Credit One

Analysis of Customer Defaults

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R Framework for Analysis

Practical Data Science with R (Zumel and Mount)

- Define the goals
- Collect and manage data
- Build the model
- Evaluate and critique the model
- Present results and document
- Deploy and maintain the model

Why R Framework?

- Method starts with clear understanding of business goals
- Efficient data analysis remains focused on business goals
- Actionable insights achieved through sound data science structure

Definition of goals

- Business Problem
  - Credit One has seen an increase in customers defaulting on loans in the past year
  - Rising defaults leads to revenue loss for business clients and potential loss of clients for Credit One
- **Project Goals**
  - Identify and understand differences in customer features by default versus no default
  - Find out if we can predict credit limits with 80% or higher level of certainty of not defaulting

Definition of goals

- Resources needed
  - Project team: Stakeholder, Senior Data Scientist, Data Science lead, Operations manager
  - Credit One historical customer data
  - Python data analysis software and associated libraries
  - Kick-off and mid-point project meeting, weekly touch bases with Senior Data Scientist
- Project deployment plan
  - If goals are achieved, predictive model will be deployed by Data Science and Operations team
  - Enhancements and bug fixes to occur weekly following model deployment

Collect and Manage Data

- Data available: Historical dataset of credit card customers
  - 30,000 total observations
  - 25 variables:
    - ID
    - Limit balance
    - Sex
    - Education
    - Marriage
    - Age
    - PAY_0 – PAY_6 (prior 6 month repayment status)
    - BILL_AMT1 – BILL_AMT6 (prior 6 month billing statements)
    - PAY_AMT1 – PAY_AMT6 (prior 6 month payments)
    - Default status

Collect and Manage Data

- Is the data quality good enough?
  - Initial review shows no missing or duplicate data
  - Further analysis is needed to determine if data quality is good enough to achieve goals
- Are there any known issues with data? If so, how will they be addressed?
  - Variable names can be changed to make more understandable
  - Must convert variables with word values to number values so software can analyze data
  - Remove unnecessary rows (header definitions) and columns (ID) irrelevant for data analysis
- **Exploratory data analysis (EDA)** will be conducted to:
  - Identify and understand differences in customer features by default versus no default
  - Identify relationships between variables to determine datapoints most useful for modeling

Predictive Modeling

- Modeling techniques
  - A minimum of 3 models will be built to determine best performing model
  - Feature selection (keeping impactful variables) will occur to optimize model performance
  - Models will be tuned to enhance accuracy
  - Validation steps will be implemented to minimize error
  - Models will be evaluated to determine if accurate enough to meet stakeholder needs

Model Evaluation

- Is the model accurate enough to meet stakeholders' needs?
  - Stakeholders' want to reverse the trend of rising customer defaults
  - Current data reveals that 22% of Credit One customers have defaulted on loans
  - Model accuracy of 80-90% is generally considered successful
  - Further analysis is needed to determine if model meets stakeholders' needs
- Does it perform better than the obvious guess?
  - Further analysis is needed to determine if models perform better than obvious guess
- Do the results of the model make sense in the context of the real-world problem domain?
  - To be determined

Present Results and Document

Present key findings and opportunities to stakeholders by May 23, 2020

- How should stakeholders interpret the model?
- How confident should they be in its predictions?
- When should they potentially overrule the model's predictions?

Simple Outline

- Objective
- Background
- Scope
- Approach
- Recommendations
- Key insights with impact
- Next steps

Deploy and Maintain the Model

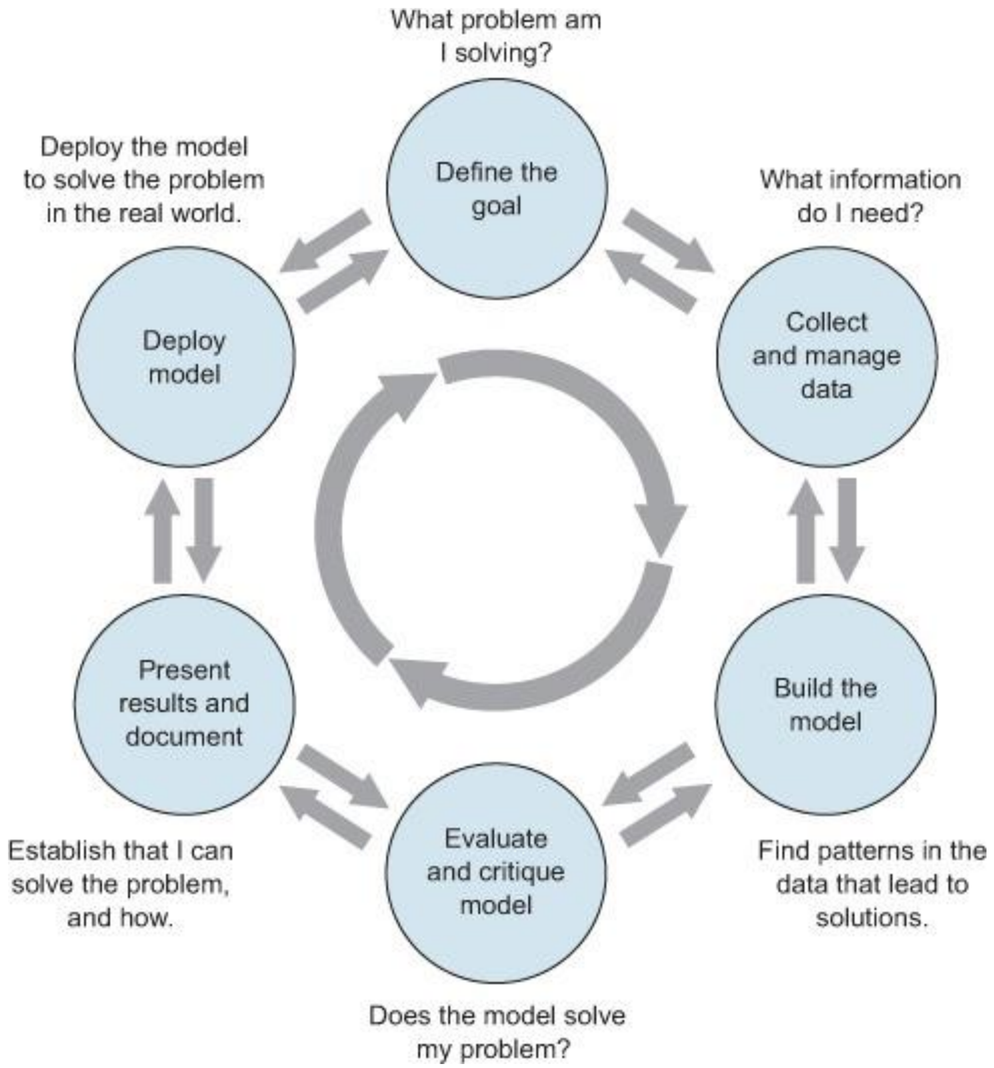
Implement process to ensure model runs smoothly

- How is the model to be handed off to "production?"
- How often, and under which circumstances, should the model be revised?

Visualization of R Framework (Zumel & Mount)

Potential pitfalls (and solutions)

- Business goals are unclear (ask questions in the beginning to clarify)
- Data quality not good enough (recommend additional data variable collection)
- Data is not good enough to meet goals (revisit project design and goal defining stage)
- Model does not solve problem (return to data collection/management and model building stage)
- Recommendations are vague (recommendations should be actionable and have positive impact)



What problem am I solving?

Define the goal

What information do I need?

Collect and manage data

Find patterns in the data that lead to solutions.

Build the model

Does the model solve my problem?

Evaluate and critique model

Establish that I can solve the problem, and how.

Present results and document

Deploy the model to solve the problem in the real world.

Deploy model