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# Building AI Projects

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Starting an AI project

# Starting an AI project

- Workflow of projects
- Selecting AI projects
- Organizing data and team for the projects



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# Building AI Projects

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Workflow of a  
machine learning project

# Example: Speech recognition



Amazon  
*Echo / Alexa*



Google  
*Home*



Apple  
*Siri*



Baidu  
*DuerOS*

# Key steps of a machine learning project

*Echo / Alexa*

1. Collect data

2. Train model

Iterate many times until  
good enough

3. Deploy model

Get data back  
Maintain / update model

# Key steps of a machine learning project

## *Self-driving car*

### 1. Collect data



image

position of other cars

### 2. Train model

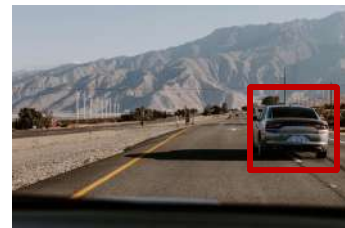
Iterate many times until  
good enough



### 3. Deploy model

Get data back

Maintain / update model





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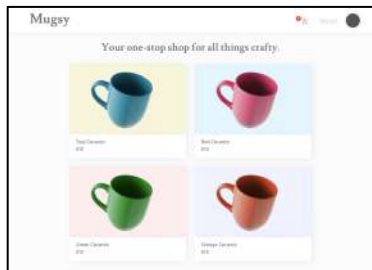
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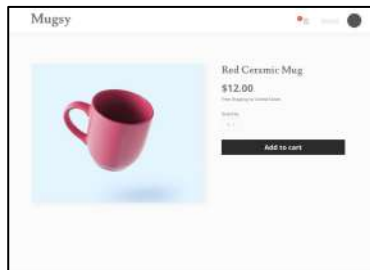
Workflow of a  
data science project

# Example: Optimizing a sales funnel

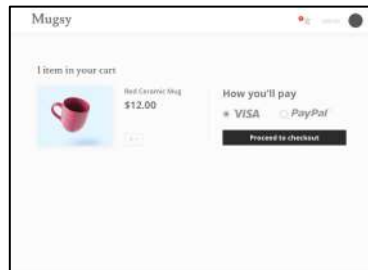
Visit website



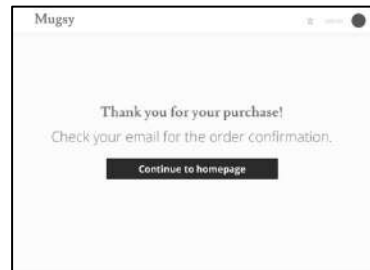
Product page



Shopping cart



Checkout





# Key steps of a data science project

## *Optimizing a sales funnel*

1. Collect data

User ID	Country	Time	Webpage
2009	Spain	08:34:30 Jan 5	home.html
2897	USA	13:20:22 May 18	redmug.html
4893	Philippines	22:45:16 Jun 11	mug.html

2. Analyze data

Iterate many times to get good insights

3. Suggest hypotheses/actions

Deploy changes

Re-analyze new data periodically

# Key steps of a data science project

## *Manufacturing line*

Mix clay



Shape mug



Add glaze



Fire kiln



Final inspection



Clay Batch #	Supplier	Mixing time (minutes)
001	ClayCo	35
034	GooClay	22
109	BrownStuff	28

1. Collect data

2. Analyze data

Iterate many times to get good insight

3. Suggest hypotheses/actions

Deploy changes

Re-analyze new data periodically

Mug Batch #	Country	Humidity	Temperature in kiln (F)	Duration in kiln (hours)
301	Spain	0.002%	1410°	22
302	USA	0.003%	1520°	24
303	Malaysia	0.002%	1420°	22



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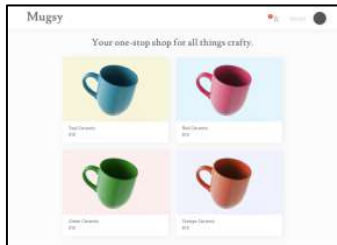
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Every job function  
needs to learn how to use data

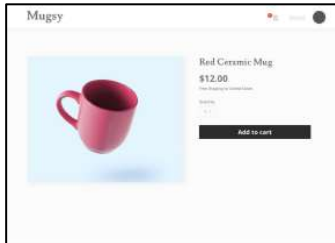
# Sales

## Data science

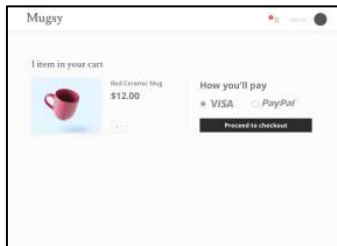
Visit website



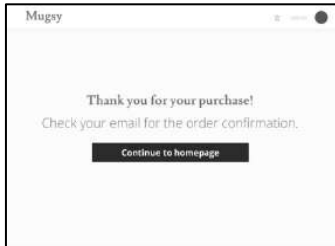
Product page



Shopping cart



Checkout



Optimize sales funnel

## Machine learning

Name	Title	Company size	Email	Priority
Tayler	CEO	3050	tay@a..	high
Janet	Manager	230	jan@b..	medium
David	Intern	30	dave@c..	low

Automated lead sorting

# Manufacturing line manager

## Data science

Mix clay



Shape mug



Add glaze



Fire kiln



Final inspection



Optimize sales funnel

## Machine learning



ok



ok

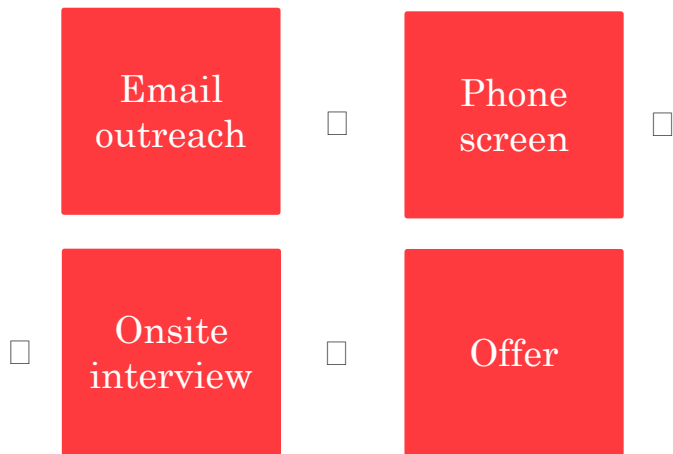


defect

Automated visual inspection

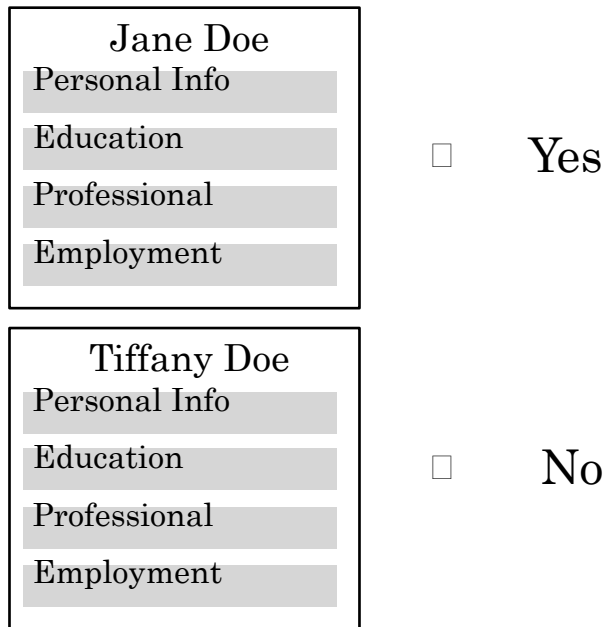
# Recruiting

## Data science



Optimize recruiting funnel

## Machine learning



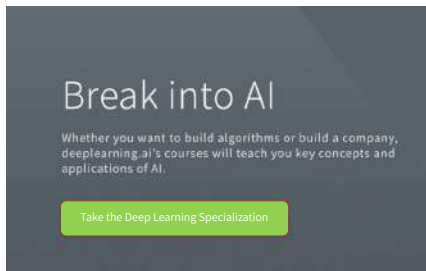
Automated resume screening

# Marketing

## Data science



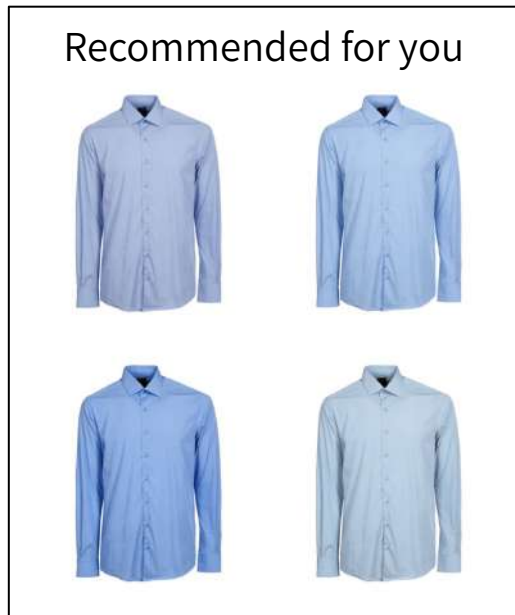
A



B

A/B testing

## Machine learning



Customized product recommendation

# Agriculture

Data science



Crop analytics

Machine learning



Precision weed killing





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# Building AI Projects

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How to choose an AI project I

# AI knowledge and domain knowledge

What AI  
can do

Things  
valuable  
for your  
business

AI experts

Domain experts



# Brainstorming framework

- Think about optimizing tasks rather than automating jobs. E.g., call center routing, radiologists.
- What are the main drivers of business value?
- What are the main points in your business?

# You can make progress even without big data

- Having more data almost never hurts.
- Data makes some businesses (like web search) defensible.
- But with small datasets, you might still make progress.





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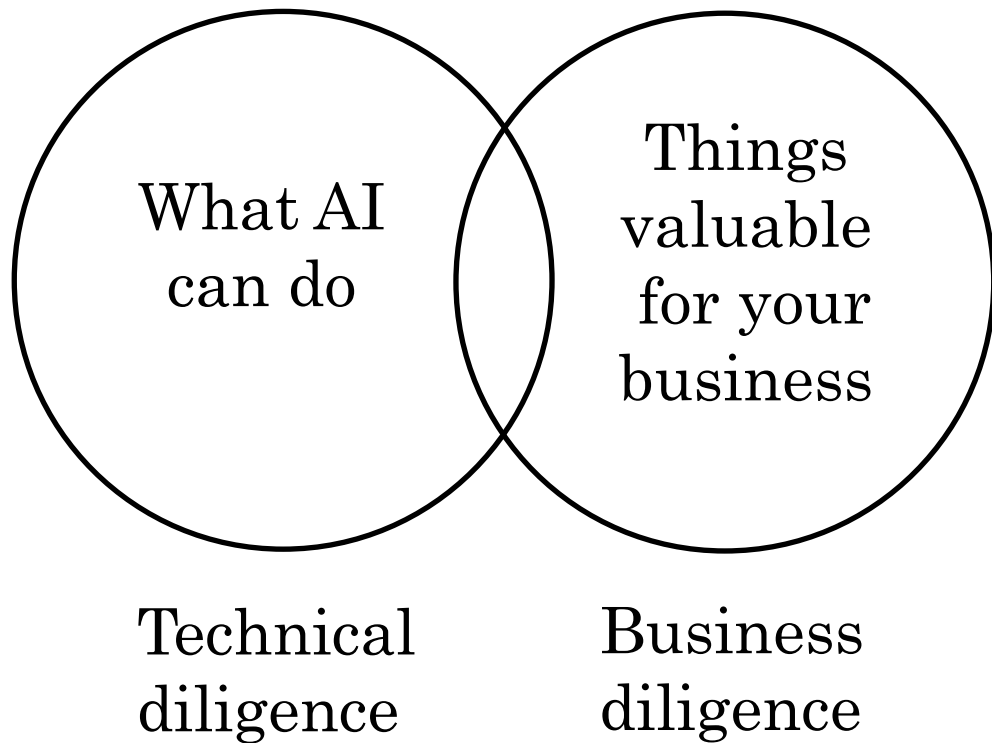
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# Building AI Projects

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How to choose an AI project II

# Due diligence on project



# Due diligence on project

## Technical diligence

- Can AI system meet desired performance
- How much data is needed
- Engineering timeline

## Business diligence

- Lower costs current business
- Increase revenue current business
- Launch new product or business new business

# Build vs. buy

- ML projects can be in-house or outsourced
- DS projects are more commonly in-house
- Some things will be industry standard – avoid building those.





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Working with an AI team

# Specify your acceptance criteria



ok

Goal: detect defects  
with 95% accuracy



ok

Provide AI team a dataset on  
which to measure their  
performance



defect

# How AI teams think about data

Training set



ok



ok



ok

Test set



ok



ok



defect

# Pitfall: Expecting 100% accuracy

Test set



ok



ok



ok



defect



ok

- Limitations of ML
- Insufficient data
- Mislabeled data
- Ambiguous label



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# Building AI Projects

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Technical tools for  
AI teams (optional)

# Open-source frameworks

## Machine learning frameworks:

- TensorFlow
- PyTorch
- Keras
- MXNet
- CNTK
- Caffe
- PaddlePaddle
- Scikit-learn
- R
- Weka

## Research publications

- Arxiv

## Open source repositories:

- GitHub

# CPU vs. GPU

CPU: Computer processor (Central Processing Unit)



GPU: Graphics Processing Unit



Cloud vs. On-premises