Credit One
Default Risk Analysis

- A DATA SCIENCE PROCESS FRAMEWORK -

Overview

- **Credit One Main facts:**
  - A third-party credit rating authority that provides retail customer credit approval services to Blackwell Electronics and other partners
  - The number of customers who have defaulted on their loans have increased over the past year
  - As a credit scoring service provider, Credit One could risk losing business

- **Desired outcome:** Minimize Credit One's partners risk exposure

- **Questions to Answer**

  Which customer attributes might relate to whether or not a customer is likely to default on their current credit obligations?

Data Science Process Framework

- This framework is aligned to the data science process followed in the previous task
- Potential pitfalls:
  - Goals misaligned to the business
  - Poor quality data
  - Not being able to get good predictions after modeling
  - Not buying in from stakeholders
  - Poor deployment and maintenance

(*) Based on Zumel and Mount, Practical Data Science with R, chapter 1

Goals

- Define a Data Science Process to understand how much credit should CREDIT ONE allow someone to use or, if someone should not be approved
- Identify which customer attributes might relate to whether or not a customer is likely to default on their current credit obligations

Collect and Manage Data

- Data Available: Credit.csv file saved to local computer

  Owner: Credit One. Access limited to Data Science team

- Data shape: 30.000 + observations

  25 attributes. See data dictionary

- Data Types: All attributes are objects. Data types Conversions are necessary. Categorical variables need to be represented as numbers and discretization for some variables are needed too

- Other Preprocessing tasks:

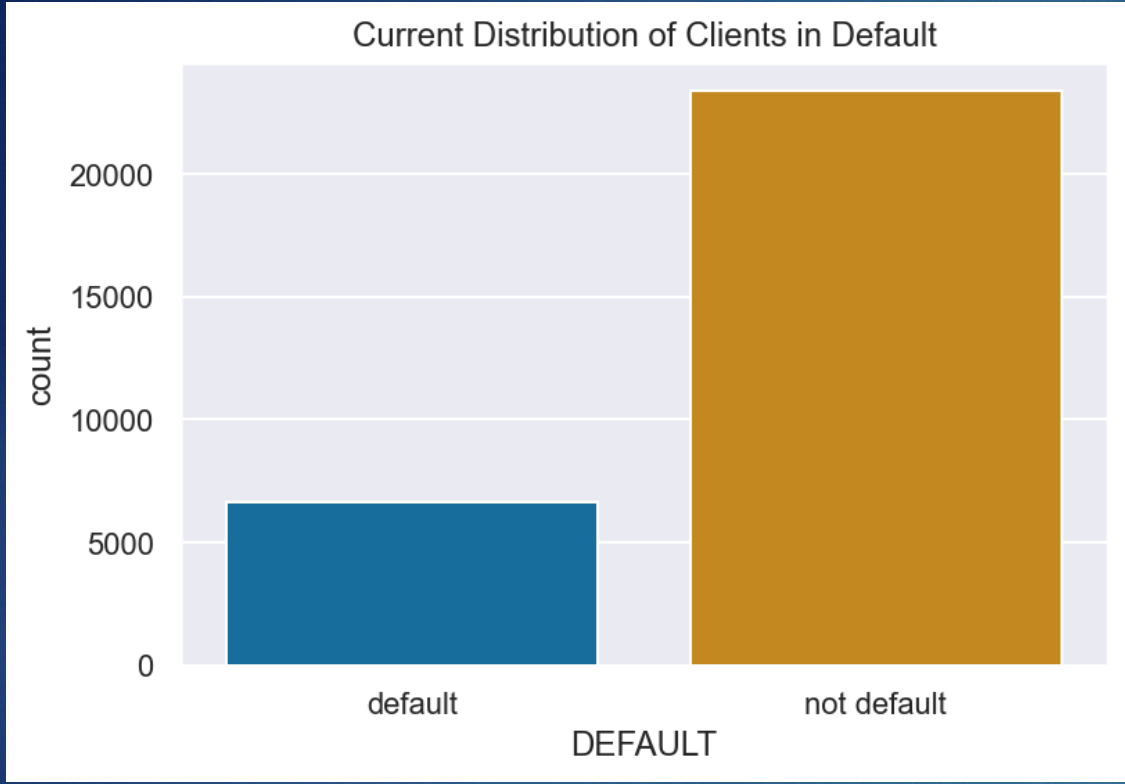
  Will drop these from the data set:

  - First observation corresponds to the attribute description
  - Erase the first observation, once column names have been changed
  - Observation with a Null values (1), and observations with non complaint values (e.g. gender = 'sex')

  Will convert categorical attributes (gender, education and default) to a numerical representation

- Exploratory Data Analysis (EDA): Learn from the data and make relevant visualizations

CreditOne Data Summary



- 23364 clients in good standing
- 6636 clients in default (**22%**)
- There is not information about the current balance
- See CreditProfile to see the dataset information

- It appears that the data quality is good enough after cleaning and preprocessing it
- It would have been desirable to know the current balance not just the balance limit

Build and Evaluate the model

- Target variables to predict:

  Credit Amount (LIMIT_BAL) : Amount of the given credit

  Client Behavior (DEFAULT) : Whether the client is in good standing or not.
- Plan to use Machine Learning Regression methods to predict the targets
- The number of models to implement will depend on the results obtained. (Evaluation) This is an iterative process
- There is no budget constrain, but it is urgent to solve the issue

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Present Results and Document

- The the models built and its results will be presented to the stakeholders
  - Accuracy obtained should be > 85% to have a good level of confidence in the predictions
- The report will include recommendations for its deployment and maintenance

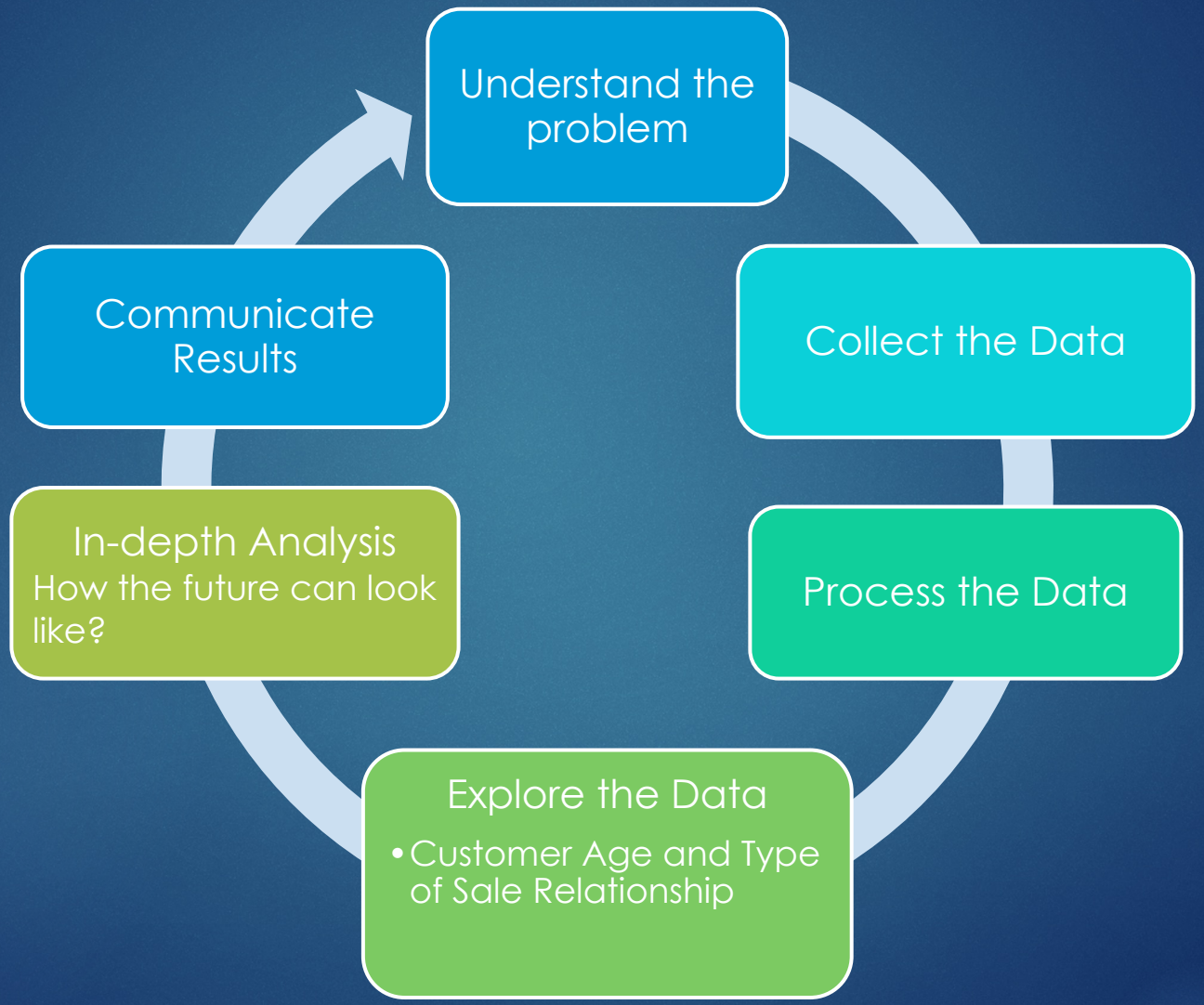
Data Dictionary

Attribute	Description
ID	Unique identifier
LIMIT_BAL	Credit amount
DEMOGRAPHIC DATA	
GENDER(1)	0 = female 1 = male
EDUCATION(2)	0 = other 1 = high school 2 = university 3 = graduate school
MARRIAGE	0 = other 1 = married 2 = single 3 = divorced
AGE	Year

(1) Changed order to reflect categorical encoding output
(2) Changed order to reflect educational level

Attribute	Description
PAY_1 – PAY_6	Monthly Repayment Status: PAY_1 = September 2005 … PAY_6 = April 2005 Key: -2 = No consumption -1 = Paid in full 0 = Use of revolving credit 1 = 1 month payment delay 2 = 2 months payment delay … 8 = 8 months payment delay 9 = 9 months payment delay or more
BILL_AMT_1 - BILL_AMT_6	Monthly bill statement: BILL_AMT1 = September 2005… BILL_AMT5 = April 2005
PAY_AMT1 - PAY_AMT6	Amount previous payment PAY_AMT1 = September 2005… PAY_AMT6 = April 2005
DEFAULT	client's behavior 0 = not default, 1 = in default

Data Mining Approach



(*) Based on AJGoldstein.com Data Science Deconstructed