UNIT 1 ASSIGNMENT

ML in a Nutshell

## Instructions

Many of the apps and websites you use on a daily basis are examples of applications of machine learning. There are three parts to this assignment where you will analyze an example of your choice.

Except as indicated, use this document to record all your assignment work and responses to any questions. At a minimum, you will need to turn in a digital copy of this document to your facilitator as part of your assignment completion. You may also have additional supporting documents that you will need to submit. Your facilitator will provide feedback to help you work through your findings.

**Note**: Though your work will only be seen by those grading the course and will not be used or shared outside the course, you should take care to obscure any information you feel might be of a sensitive or confidential nature

*Complete each assignment part as you progress through the course. Wait to submit the assignment until all parts are complete. Begin your course assignment by completing part one below. Directions to submit your assignment can be found on the final part of the assignment page at the end of Module 1.3: The ML Lifecycle. Information about the grading rubric is available on any of the course assignment pages online. Do not hesitate to contact your facilitator if you have any questions about the assignment.*

Part One

# Using ML for Industrial Decision Making

In this part of the assignment, you will identify a real-life company and a product, feature, or application that is driven by a supervised Machine Learning. Answer the following questions based on that real-life example.

## Questions:

1. What is your chosen Machine Learning example?

Example answer: I would like to recommend suggested Tweets to send to Twitter users in a daily email digest.

Your answer should be a proper Supervised or Unsupervised problem, and should tie back to some real-life company/product.

State the business objective of the underlying Machine Learning algorithm.

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| Example answer: The objective is to keep Twitter users engaged with the app by sending relevant Tweets that encourage them to click and start a new Twitter session.  The objective here should be a business objective or a solvable business/user problem. |

1. What is the label and what are three features that might be used to predict the label?

Example answer: For the Twitter example, you could use email clicks as the label. The features would be aspects of the suggested Tweets, such as 1) the topic of the Tweet, 2) whether or you have engaged with the author’s Tweets in the past, 3) the engagement rate of the given Tweet.

1. Finally, explain why you think Machine Learning is the right approach to achieve the underlying objective. (To help your thought process, think about what the alternative, non-ML solution could have been. Note also that sometimes it may be the case that the use of ML by the company is not well motivated.)

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| Example problem: I could approach this problem using a heuristic, such as most popular Tweets in your network. But I would hypothesize that ML would drive more clicks because the suggestions would be personalized to your particular interests and engagement patterns. |

Part Two

# Recognizing ML Problem Types

In this part of the assignment, you will take your example from the previous part and will further analyze its problem type, classification or regression.

## Questions:

1. What type of problem do you think it represents? Explain why you think your problem is classification or regression given the concepts you explored in this module.

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| Example answer: In the Twitter example, I am predicting whether someone clicks on an email. Since this is a binary outcome, this would be a classification problem. |

1. Give another example of a classification or regression problem that you interact with in your daily life, or one that companies or governments might use.

Example answer: Another example of a classification problem is Google Adwords. Every time I make a search they present ads to me. They choose these ads based on a prediction that I might click on them.

Part Three

# The ML Lifecycle

Imagine that you are working for a telecom company. The management of the company is looking to address the problem of customer churn\*. Your task is to predict which customers are likely to churn.   
In your own words, describe the steps that you would take to address this problem. Focus in particular on the following questions:

* Why is it useful to predict the customers that will churn in the future? How can such knowledge serve the business objectives?
* How would you further formalize the problem? Define, in your own words, what inputs would be useful for your model, and how you would define the target quantity or measure that you would try to predict.
* What kind of methods (supervised or unsupervised) would be appropriate to use? Why?
* What kind of data would you ideally use, and what kind of data do you expect to be available?

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| Below are some ideal answers.   * Predicting customer churn would help us identify which customers are at risk of leaving the company. The company could design interventions to proactively reach out to these customers to prevent them from leaving. One example is to offer a discount for future services. * First, I should know whether a customer canceled their service at a given time. I can use this event as our label. For features, I might look at :1) how much the customer spends each month, 2) whether or not the customer has called customer service in the past 3 months, 3) how old is their current phone plan * Since I have a binary outcome, I think that supervised learning, specifically, classification, is appropriate * I have customer billing records that I can use to define our label, as well as customer activity logs to use for the features. |

*\*Customer churn is the loss of customers or clients and happens when customers decide to stop doing business with a company.* 

*To submit this assignment, please refer to the instructions in the course*.