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Building AI Projects

Starting an AI project

Andrew Ng

Starting an AI project

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

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Building AI Projects

Workflow of a machine learning project

Andrew Ng

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

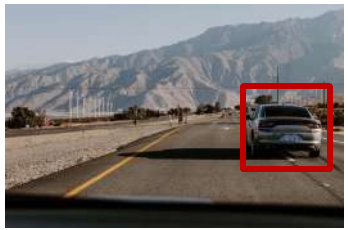
2. Train model

   Iterate many times until good enough

3. Deploy model

   Get data back

   Maintain / update model

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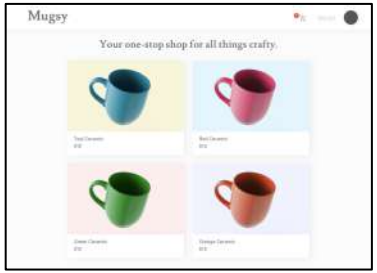
Building AI Projects

Workflow of a data science project

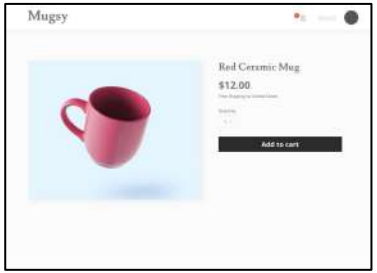
Andrew Ng

Example: Optimizing a sales funnel

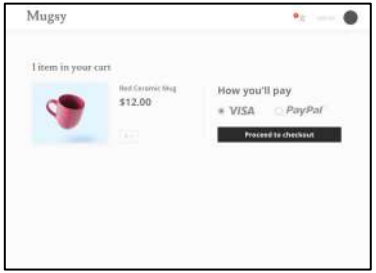
Visit website



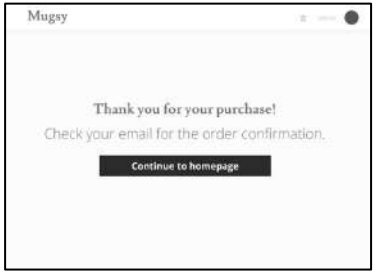
Product page



Shopping cart



Checkout



Key steps of a data science project

Optimizing a sales funnel

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

1. Collect data
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%	1410º	22
302	USA	0.003%	1520º	24
303	Malaysia	0.002%	1420º	22

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Building AI Projects

Every job function
needs to learn how to use data

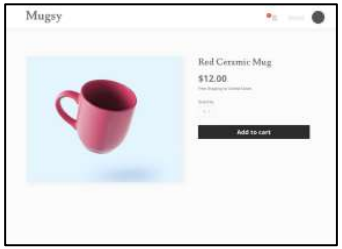
Andrew Ng

Sales

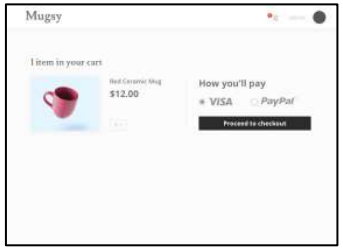
Data science

Visit website

Product page



Shopping cart



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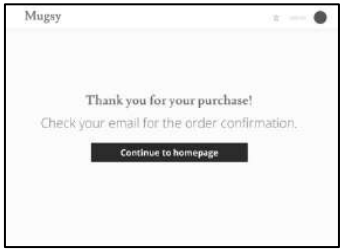


Optimize sales funnel

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

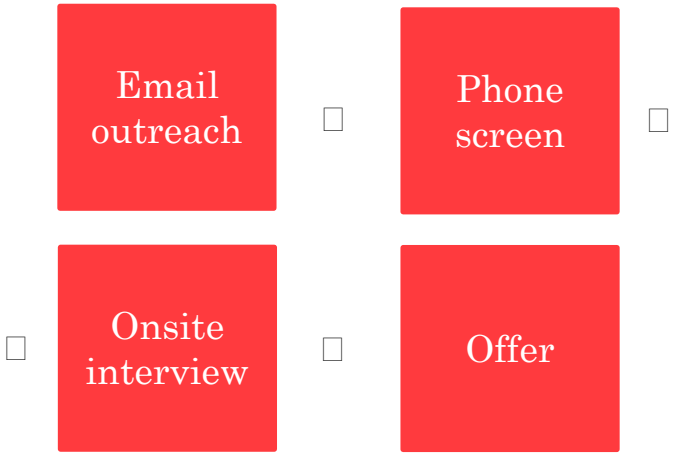
ok

defect

Automated visual inspection

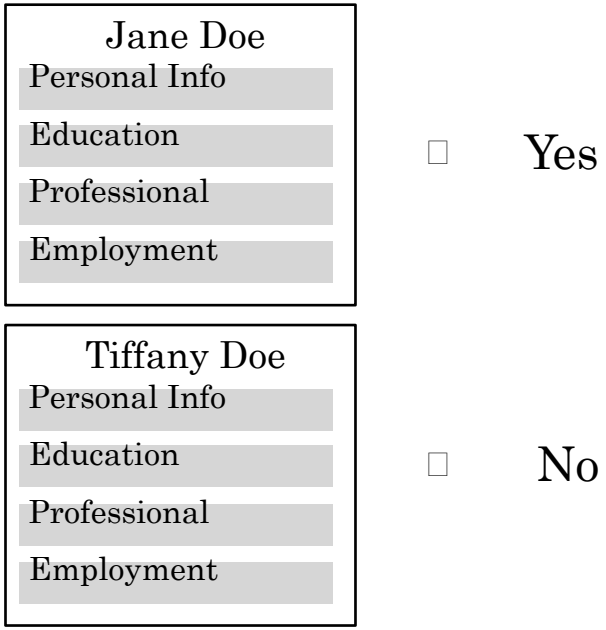
Recruiting

Data science



Optimize recruiting funnel

Machine learning

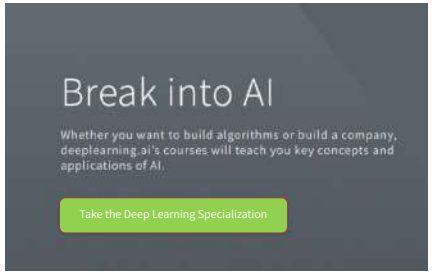


Automated resume screening

Marketing

Data science

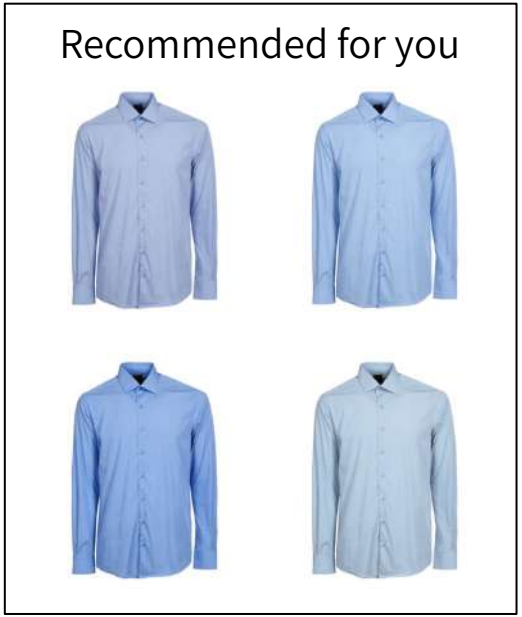
A



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

How to choose an AI project I

Andrew Ng

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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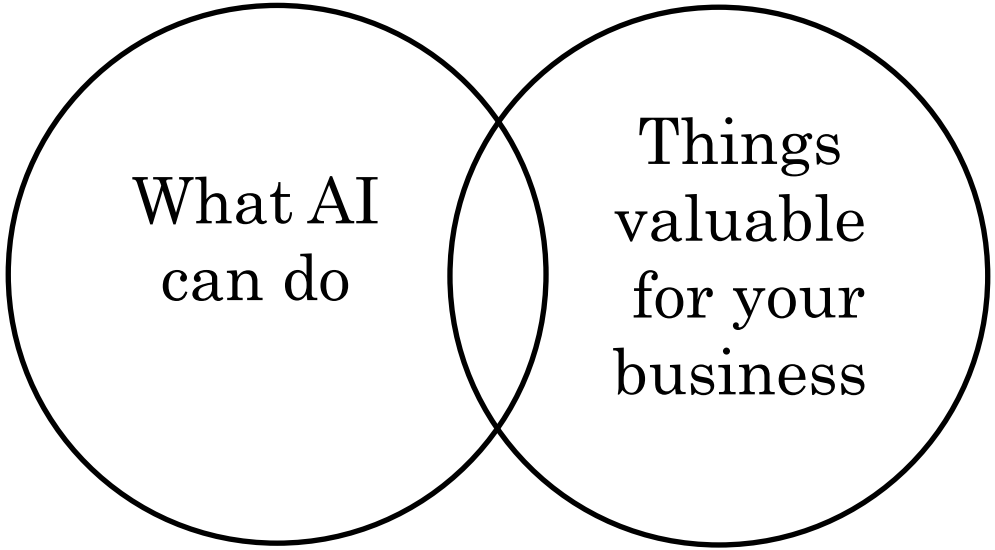
Building AI Projects

How to choose an AI project II

Andrew Ng

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
- 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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Building AI Projects

Working with an AI team

Andrew Ng

Specify your acceptance criteria

ok

ok

defect

Goal: detect defects with 95% accuracy

Provide AI team a dataset on which to measure their performance

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

Technical tools for AI teams (optional)

Andrew Ng

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