# USING AI AND MACHINE LEARNING IN BUSINESS

## OVERVIEW

Build products that use machine learning technology at scale

Applications of AI

* Face Recognition
* Retail Inventory Management
* E-Commerce search relevance
* Customer support automation
* Data categorization/classification
* Agricultural automation
* Manufacturing efficiency and quality control
* Optical Character Recognition (OCR)
* Autonomous vehicles
* Sentiment analysis of social media posts/mentions

## AI APPROACH

**Typical Machine learning pipeline**

Model Selection

Use an approach that realizes business value in the beginning of a problem

**STEP 1 - Business Problem, Definition, value, stakeholders, priority, investment**

* This is hardest part
* Define it properly
* Who are the stakeholders?
* What level of investment are stakeholder willing to make to solve the business problem?

**STEP 2 – Data – Availability, provenance, security, coverage, cleaning, augmentation, annotation, refreshing, pipeline development**

* Is right data available?
* What is the provenance (origin) of the data?
* Any security issues?
* What is coverage of dataset?
* Does it need to be cleaned, augmented or annotated?
* What is the strategy for refreshing and pipeline development for data over time?

**STEP 3 – Model Building – Feature extraction, hyperparameters, tuning, selection, benchmarking**

* Build model with appropriate accuracy
* Feature extraction, hyperparameters, fine tuning

**STEP 4- Deploy & Measure – Business value, measurement, A/B testing, versioning, business process integration**

* Many companies get stalled in this step.
* There should be a clear path to deploy the model.
* Setting up ways to A/B test and versioning.
* Integrate the model seamlessly into the business process.

**STEP 5 – Active Learning & Tuning – Bias mitigation, ground truth & success, monitoring, version control**

* Actively learn in production environment
* Refreshing the ground truth
* Mitigate bias
* Monitor and version control
* Rinse and repeat the steps

## BUSINESS NEEDS

1. **Business needs drive the data not the other way round**. Eg: One always plans and packs based on the destination. If going to cold place then pack sweaters, jackets, snow glasses. If going to beach then one generally packs swimsuit, flipflops etc. One does pack first and then decide the destination.
2. Starting with data instead of business need is like packing wrong suitcase without knowing where one is going and for how long.
3. Production systems actively learn from humans to improve performance.
4. Active learning - model can learn from data that is labeled by human annotators and experts.
5. When a model does not know the answer to a specific query or how it might respond to a certain input, you should gather more data from human annotators and re-train your model to increase its knowledge base and increase the confidence of your model.

## THE BUSINESS CASE

### Making a Business Case

Example case provided of Adobe where the task is to find a stock photo for collateral which is likely to drive conversion and sales

If a customer wants a high-resolution picture. It will be difficult for the customer to browse though over 120 million images to select the appropriate image. This is where Adobe can class the images to help customers.

**So, the Business Problem is – Find the right image fast for the customer**

The different steps required by customer to get the correct image is as follows

1. Gather examples of photos with high conversion
2. Gather examples of photos with low conversion
3. Identify visual criteria which are consistent with high converting photos
4. Log on to stock photo database
5. Generate appropriate search query
6. Enter search query
7. Apply filter to narrow results
8. Identify images with corresponding aesthetic qualities
9. Evaluate pricing options
10. Purchase image

### QUIZ

Job: find a stock photo for collateral which is likely to drive conversion and sales

1. Gather examples of photos with high conversion
2. Gather examples of photos with low conversion
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Which sequential steps could use ML computer vision technology to accomplish the task?

1. 1 -3
2. 2-5
3. 5-8
4. 7-10

Answer – (C) 5-8

### Identify AI value

A tool to address business problem is identifying the AI value for each activity. Identify whether the tasks can be done by human or AI.

The tool It can help stack, rank and prioritize different opportunities for machine learning. This also helps to identify what data is needed to accomplish a specific task.

## QUIZ FOR NOTES

The steps: definition, value, stakeholders, priority & investment corresponds to which of the following stages of AI approach

1. Data
2. Business Case
3. Deploy & Measure
4. Active Learning & Tuning

**Answer - B**