

The background of the slide is a dark blue-tinted aerial photograph of a city at night, showing numerous lit-up buildings and streets.

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Managing Machine Learning Projects

Course Overview

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Why Take This Course?

- The failure rate of ML projects is very high, largely due to non-ML factors
- Applying best practices in opportunity identification, ML system design, and ML project management can greatly improve odds of success
- This course will help individuals and teams working on ML projects to organize their efforts and to design and deliver successful products

AI Product Management Specialization

Course 1

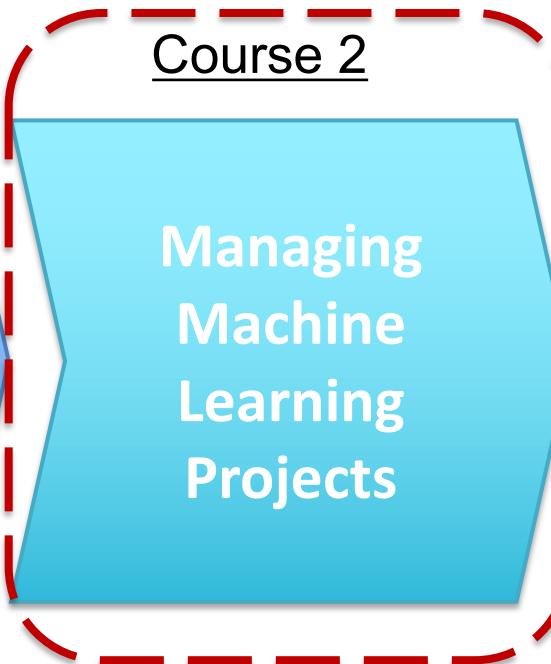
Machine
Learning
Foundations
for Product
Managers

Course 2

Managing
Machine
Learning
Projects

Course 3

Human Factors
in AI



Course Learning Objectives

At the conclusion of this course, you should be able to:

- 1) Identify opportunities to apply ML to solve problems for users
- 2) Apply the data science process to organize ML projects
- 3) Evaluate the key technology decisions to make in ML system design
- 4) Lead ML projects from ideation through production using best practices

Course Outline

Module	Topic
1	Identifying Opportunities for ML
2	Organizing ML Projects
3	Data Considerations
4	ML System Design & Technology Selection
5	Model Lifecycle Management

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Module 1: Identifying Opportunities for ML

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"Successful problem solving requires finding the right solution to the right problem. We fail more often because we solve the wrong problem than because we get the wrong solution to the right problem." - Russell Ackoff

Module 1 Objectives:

At the conclusion of this module, you should be able to:

- 1) Identify opportunities for the application of ML to solve problems
- 2) Use best practices to validate product ideas
- 3) Apply heuristics and baseline models to jump-start ML projects

The background of the slide is a dark blue-tinted aerial photograph of a university campus. The campus features several large, historic Gothic-style buildings with intricate stonework and tall spires. Interspersed among these are more modern, low-slung engineering and science buildings with glass windows and steel frames. The grounds are filled with trees and green lawns.

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Identifying Opportunities

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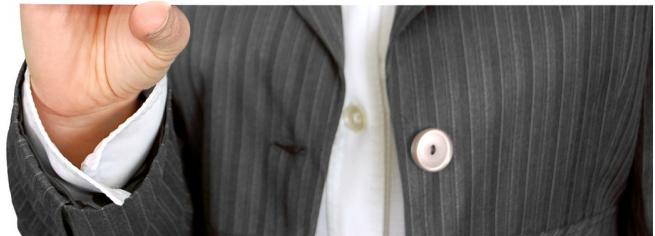
of ML projects fail*

How AI projects often start

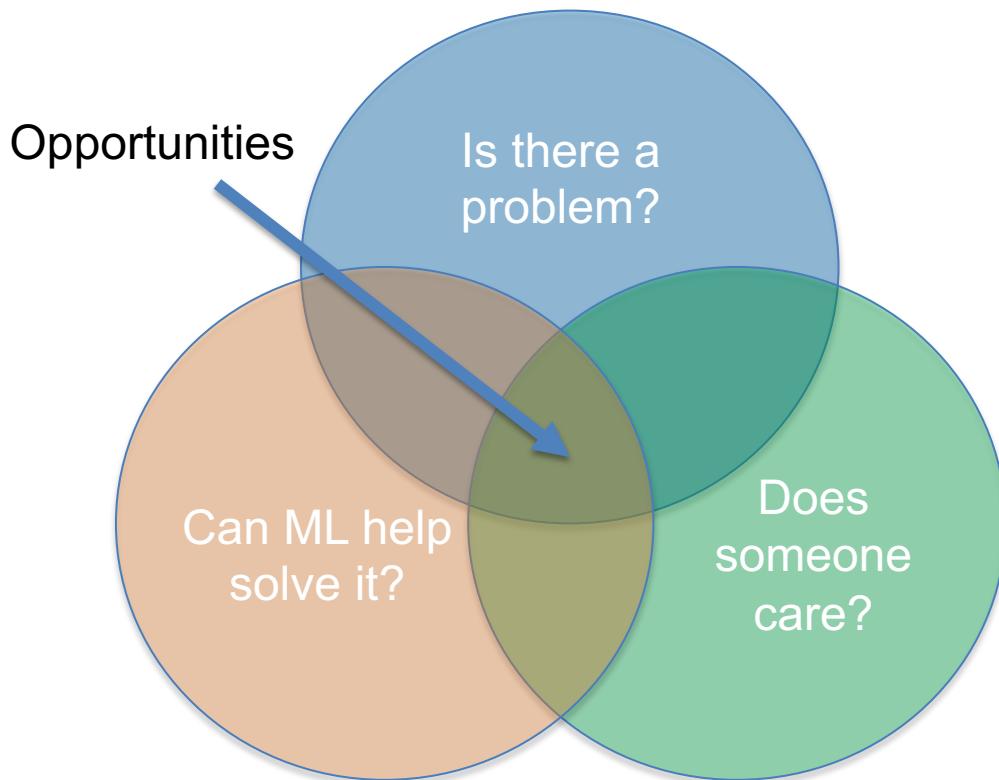
- Executives worry that “everyone else” is already using AI
- Someone dictates that we are going to launch AI projects
- Team goes looking for places to plug in AI
- Team jumps right to building and tuning models



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How AI projects should start



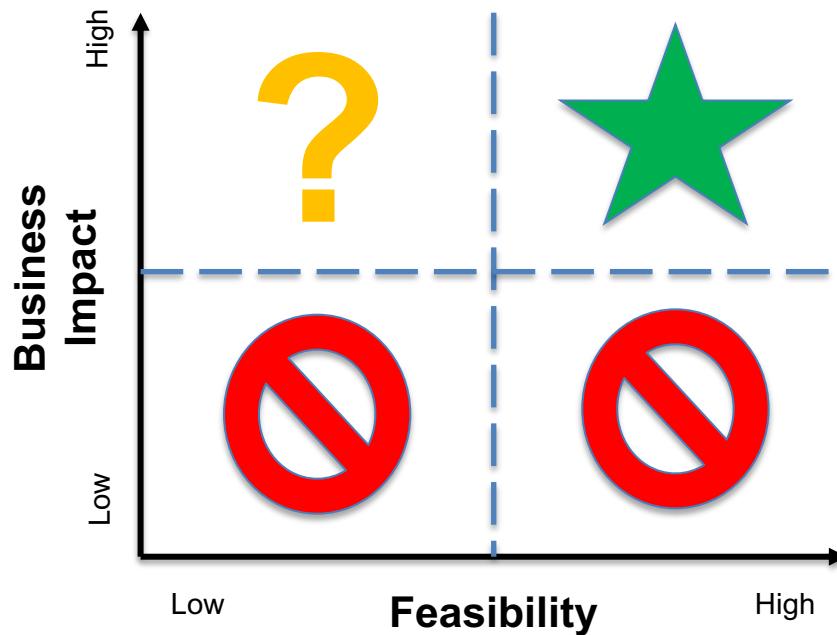
How to identify problems

- Listen to users
 - Interviews, focus groups
 - Identify pain points
 - How are they solving it today?
- Observe them in context
 - Field observation, shadowing
 - Identify latent problems

Can ML help solve it?

- Is it feasible with ML?
 - Easy
 - Hard
 - (Currently) impossible
- Can we get data?
 - Do we have it? Can we access it?
 - Can we get it?

Problems worth solving



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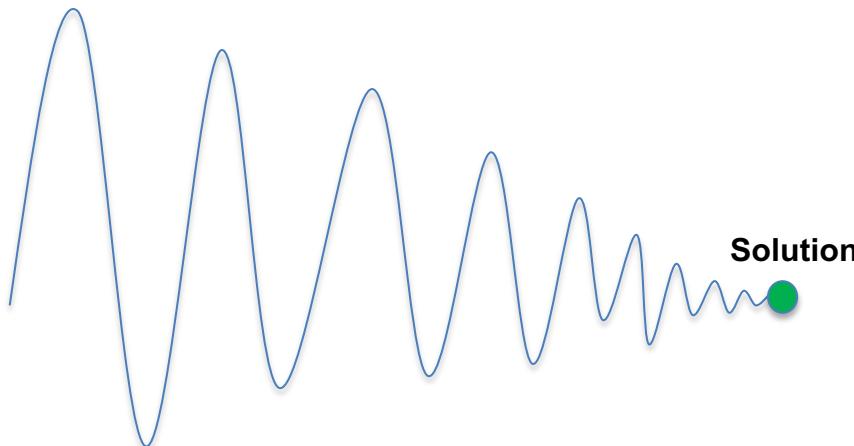
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Validating Product Ideas

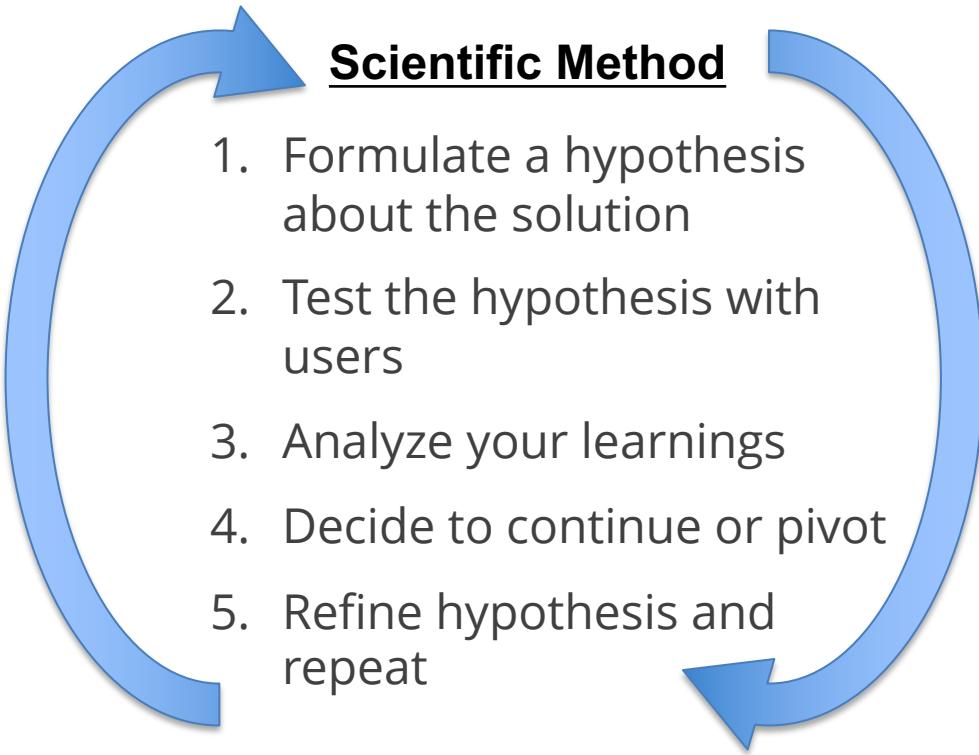
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Objective is convergence

- When we begin a project we have little information on the solution
- We converge to a solution through validating many small experiments



Validation process



Mockups

- The quicker we can get to a visual representation of a potential solution, the more we can learn
 - Wireframes
 - Screenshots
 - Mock-up demos
- At this point we assume we will be able to make the model work



When to move forward

- ✓ Confirmed the problem
- ✓ Understood how it is solved today
- ✓ Converged on a potential solution
- ✓ Technical feasibility screening

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Benefits of ML in Products

Why use ML?

Bad reasons:

- Because an executive said so
- Because it's cool

Good reason:

- Because it adds business value for your users:
 - Automation
 - Prediction
 - Personalization

Automation

- Eliminating repetitive, tedious work
- Reducing cost and/or improving quality
- Automation vs. augmentation
- Risks of automation
 - Adaptation to environment
 - Ethical standards
 - Accountability



Prediction

- ML is good at identifying patterns in large quantities of data
- Given sufficient data and right features, non-random phenomenon can be predicted
- Prediction helps support decision-making
- Risks of prediction
 - Changes in the environment
 - Cost of being wrong



Personalization

- ML can “learn” about a user through data collected
 - Preferences
 - Knowledge
- This enables us to deliver more valuable personalized experiences
 - Recommendations
 - Tailored experiences



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ML versus Heuristics

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Heuristics

- Methods of solving problems using a simplified set of rules based on past experience
- Hard-coded business rules rather than machine learning
- Examples:
 - Predicting the mean value
 - Classifying as the most common class
 - Recommending the highest rated

Heuristics versus ML

Benefits of Heuristics

- Easier to create and maintain
- Minimal computational cost
- High interpretability

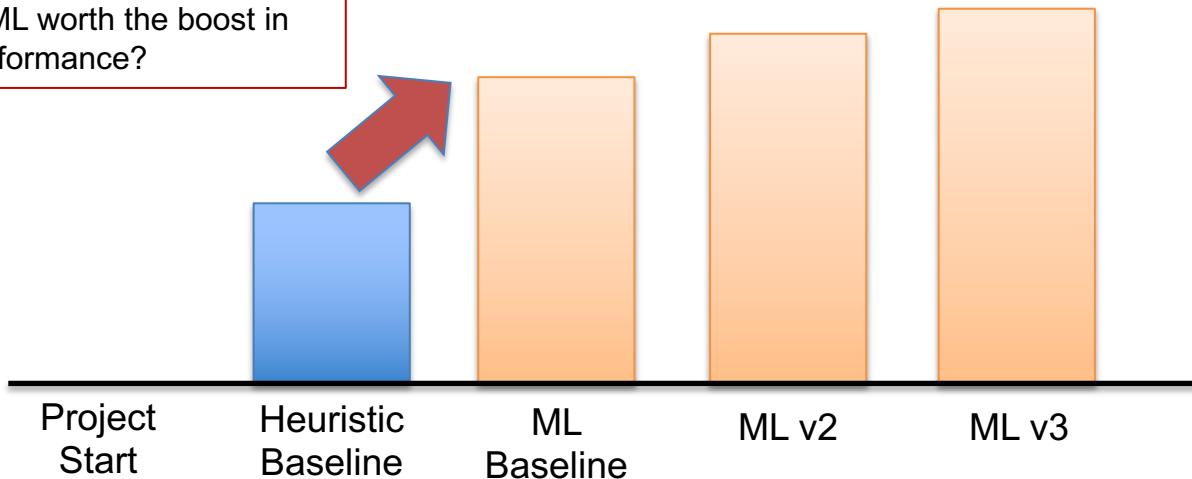
Benefits of ML

- Often better performing
- Can evolve with re-training
- Suitable for a wider range of problems (e.g. big data, computer vision)

Establishing a baseline

Performance

- Is ML necessary to reach a satisfactory level?
- Is ML worth the boost in performance?



The background of the slide is a dark blue-tinted aerial photograph of the Duke University campus. The image shows a dense cluster of buildings, including several large Gothic-style structures and modern concrete and glass buildings. The campus is surrounded by a mix of green trees and some industrial-looking buildings in the distance.

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Wrap-up

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Wrap Up

- Three criteria for identifying good opportunities:
 1. Is there a problem
 2. Can ML help solve it?
 3. Does someone care?
- Validate product ideas before investing time in R&D
- Consider heuristics, at least to set a baseline