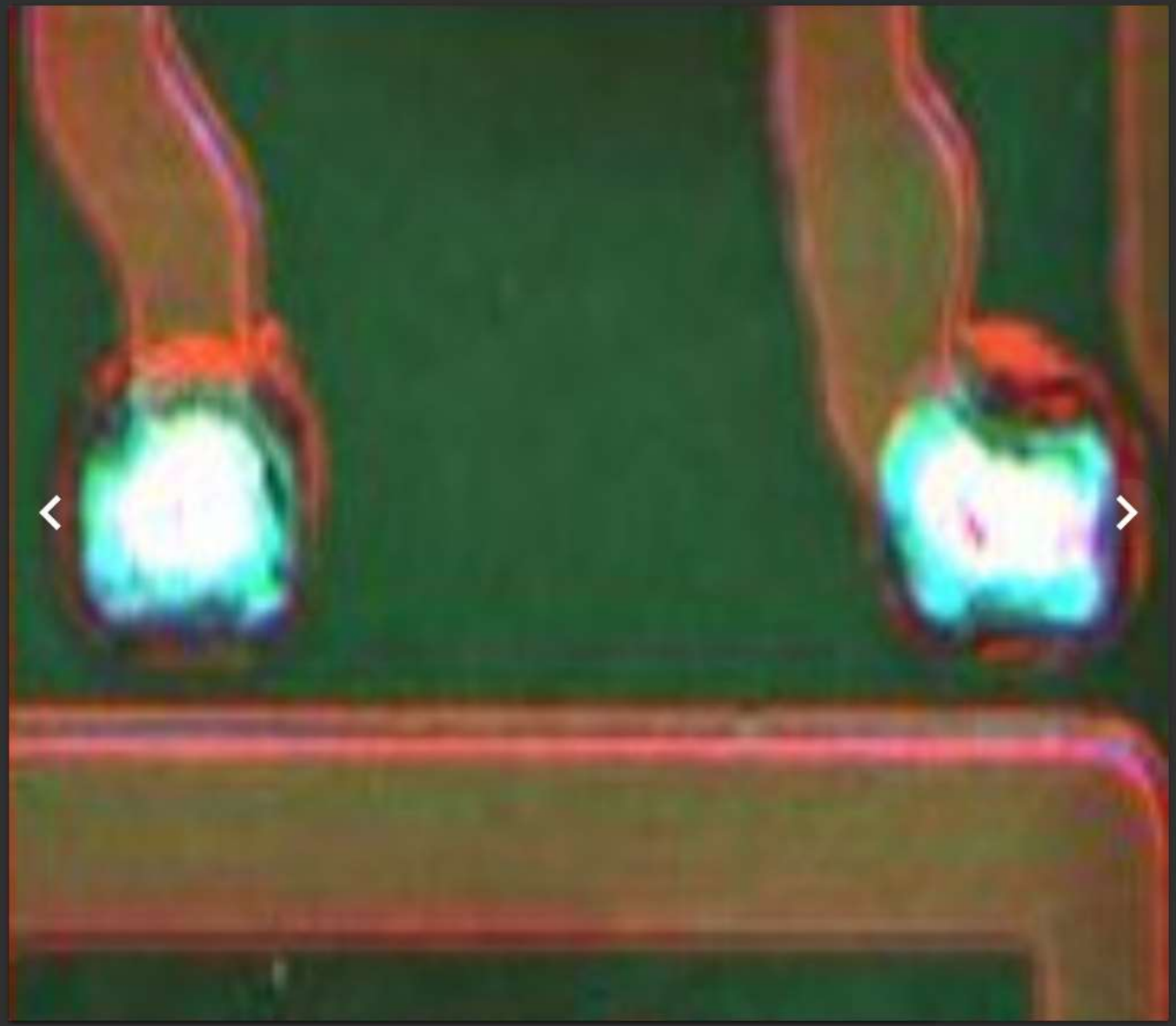
Optical Image Analysis



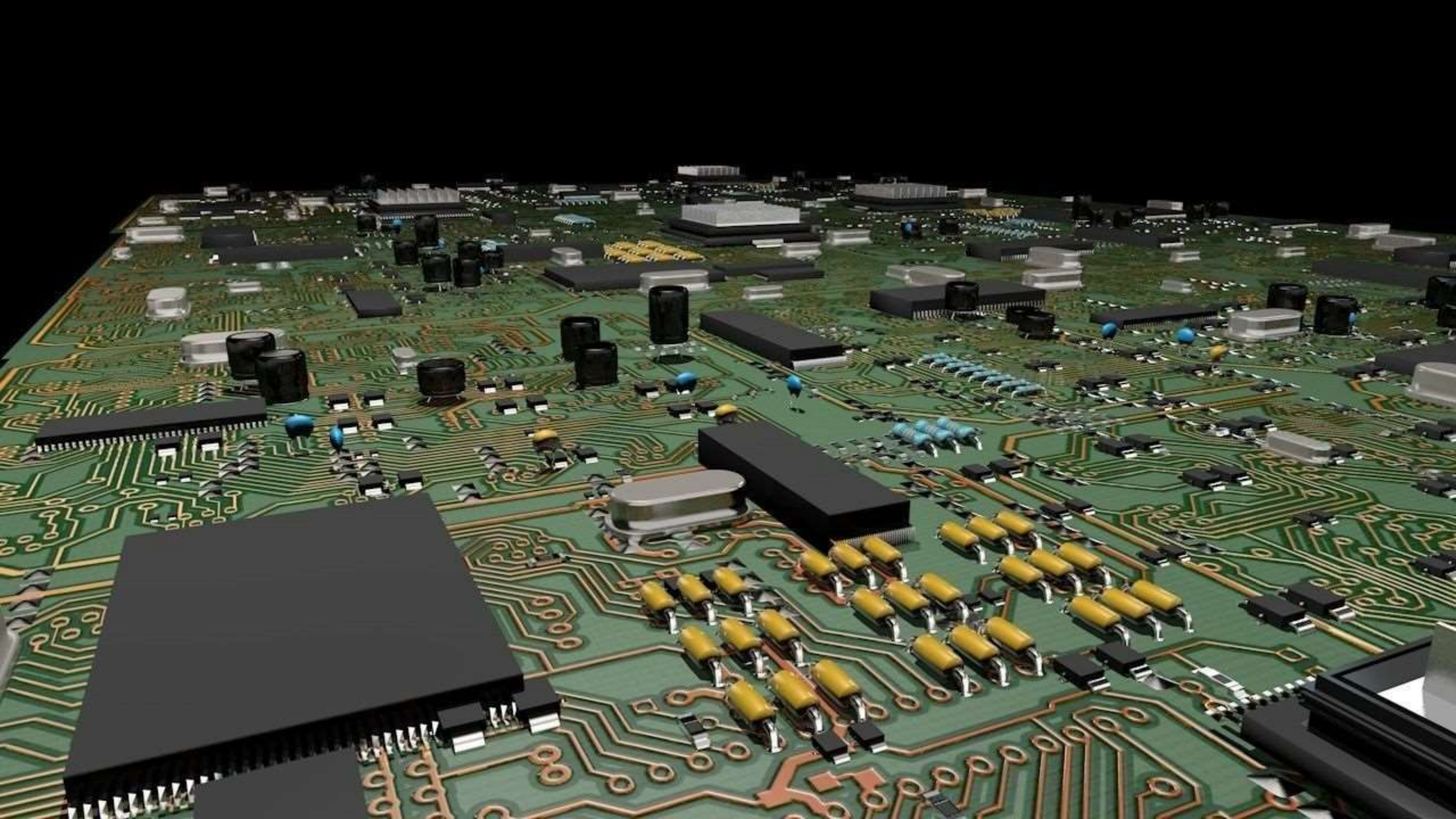
RKZ123610-1-2017-02-22

RKZ323220-1-2017-02-22

RYN901641-2-2017-04-01

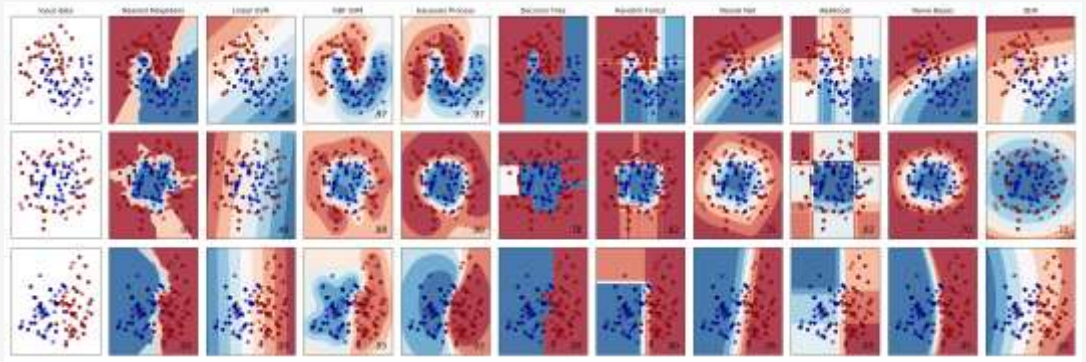
RKZ123210-1-2017-05-10

Optical Image Analysis



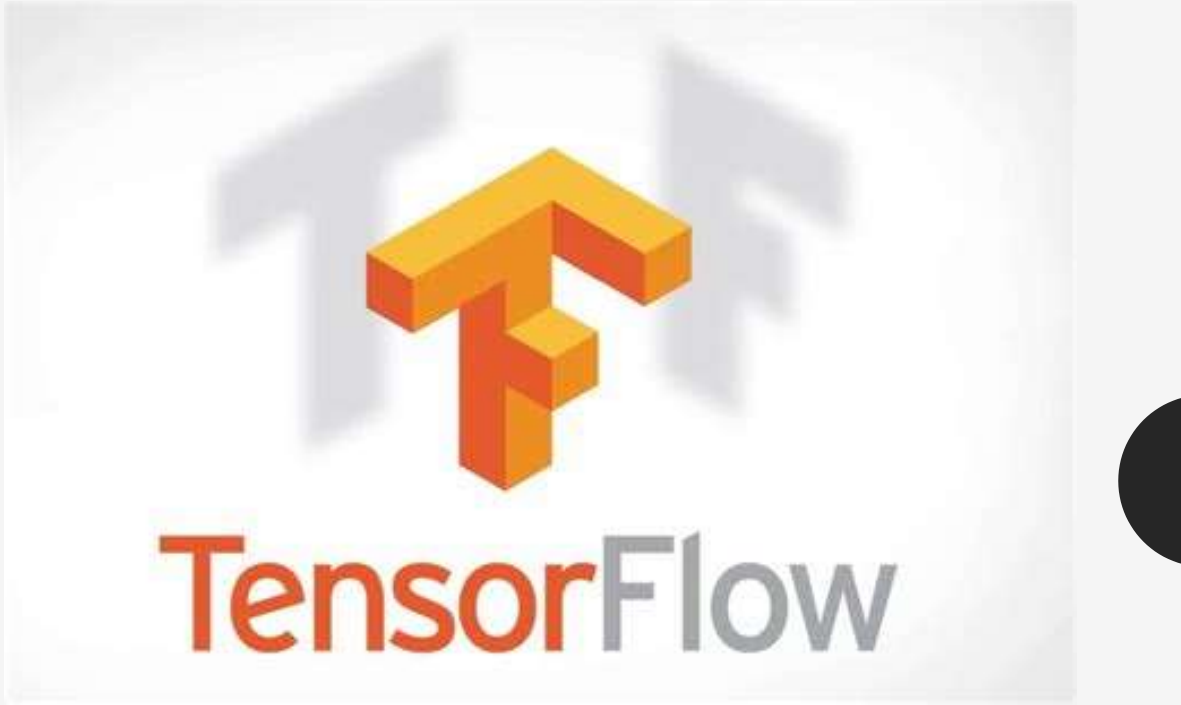
Popular **machine learning** packages

- scikit-learn (Python)
- caret (R)



Popular **deep learning** frameworks

- TensorFlow
- MXNet
- Cognitive Toolkit (CNTK)
- PyTorch



Microsoft

Creating Your Own Model

…takes time, data, experience, hardware.

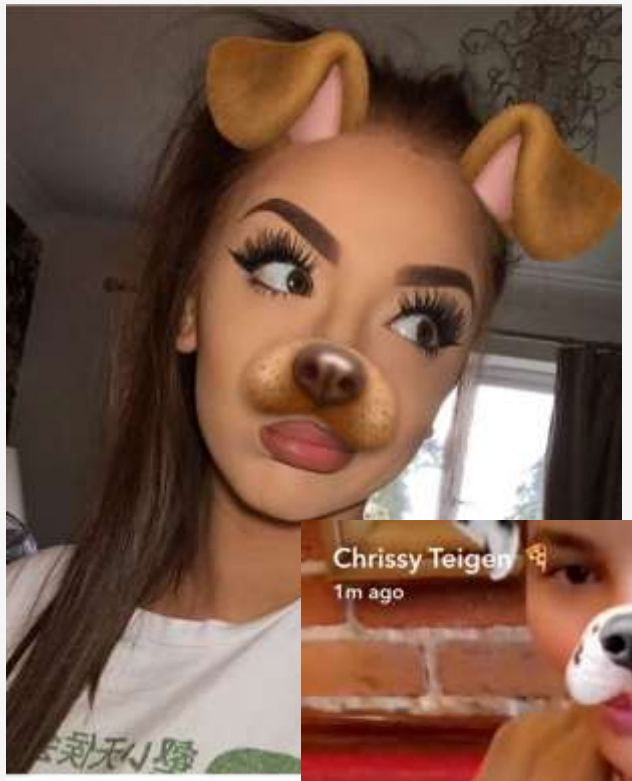
Microsoft

Deploying Someone Else's

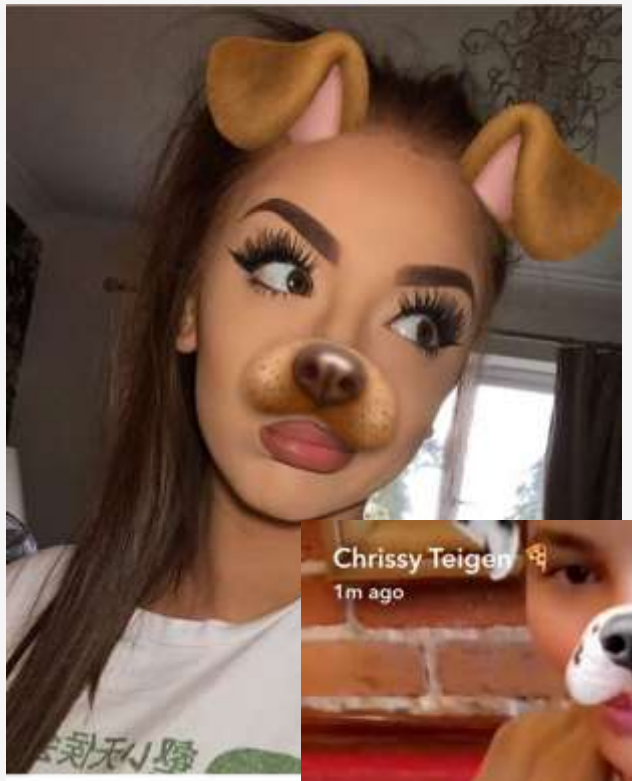
Why, you stuck-up, half-witted, scruffy-looking nerf herder!

Why, you stuck-up, half-witted, scruffy-looking nerf herder!

Why, you stuck-up, half-witted, scruffy-looking nerf herder!



Chrissy Teigen
1m ago

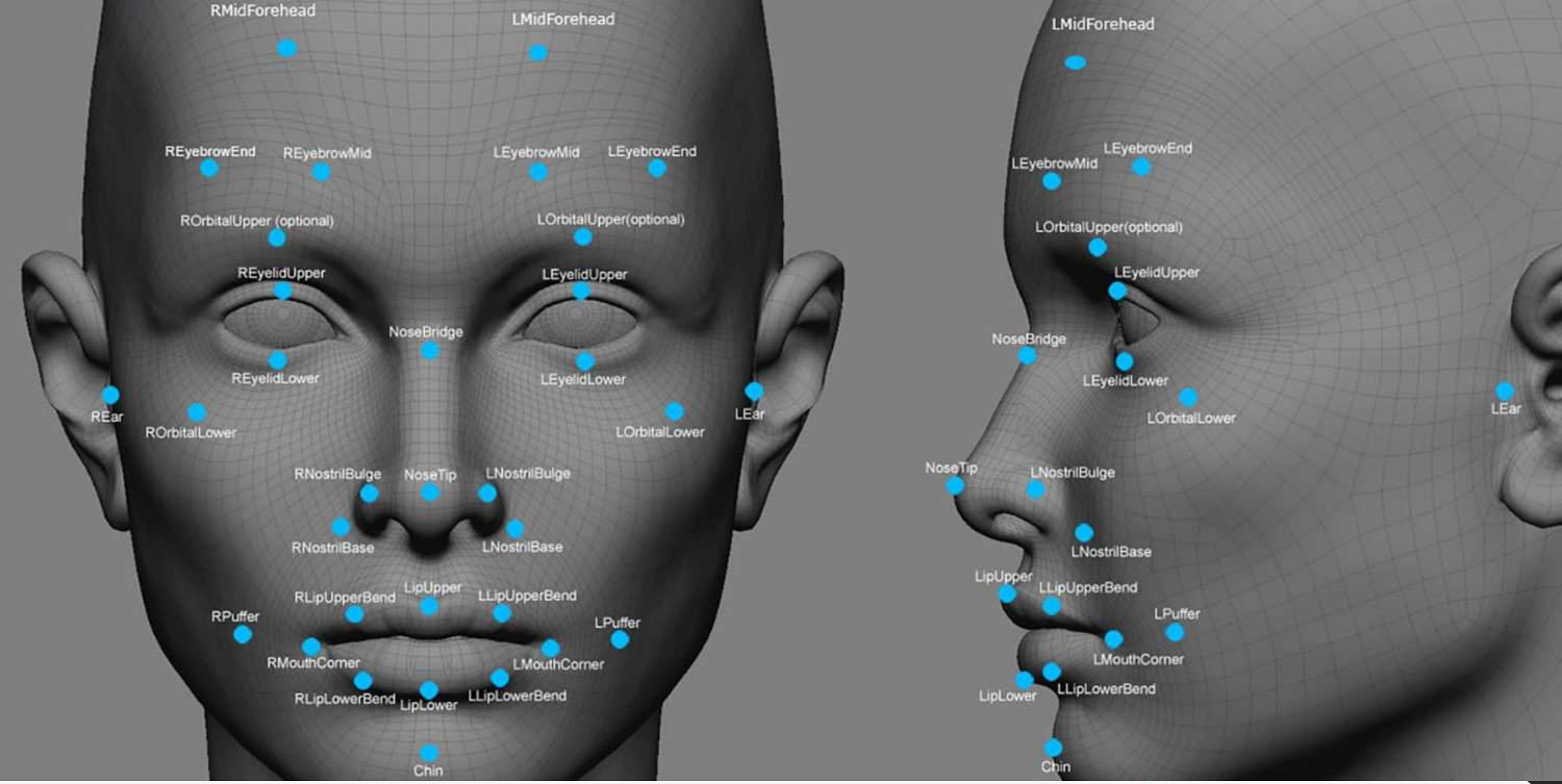


Chrissy Teigen
1m ago

Expecto patronum

MakeAGIF.com

MakeAGIF.com


RMidForehead
LMidForehead
REyebrowEnd
REyebrowMid
LEyebrowMid
LEyebrowEnd
ROrbitalUpper (optional)
LOrbitalUpper(optional)
REyelidUpper
LEyelidUpper
NoseBridge
REyelidLower
LEyelidLower
REar
ROrbitalLower
LOrbitalLower
LEar
RNostrilBulge
NoseTip
LNostrilBulge
RNostrilBase
LNostrilBase
RLipUpperBend
LipUpper
LLipUpperBend
RPuffer
LPuffer
RMouthCorner
LMouthCorner
RLipLowerBend
LipLower
LLipLowerBend
Chin
LMidForehead
LEyebrowEnd
LEyebrowMid
LOrbitalUpper(optional)
LEyelidUpper
NoseBridge
LEyelidLower
LOrbitalLower
LEar
NoseTip
LNostrilBulge
LNostrilBase
LipUpper
LLipUpperBend
LPuffer
LMouthCorner
LipLower
LLipLowerBend
Chin

Suz 🐢 vim witch ❄
@noopkat
Following

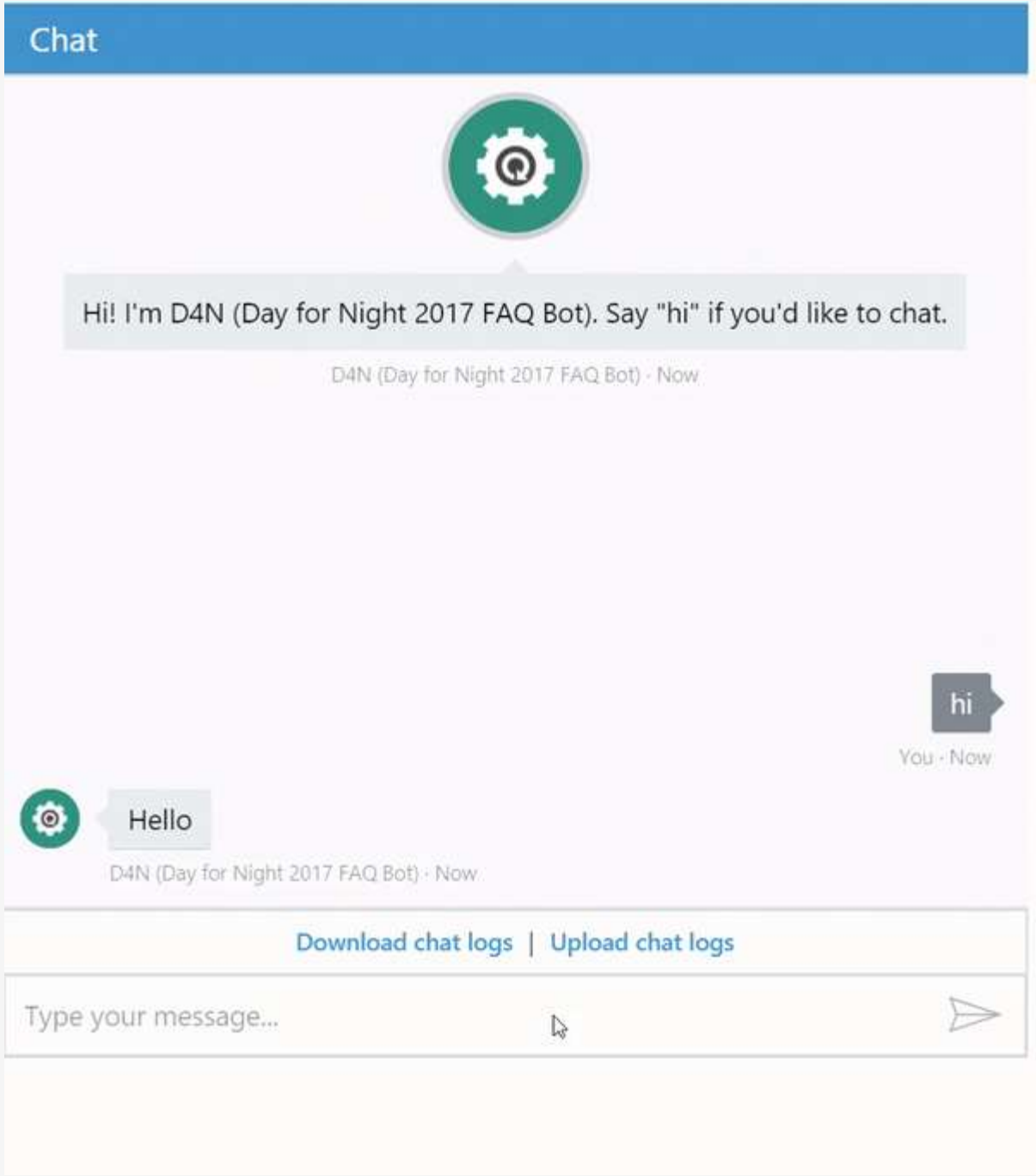
Using some silly code I wrote to stress test the face api + hotel wifi. Surprisingly responsive!

Asim Hussain
@jawache
Following

Just released my first web component! smiletounlock.com built using @stenciljs. Want to give away free content on your site? How about asking for a smile in return 😄

{ } Language Understanding Intelligent Service PREVIEW

Teach your apps to understand commands from your users



```python
import http.client, urllib.request, urllib.parse, urllib.error, base64, json

# Replace the subscription_key string value with your valid subscription key.
subscription_key = secret

# Replace to match your region.

uri_base = 'westcentralus.api.cognitive.microsoft.com'

headers = {
    # Request headers.
    'Content-Type': 'application/json',
    'Ocp-Apim-Subscription-Key': subscription_key,
}

params = urllib.parse.urlencode({
    # Request parameters. All of them are optional.
    'visualFeatures': 'Categories,Description,Color',
    'language': 'en',
})

body = "{'url':'http://paigevie.ws/zurich_rolls.JPG'}"

try:
    # Execute the REST API call and get the response.
    conn = http.client.HTTPSConnection('westcentralus.api.cognitive.microsoft.com')
    conn.request("POST", "/vision/v1.0/analyze?%s" % params, body, headers)
    response = conn.getresponse()
    data = response.read()

    # 'data' contains the JSON data. The following formats the JSON data for display.
    parsed = json.loads(data.decode())
    print ("Response:")
    print (json.dumps(parsed, sort_keys=True, indent=2))
    conn.close()

except Exception as e:
    print('Error:')
    print(e)
```

```python
import requests

# Get the key from tab Keys on Azure portal
key = "INSERT YOUR KEY HERE"

url4authentication = 'https://api.cognitive.microsoft.com/sts/v1.0/issueToken'
headers4authentication = {'Ocp-Apim-Subscription-Key': key}
resp4authentication = requests.post(url4authentication, headers=headers4authentication)
token = resp4authentication.text

# Call the Text Translate API
text = """

This woman needs steak, immediately.
Can you please assist?


"""
come = "en"
to = "sk"

url4translate = 'https://api.microsofttranslator.com/v2/http.svc/Translate'
params = {'appid': 'Bearer '+token, 'text': text, 'from': come, 'to': to}
headers4translate = {'Accept': 'application/xml'}
resp4translate = requests.get(url4translate, params=params, headers=headers4translate)
print(resp4translate.text)
```

Code and Examples available at:

@DynamicWebPaige

Vision | Speech | Language | Knowledge | Search | Labs

Computer Vision API

Distill actionable information from images

Content Moderator

Automated image, text, and video moderation

Video API PREVIEW

Intelligent video processing

Video Indexer PREVIEW

Unlock video insights

Face API

Detect, identify, analyze, organize, and tag faces in photos

Emotion API PREVIEW

Personalize user experiences with emotion recognition

Custom Vision Service PREVIEW

Easily customize your own state-of-the-art computer vision models for your unique use case

Vision | Speech | Language | Knowledge | Search | Labs

Translator Speech API

Easily conduct real-time speech translation with a simple REST API call

Speaker Recognition API PREVIEW

Use speech to identify and authenticate individual speakers

Bing Speech API

Convert speech to text and back again to understand user intent

Custom Speech Service PREVIEW

Overcome speech recognition barriers like speaking style, background

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Language Understanding Intelligent Service PREVIEW

Teach your apps to understand commands from your users

Text Analytics API

Easily evaluate sentiment and topics to understand what users want

Bing Spell Check API

Detect and correct spelling mistakes in your app

Translator Text API

Easily conduct machine translation with a simple REST API call

Web Language Model API PREVIEW

Use the power of predictive language models trained on web-scale data

Linguistic Analysis API PREVIEW

Simplify complex language concepts and parse text with the Linguistic Analysis API

Vision | Speech | Language | **Knowledge** | Search | Labs

Recommendations API PREVIEW

Predict and recommend items your customers want

Academic Knowledge API PREVIEW

Tap into the wealth of academic content in the Microsoft Academic Graph

Knowledge Exploration Service PREVIEW

Enable interactive search experiences over structured data via natural language inputs

QnA Maker API PREVIEW

Distill information into conversational, easy-to-navigate answers

Entity Linking Intelligence Service API PREVIEW

Power your app's data links with named entity recognition and disambiguation

Custom Decision Service PREVIEW

A cloud-based, contextual decision-making API that sharpens with experience

Vision | Speech | Language | Knowledge | **Search** | Labs

Bing Autosuggest API

Give your app intelligent autosuggest options for searches

Bing Image Search API

Search for images and get comprehensive results

Bing News Search API

Search for news and get comprehensive results

Bing Video Search API

Search for videos and get comprehensive results

Bing Web Search API

Get enhanced search details from billions of web documents

Bing Custom Search API

An easy-to-use, ad-free, commercial-grade search tool that lets you deliver the results you want

Bing Entity Search API PREVIEW

Enrich your experiences by identifying and augmenting entity information from the web

Vision | Speech | Language | Knowledge | Search | Labs

Project Prague

Gesture based controls

Project Nanjing

Isochrones calculations

Project Johannesburg

Route logistics

Project Cuzco

Event associated with Wikipedia entries

Project Abu Dhabi

Distance matrix

Project Wollongong

Location insights

Microsoft

Learning more about

Artificial Intelligence

Recommended Resources

A lot of stuff out there is very, very bad. These aren't.

- Andrew Ng's Coursera courses on *Deep Learning* and *Machine Learning*.
- Introduction to Deep Learning (MIT OCW).
- DataCamp
- Textbooks, formal coursework, and documentation.
  - Artificial Intelligence: A Modern Approach (Norvig & Russell)
  - Scikit-learn's docs are *fantastic*.

Getting your hands dirty.

- Kaggle
- Azure Notebooks examples
- TensorFlow Playground
- Attempt your own deep learning project!

@DynamicWebPaige

https://developer.microsoft.com/en-us/advocates/

Cloud Developer Advocates

We write, speak, and dream in code. Our global team is maniacal about making the world amazing for developers of all backgrounds. Connect with us, write code with us, and let's meet up and talk cloud and all things developer!

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Thank you!