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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

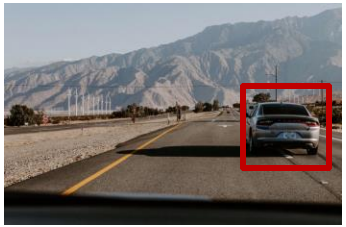
2. Train model

   Iterate many times until good enough

3. Deploy model

   Get data back

   Maintain / update model

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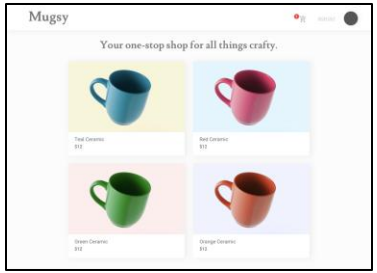
Building AI Projects

Workflow of a data science project

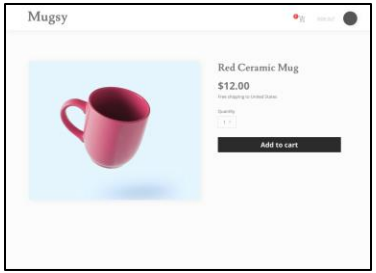
Andrew Ng

Example: Optimizing a sales funnel

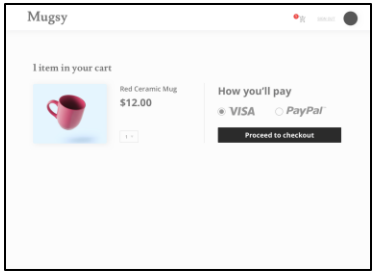
Visit website



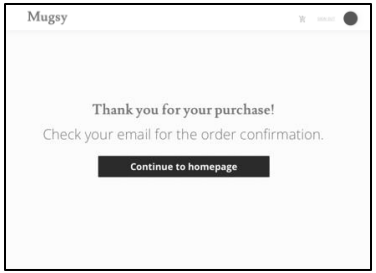
Product page



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%	1410°	22
302	USA	0.003%	1520°	24
303	Malaysia	0.002%	1420°	22

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Building AI Projects

Every job function
needs to learn how to use data

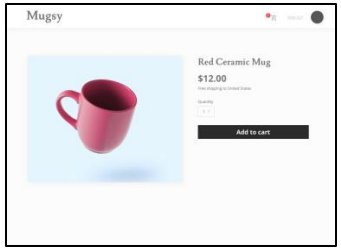
Andrew Ng

Sales

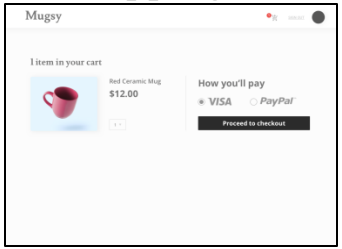
Data science

Visit website

Product page



Shopping cart



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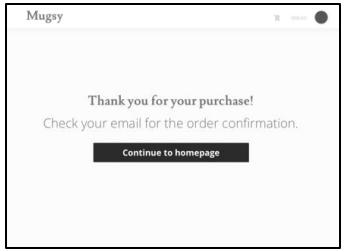


Optimize sales funnel

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

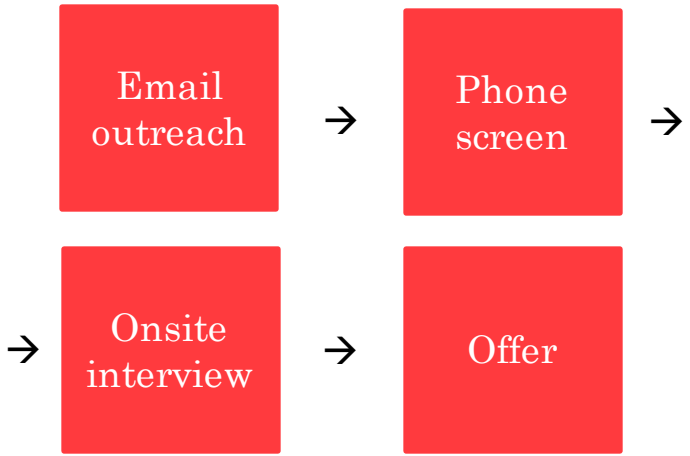

ok


defect

Automated visual inspection

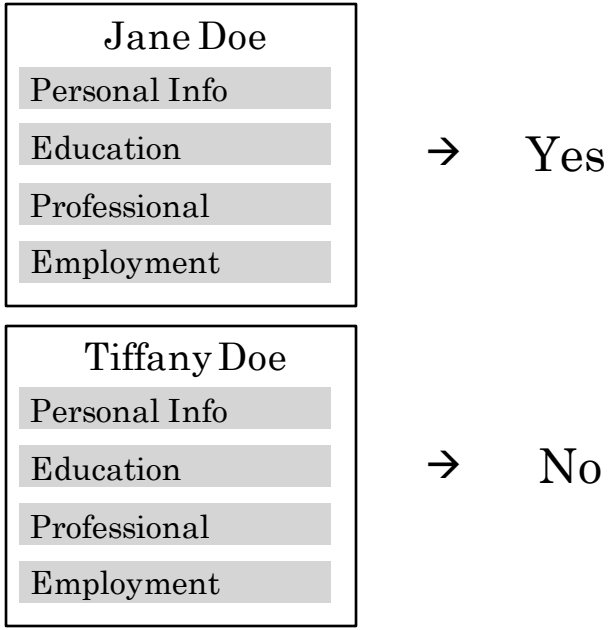
Recruiting

Data science



Optimize recruiting funnel

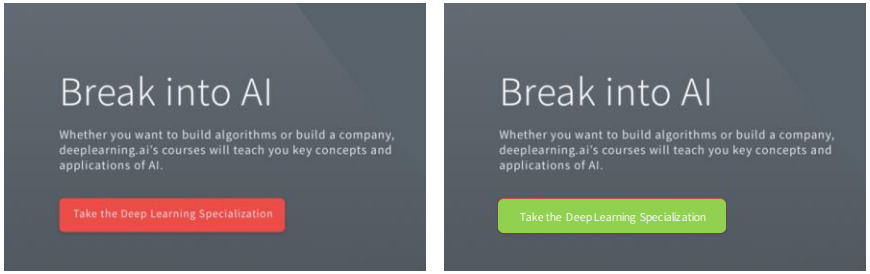
Machine learning



Automated resume screening

Marketing

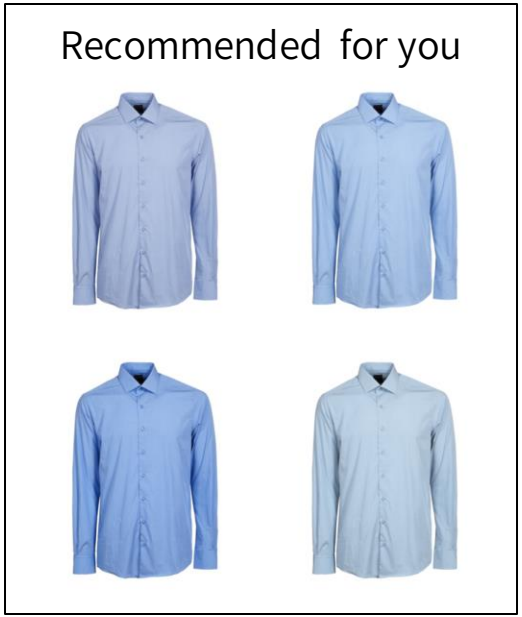
Data science



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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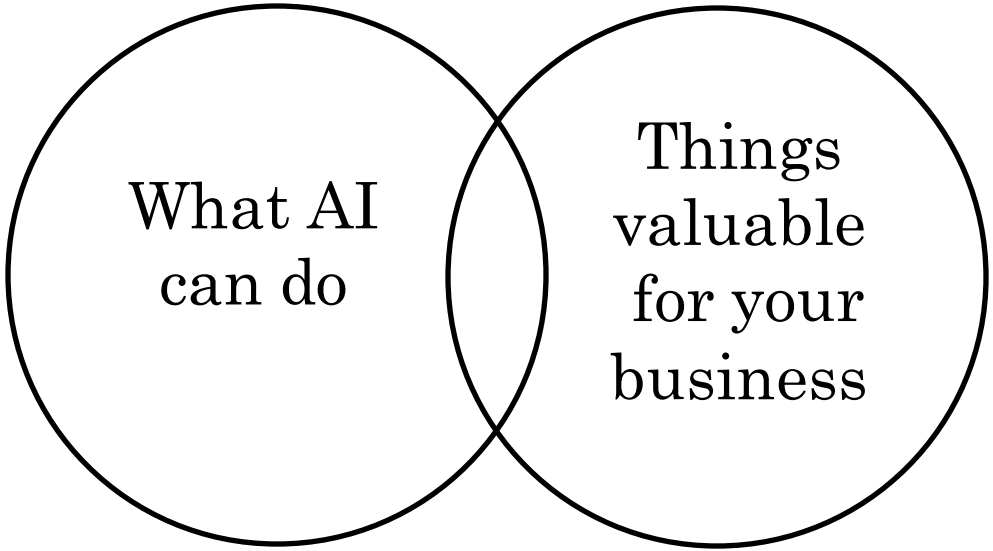
Building AI Projects

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:

- PyTorch
- TensorFlow
- Hugging Face
- PaddlePaddle
- Scikit-learn
- R

Research publications

- Arxiv

Open source repositories:

- GitHub

CPU vs. GPU

CPU: Computer processor (Central Processing Unit)

GPU: Graphics Processing Unit

Cloud vs. On-premises