Artificial Intelligence
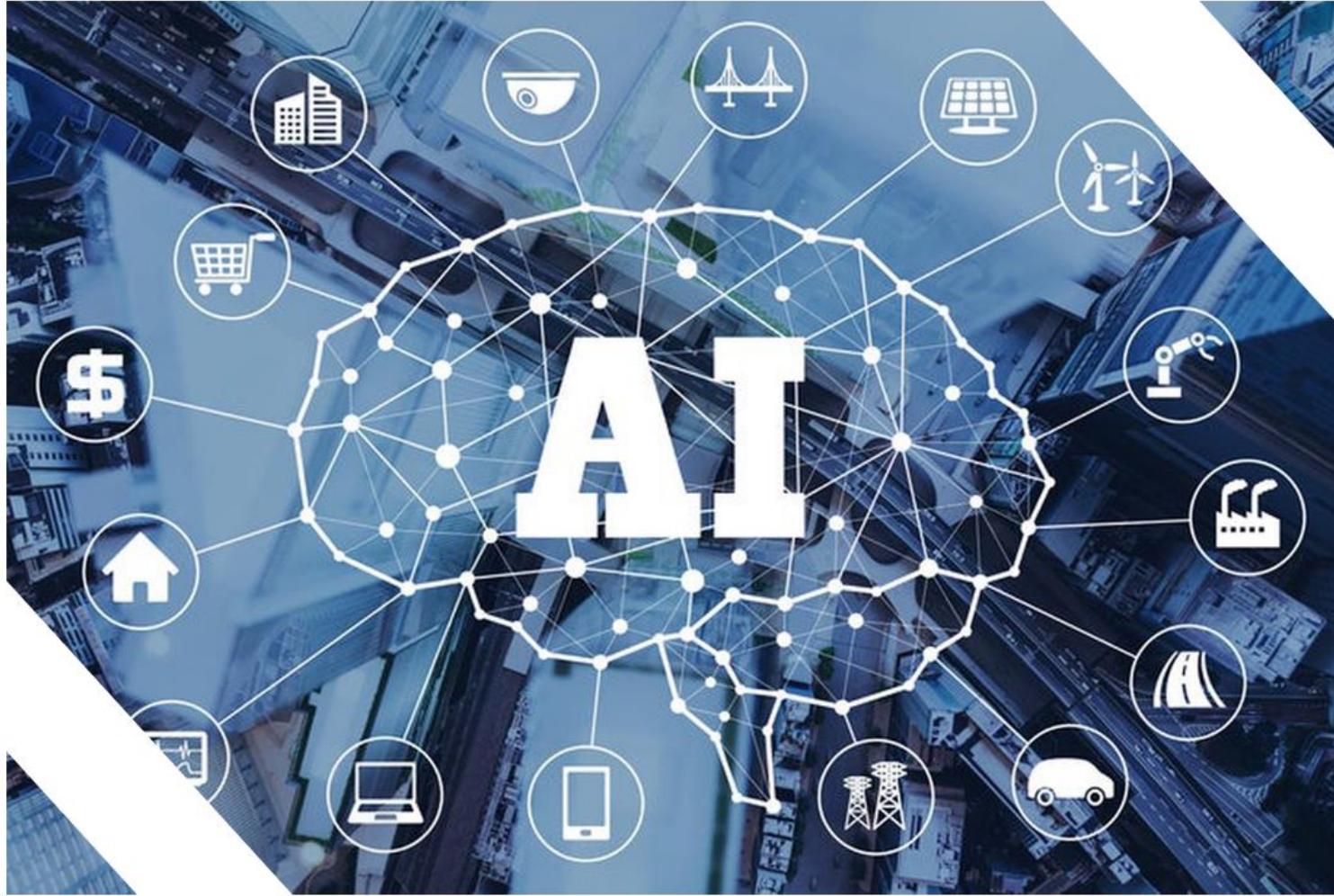
FIELDS OF FUTURE

AMIR CHARANIA

OCT 2020

Objective

Here are my goals for today's session

- To inspire you to continue to learn about Artificial Intelligence, whether you are a high school student, a college student or a professional

- To provide you with a basic understanding of how AI works, how it is being applied in every day life and provide you with resources to get started

Agenda

Here is what we will cover today
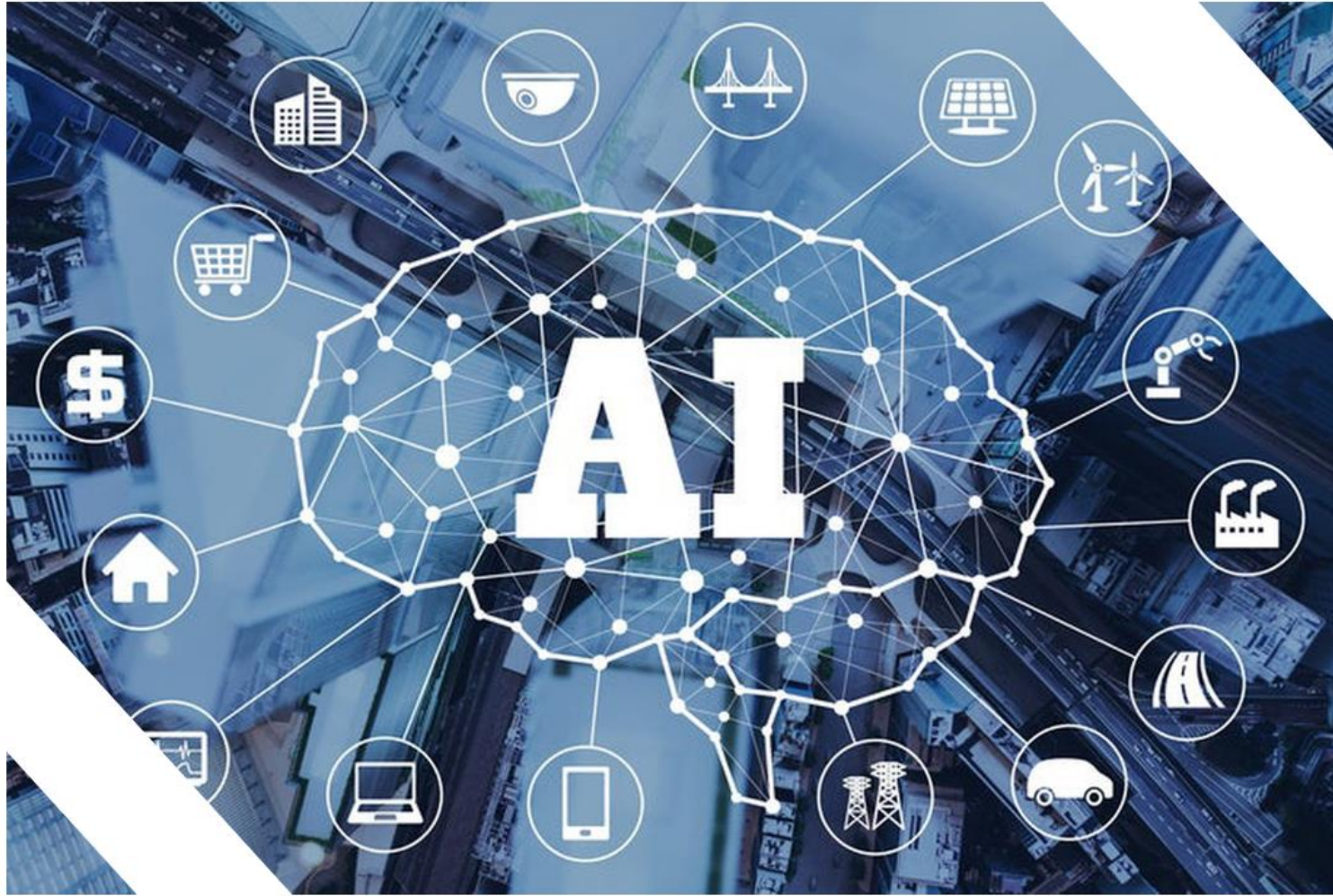
A little introduction

My background particularly as it relates to AI & Data Analytics…

What is AI & why you should care

Basic theory of Machine Learning and Deep Learning and the impact AI is having in our world

Applications of AI

How AI is impacting a number of fields from Retail all the way to farming

Jobs & Education Background

Different types of AI roles, impact of AI on jobs & necessary educational background for AI related roles

Getting Started

Resources to help you get started including tools, software, learning platforms and courses

Additional Resources

A number of miscellaneous resources you might find helpful

A little introduction…

Amir Charania

Sr. Director | Head of Data & Analytics Practice at Daugherty Business Solutions

Glimpse of my background

Education: Bachelors in CS, Mumbai Univ. | MBA in Mgmt. of Tech., Georgia Tech

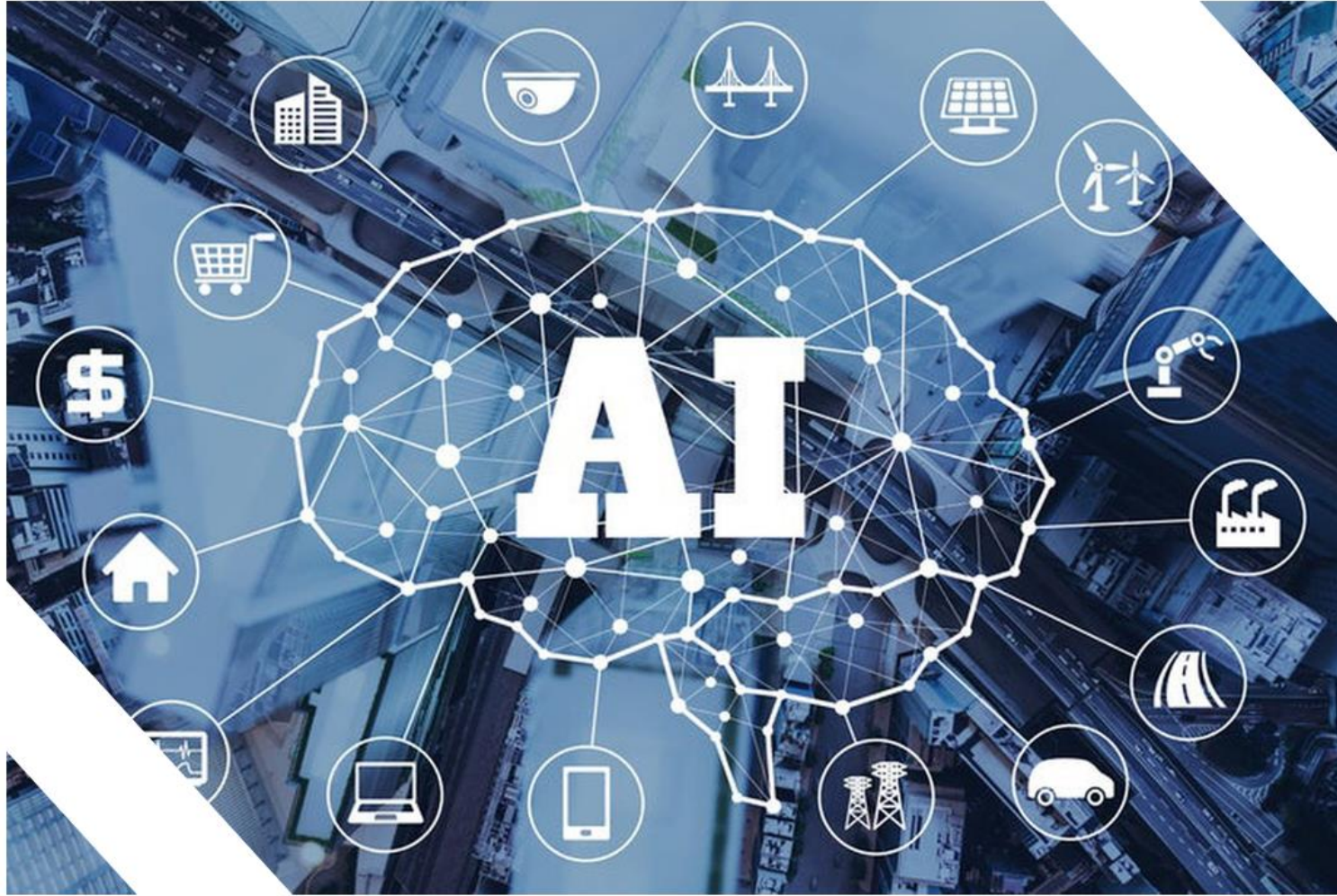**Work Experience**: Technology Consulting, Product Management, Startup

Technology domains: Data & Analytics, Artificial Intelligence, Business Intelligence

Seva background: REC, ITREB, Community Building, CAB

Why should you care about AI?

Why should you care about AI?

Because it is no less than a super power….and whether you are in high school, college or a professional, AI will impact your life and your profession

"Just as electricity transformed almost everything 100 years ago, today I actually have a hard time thinking of an industry that I don't think AI will transform in the next several years."

+14%

PwC research shows global GDP could be up to 14% higher in 2030 as a result of AI – the equivalent of an additional $15.7 trillion – making it the biggest commercial opportunity in today's fast changing economy.

+26%

The greatest gains from AI are likely to be in China (boost of up to 26% GDP in 2030) and North America (potential 14% boost). The biggest sector gains will be in retail, financial services and healthcare as AI increases productivity, product quality and consumption.

PwC Sizing the prize white paper, 2017

*"Deep Learning is a **superpower**. With it you can make a computer **see**, synthesize novel **art**, translate **languages**, render a medical **diagnosis**, or build pieces of a car that can **drive itself**. If that isn't a superpower, I don't know what is."*

Andrew Ng, Founder of deeplearning.ai and Coursera

AI is everywhere…

Things we use on a daily basis and now take for granted are a direct result of AI/ML technologies

Alexa

Netflix

Gmail Spam

Uber
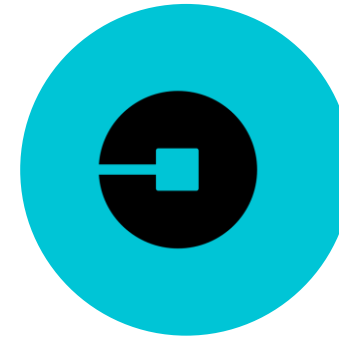
Self-driving cars

01

02

03

04

05

Language recognition & response

Making intelligent movie recommendations

Separating spam from regular email
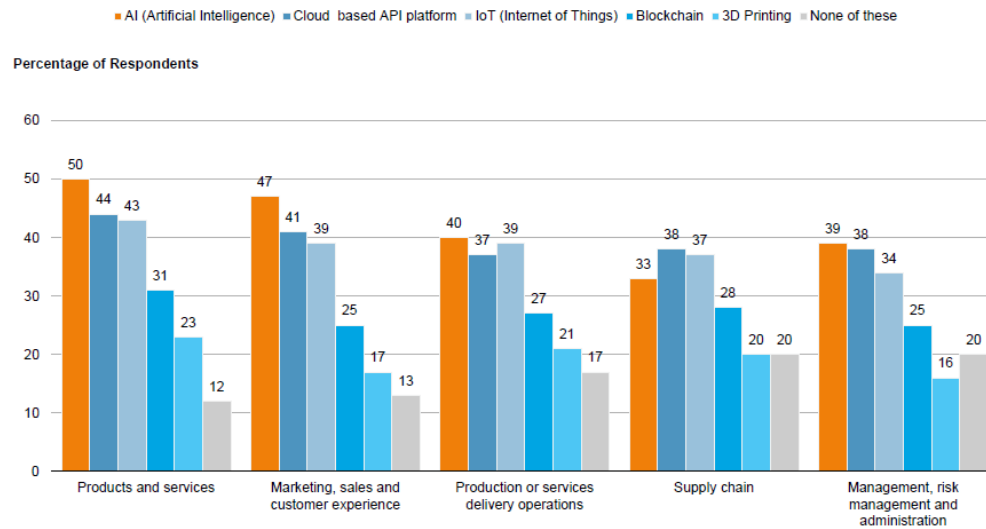
Predicting rider demand and pick up / drop off ETA

Computer vision

Artificial Intelligence FIELDS OF THE FUTURE

AI is a Top Priority for CEOs and continues to attract investment

AI is a Top Priority for CEOs

Legend: AI (Artificial Intelligence) · Cloud based API platform · IoT (Internet of Things) · Blockchain · 3D Printing · None of these

Percentage of Respondents

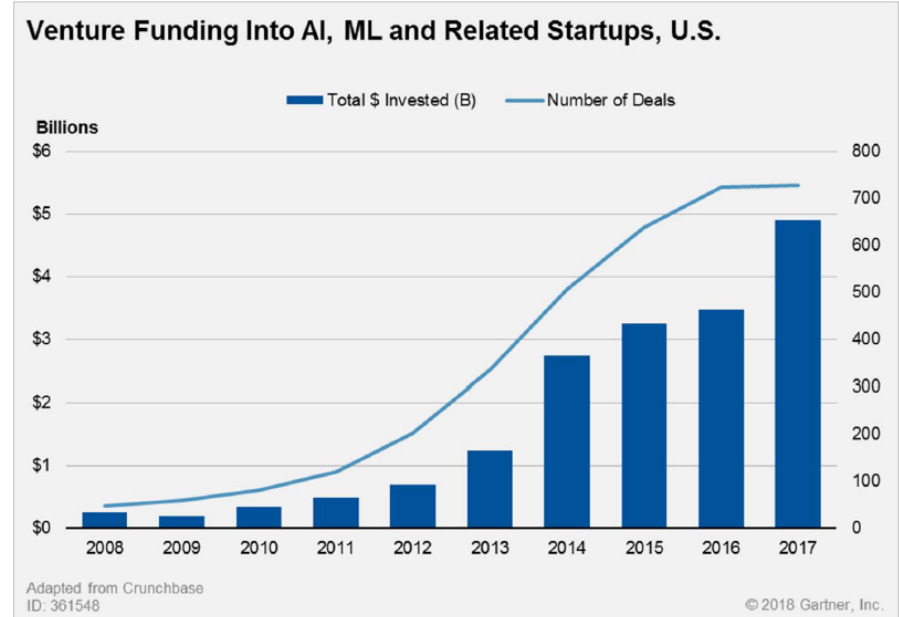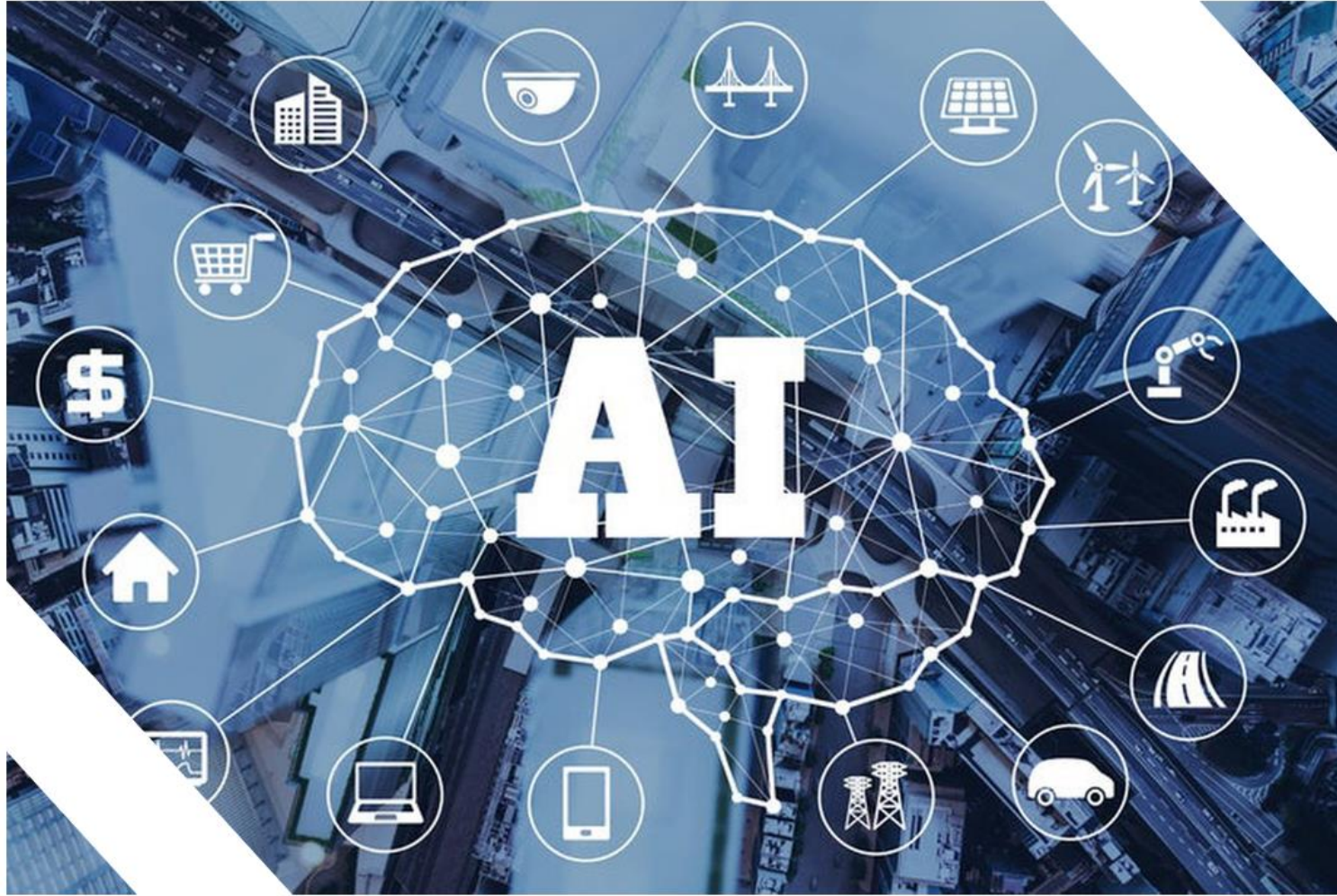|	Products and services	Marketing, sales and customer experience	Production or services delivery operations	Supply chain	Management, risk management and administration
AI	50	47	40	33	39
Cloud based API platform	44	41	37	38	38
IoT	43	39	39	37	34
Blockchain	31	25	27	28	25
3D Printing	23	17	21	20	16
None of these	12	13	17	20	20

Base: All respondents, n=460
Q14. Which of the five technologies will have a material impact on each business areas?
ID: 352839

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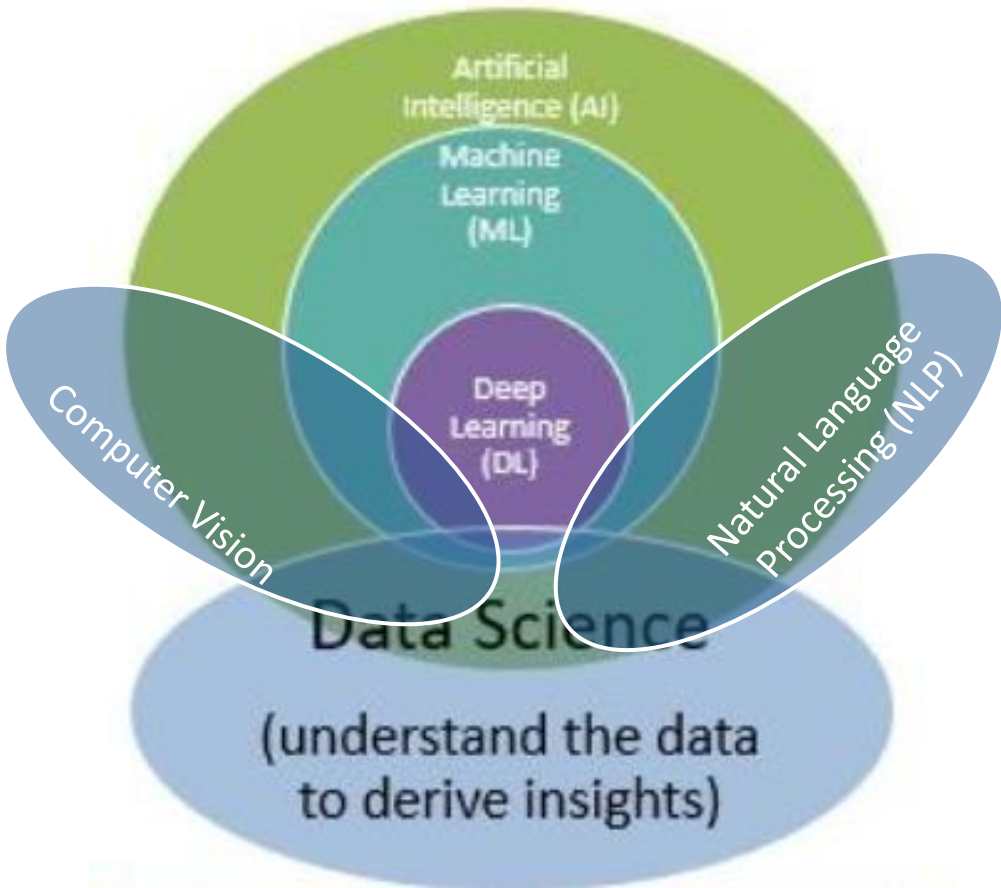
AI Continues to Attract Increased Investment

Venture Funding Into AI, ML and Related Startups, U.S.

Legend: Total $ Invested (B) · Number of Deals

Adapted from Crunchbase
ID: 361548

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8

What is AI?

What is…..

Artificial Intelligence

- Broad discipline for creating intelligent machines
- Being able to ultimately perform "intelligent" tasks like humans

Machine Learning

- Subset of AI that uses statistical techniques
- Allows computers to "learn" from the data without being programmed
- "train" a "model" using various "algorithms" to improve performance for a given task

Deep Learning

- A subset of Machine Learning where learning occurs in layers (hence the term deep)
- Each layer comprises of neurons that mimic how the human brain learns

Data Science

- Inter-disciplinary fields that leverages AI/ML to understand the data and derive actionable insights

vs.

Rules Based

- Well defined statements which are either true or false and which can be used to program computers to help make decisions

Diagram Inspired by : Prof. Ajay Anand, Deputy Director, Goergen Institute of Data Science at the University of Rochester.

How does Machine Learning work?

Based on the size of the Tumor, predict whether the Tumor is Malignant or Benign

Feature

Label

Observations

Tumor Size	Result
3.4	Malignant
4.2	Benign
1.2	Benign
2.3	Benign
5.2	Malignant
4.7	Malignant

Tumor Size	Result
1.9	?

Classification Problem

How does Machine Learning work?

Based on the size of the house, predict how much the house will sell for?

House Size	Sales Price
2400 sq. ft.	$230,000
3200 sq. ft.	$410,000
1800 sq. ft.	$167,000
2100 sq. ft.	$225,000
3000 sq. ft.	$350,000
2800 sq. ft.	$310,000

House Size	Sales Price
2200 sq. ft.	?

Regression Problem

How does Machine Learning work?

Training

Tumor Size	Result
3.4	Malignant
4.2	Benign
1.2	Benign
2.3	Benign
5.2	Malignant
4.7	Malignant

Training Data Set

Training Features → Training → Learned Model

Training Label → Training

Testing

Tumor Size	Result
1.9	?

Testing Features → Learned Model → Prediction

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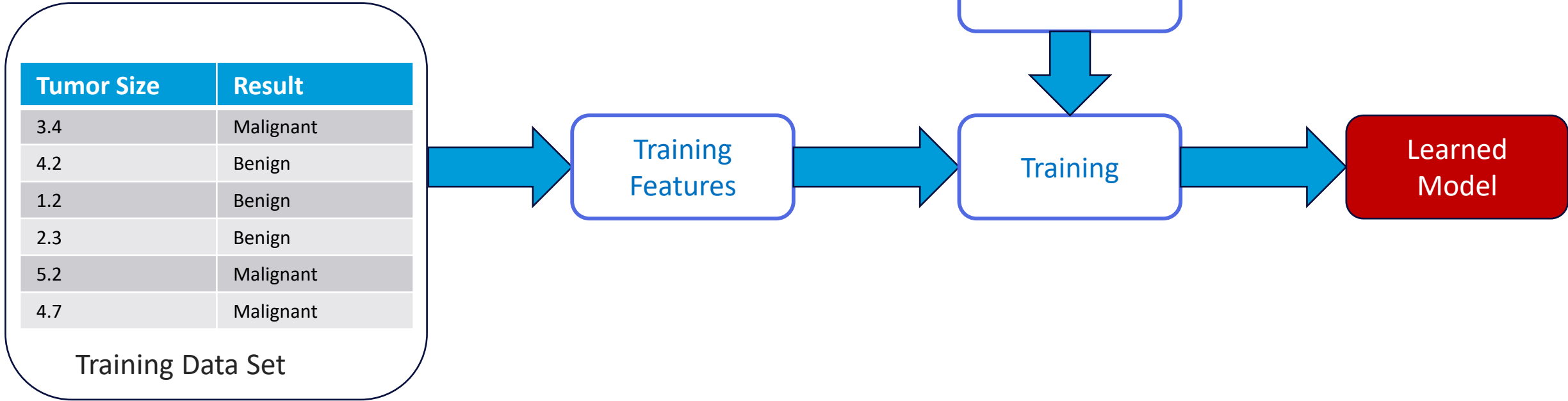
How Neural Networks & Deep Learning work?

http://playground.tensorflow.org/
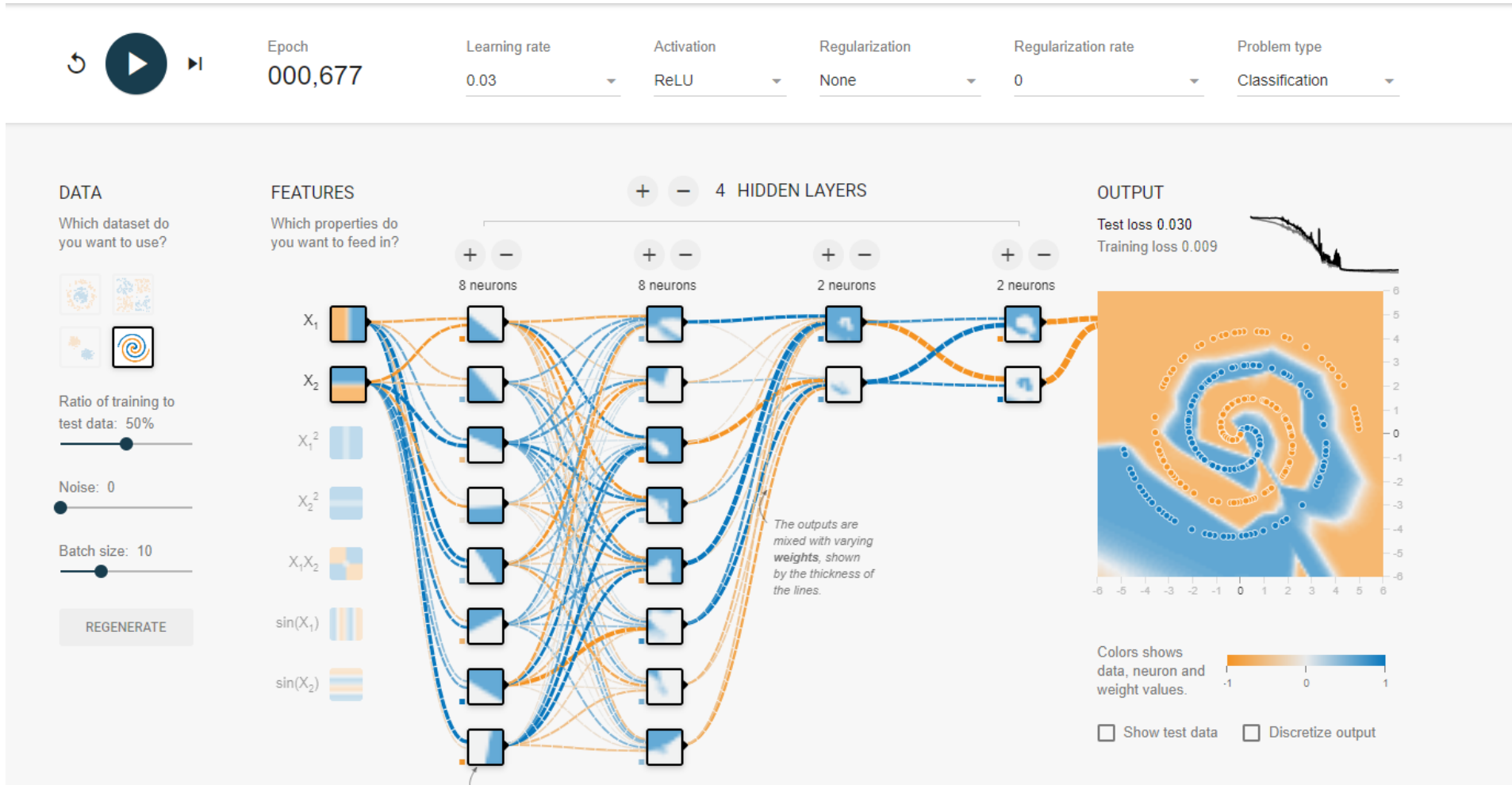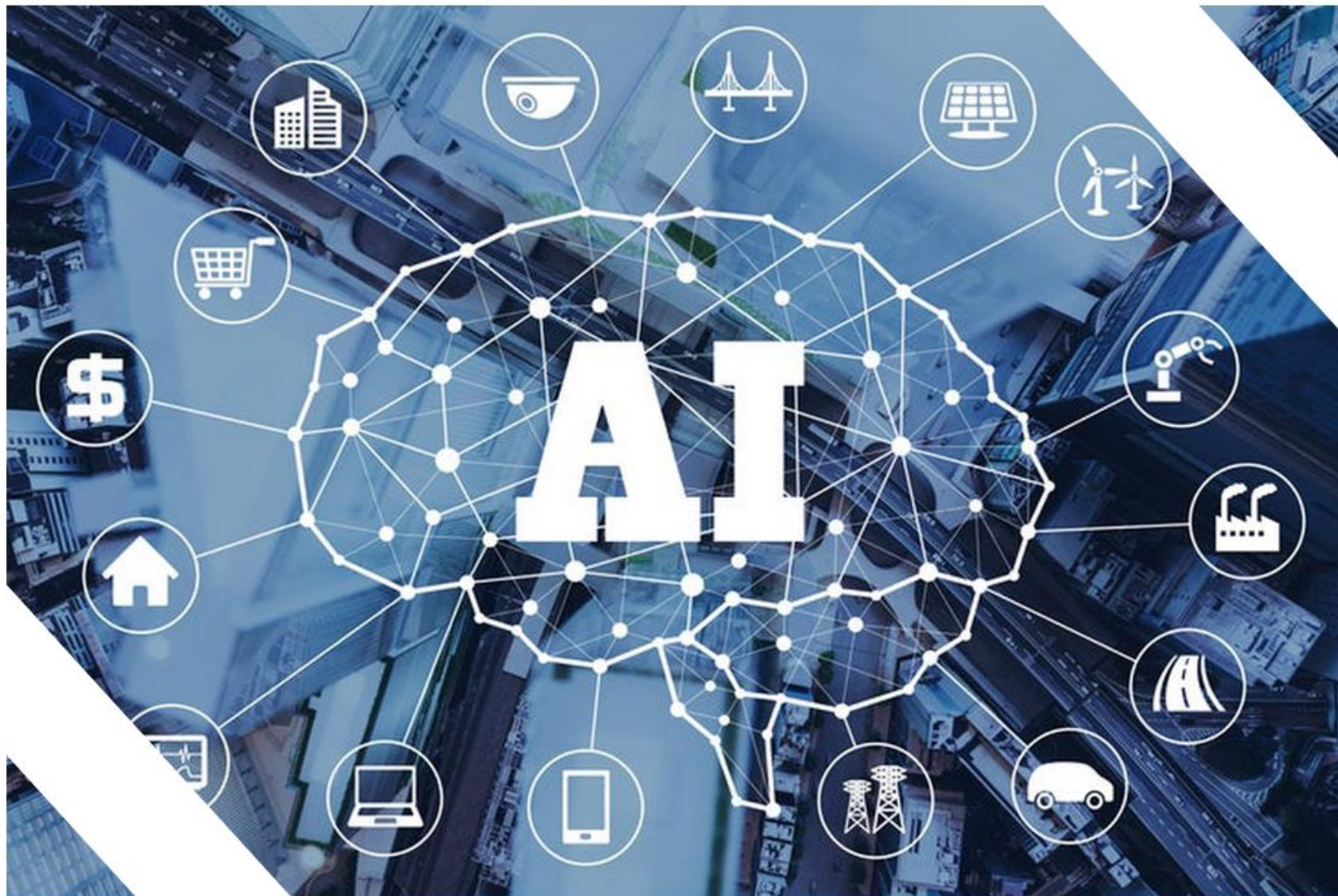
Applications of AI
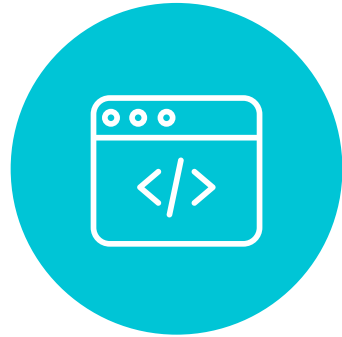
Applying AI in everyday life

Things we use on a daily basis and now take for granted are a direct result of AI/ML technologies

Retailers

01

Predicting how many units of a product will sell ahead of time (using Time Series forecasting)

Financial Traders

04

Predicting future stock prices: Algorithms identifying complex trading patterns on a massive scale across multiple markets in real time.

Mortgage Lenders

02

Predict the likelihood of default and automate loan approvals; additionally automate the underwriting process

Marketers

03

Predict the next product a customer will buy or predict which customers are most likely to purchase and target a promotion towards them
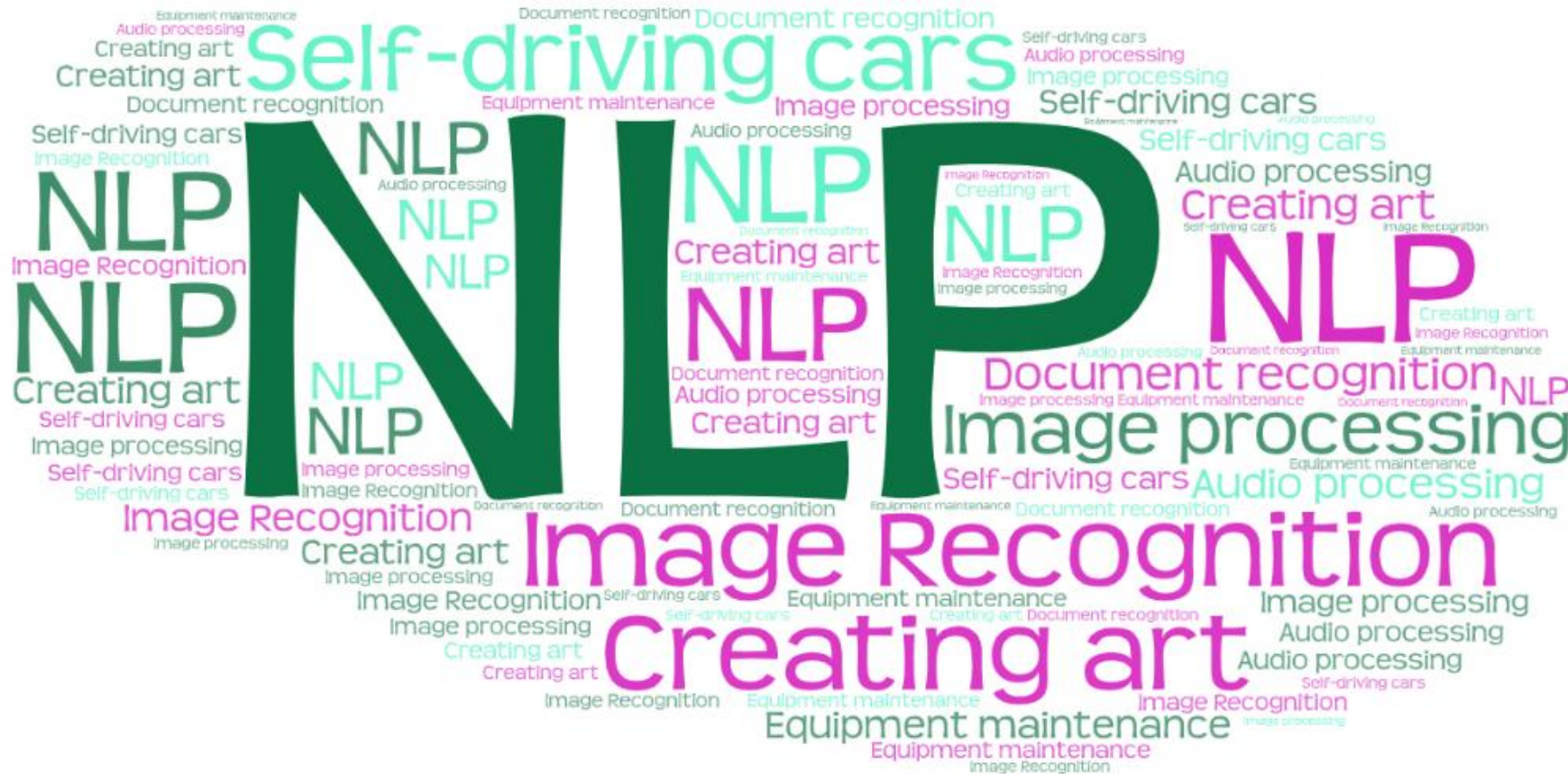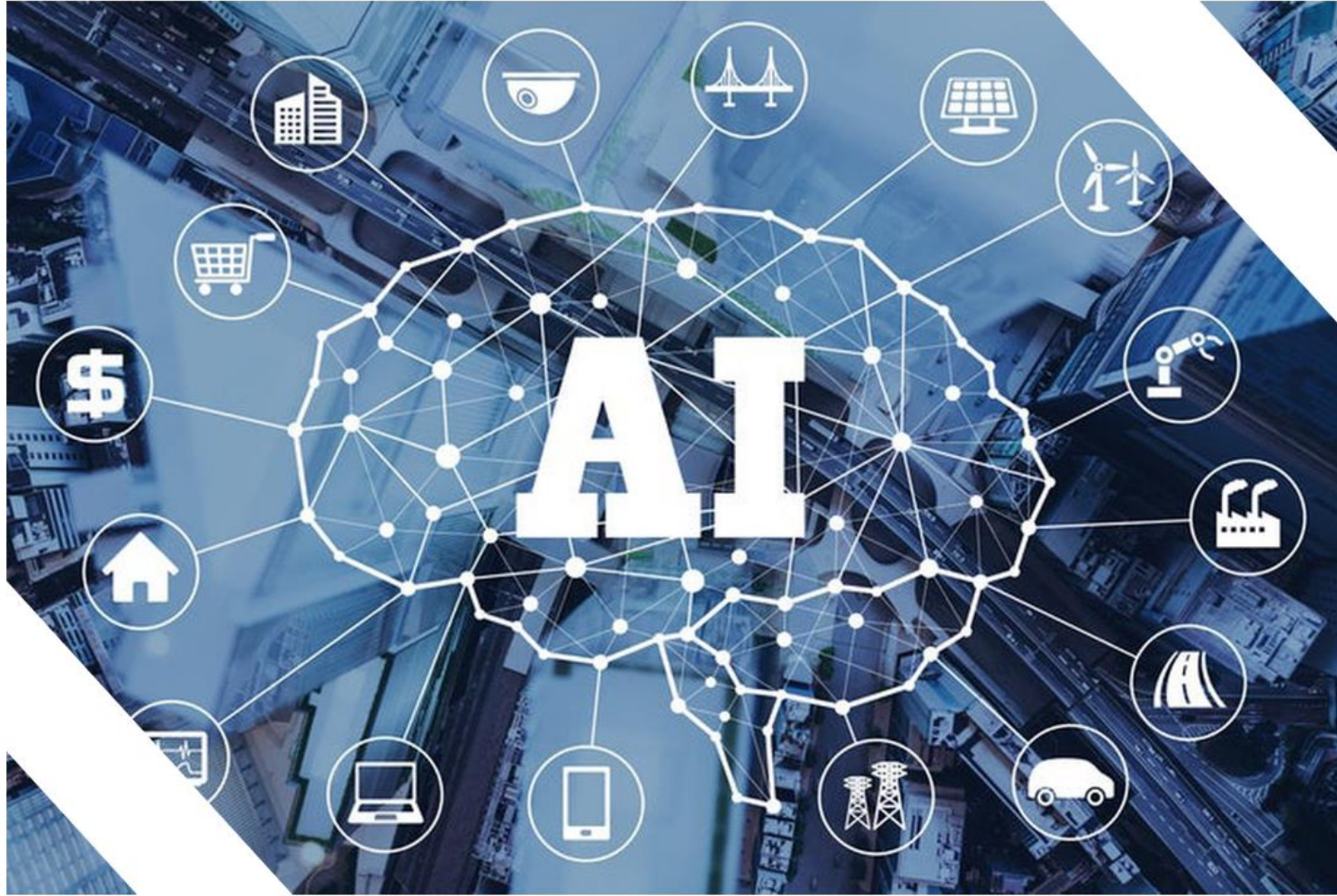
Farmers

05

Use Computer vision to distinguish between weeds and plants in order to accurately apply pesticides

Things we use on a daily basis and now take for granted are a direct result of AI/ML technologies

AI Jobs & Job Impact

What types of jobs are available in AI?

This is a sample text, Insert your desired text here this is a sample text.

Data Scientist

Hard core professionals with deep quantitative skills, building machine learning models using languages like Python, R, SAS, etc.

Predictive Analytics Professional

Professionals working hand in hand with data scientists, analyzing data to produce insights and present them to business stakeholders

Data Engineer

Professionals responsible for building the data pipeline and databases that are used by data scientists to build ML models

AI Success Manager

Professionals that work with the business teams and take overall responsibility for the success of the AI/ML project

Product Sales

Professionals that understand the value proposition of AI / ML products and sell those products to other business'

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Automation Due To AI

30%

Activities

60%

Occupations

5%

Occupations fully automated

2x

Jobs impacted in US as compared to India

Artificial Intelligence FIELDS OF THE FUTURE

Impact on jobs
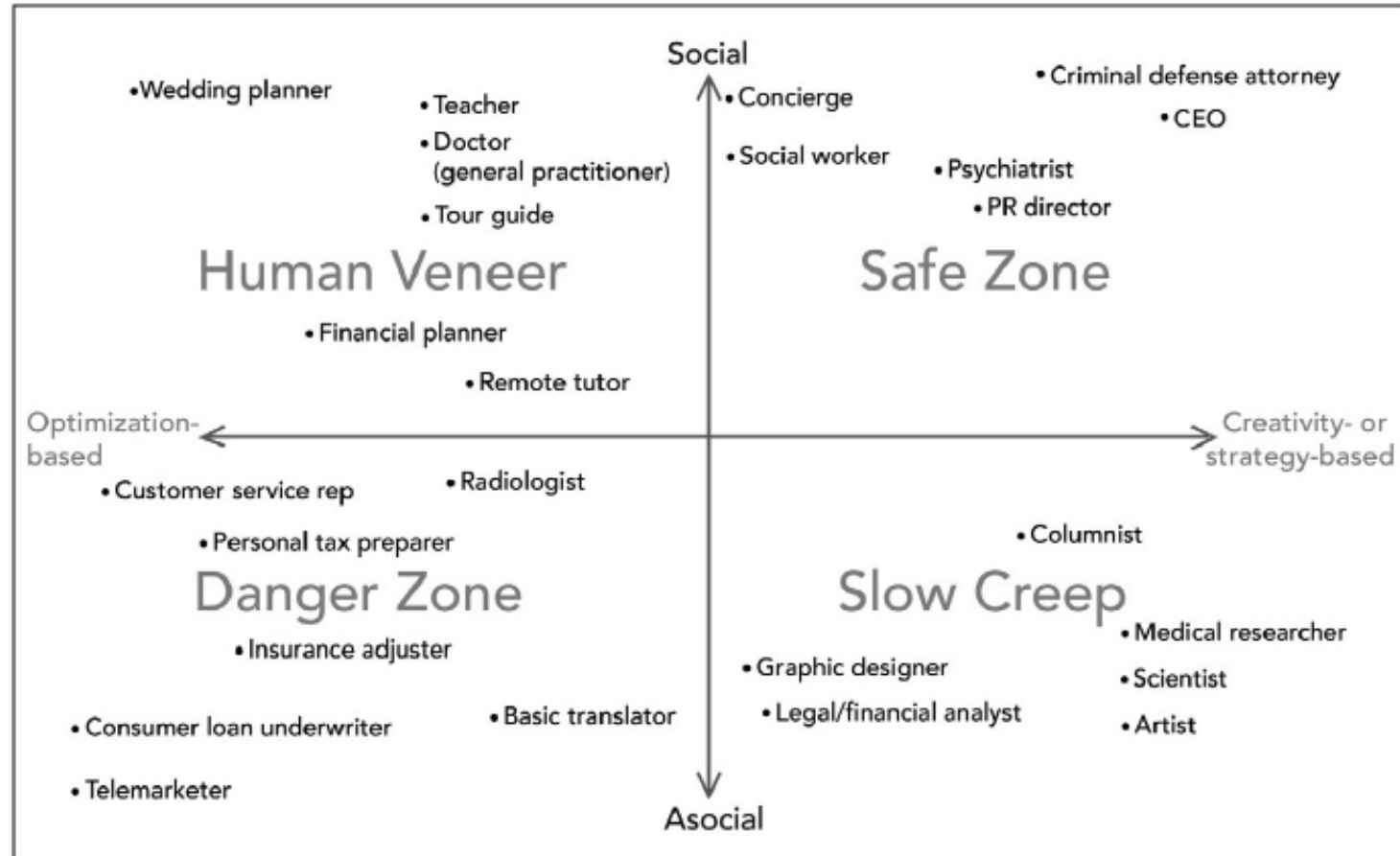
Risk of Replacement: Cognitive Labor

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What can you do 5 minutes after attending this session to get started?
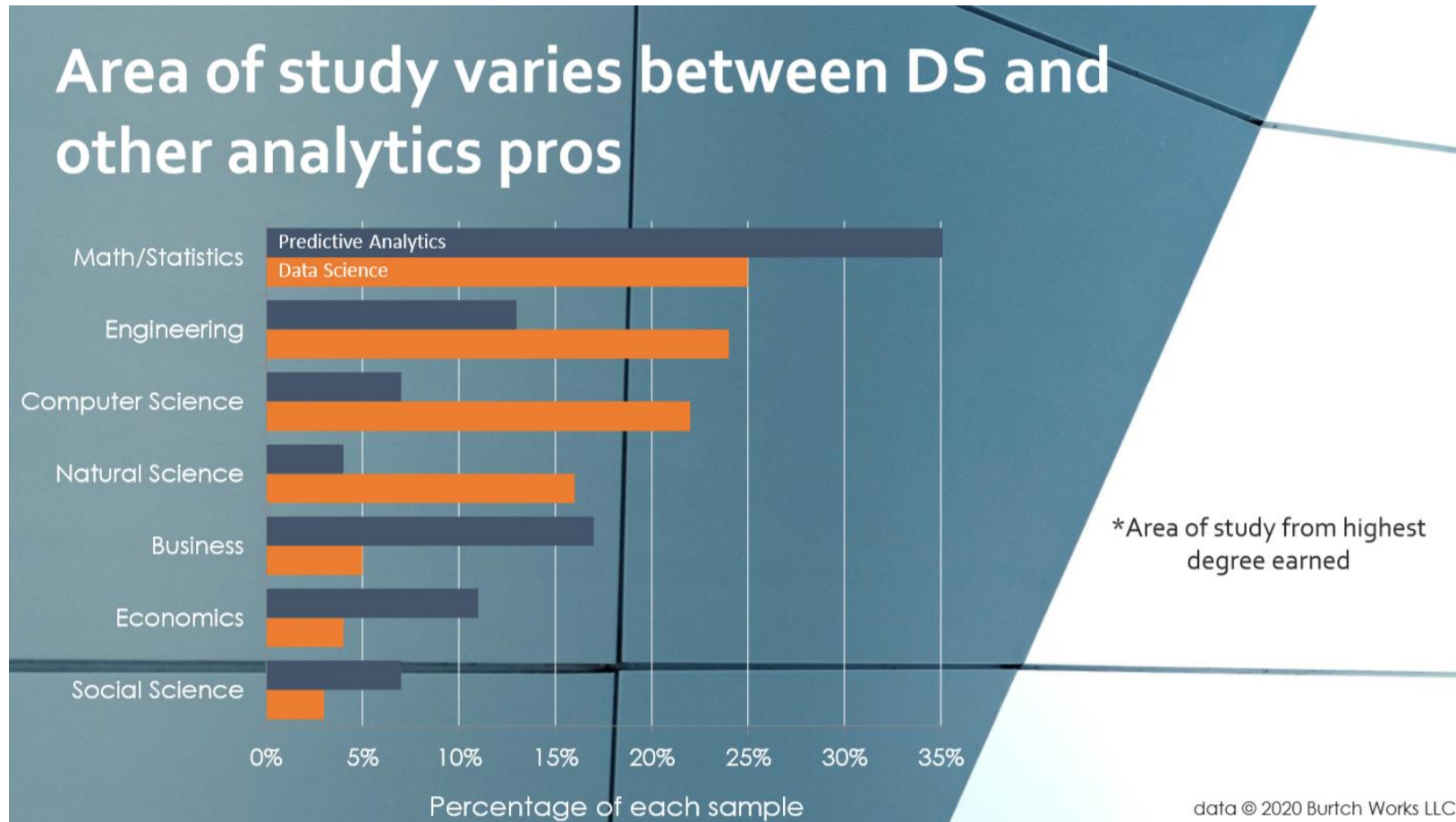
How can you get started?

What can you do 5 minutes after attending this session to get started?

Tools / Languages

Python, Jupyter

SQL

MySQL

R Programming

Python Libraries
Pandas, NumPy, BeautifulSoup, MatplotLib

ML Libraries
Sci-kit, Keras, Tensorflow, PyTorch

Learning Platforms

Udemy

edX

coursera

O'REILLY

Gartner

## Sample courses I took…

Data Science Essentials on EdX

Statistical Thinking for Data Science and Analytics by ColumbiaX on EdX

Introduction to Python for Data Science

Deep Learning with TensorFlow, Keras, and PyTorch by Jon Krohn on O'rielly

Tensorflow 2.0: Deep Learning and Artificial Intelligence on Udemy

Numerous other courses and tutorials including those on YouTube

Artificial Intelligence FIELDS OF THE FUTURE
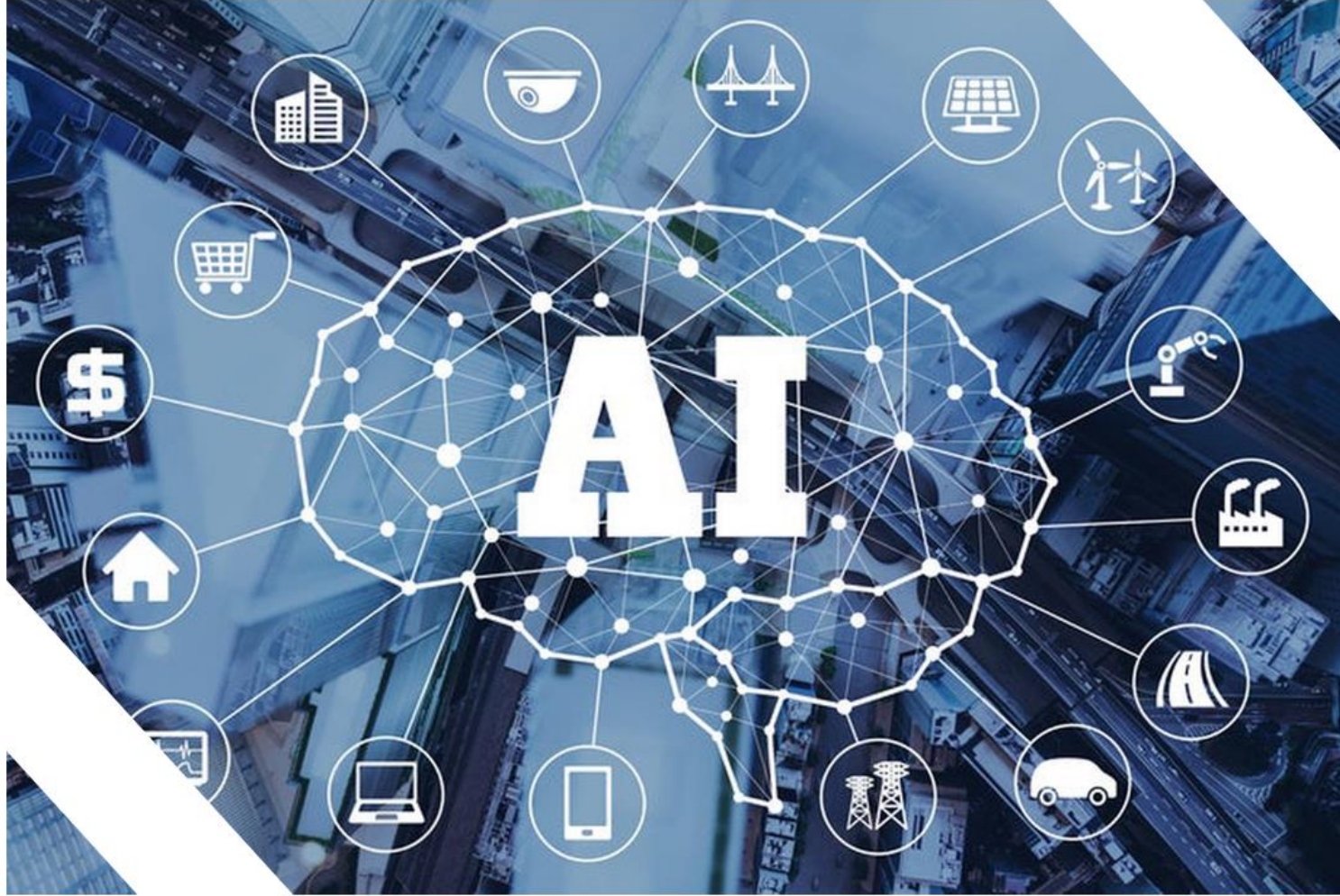
Challenges facing AI & Resources

Challenges facing AI

Societal, technological & human challenges brought about by AI

Human manipulation

Social media using personal data, reading habits, and AI algorithms to manipulate our thinking

Training data-sets

For example, obtaining clinical trial data to predict disease outcomes is fairly challenging

Bias

Algorithms work on training data, which may reflect biased human decisions or historical inequalities

AI Explainability

Many applications of AI have societal implications and need explainations, e.g. loan approvals, criminal justice

Data Privacy

AI applications will lose trust and fail if they don't address the issue of data privacy. Giving individuals the power to chose how much of their data is used by the algorithm is key

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Practicing SQL

www.sqlzoo.net

Writing ML code without any setup:

Google Colab

https://colab.research.google.com/

Recommended Book on Statistics:

Naked Statistics by Charles Wheelan

(available on Audible as well)

Video Course: Deep Learning with Tensorflow, Keras and PyTorch by Jon Krohn

https://learning.oreilly.com/videos/deep-learning-with/9780136617617

Universities offering Bachelors & Masters in AI:

https://www.computersciencedegreehub.com/best/artificial -intelligence-engineering-schools/

Awesome Public Datasets

awesome

NOTICE: This repo is automatically generated by apd-core. Please **DO NOT** modify this file directly. We have provided a new way to contribute to Awesome Public Datasets. Join the slack community for more communication.

- ✅ I am well.
- ⚠️ Please fix me.

This list of a topic-centric public data sources in high quality. They are collected and tidied from blogs, answers, and user responses. Most of the data sets listed below are free, however, some are not. Other amazingly awesome lists can be found in sindresorhus's awesome list.

https://github.com/awesomedata/awesome-public-datasets

Burtch Works
Executive Recruiting

2020
Burtch Works Study

Data Science & Predictive Analytics

Resources

Links to additional resources

Georgia Tech Data Science and Analytics Boot Camp

Intermediate Excel
- Pivot Tables
- VBA Scripting

Fundamental Statistics
- Modeling
- Forecasting

Python Programming
- Python 3
- NumPy
- Pandas
- Matplotlib
- API Interactions

Databases
- MySQL
- MongoDB
- ETL

Front End Web Visualization
- HTML
- CSS
- Bootstrap
- Dashboarding
- JavaScript Charting
- D3.js
- Geomapping with Leaflet.js

Business Intelligence Software
- Tableau

Advanced Topics
- Big Data Analytics with Hadoop
- Machine Learning

Online | 24 weeks | $10K

https://bootcamp.pe.gatech.edu/data/

McKinsey Global Institute

The promise and challenge of the age of artificial intelligence

October 15, 2018 | Executive Briefing

https://www.mckinsey.com/featured-insights/artificial-intelligence/the-promise-and-challenge-of-the-age-of-artificial-intelligence