Executive Data Science Deep Dive

Data Analytics, Machine Learning for Actionable Insights

06.08.2021 Doc Revision Ver: 1.2

Expression of Interest for

Department Head

Department Of Electrical, Electronic And Communication Engineering (EECE)
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EXECUTIVE SUMMARY

[150-200 word summary of the report that provides a high-level overview of use data science and statistics to solve business problems & gain insights into everyday problems]

As a practitioner in the Data Science field, I have seen how almost all the decisions not backed up by data end up not being a successful one. Being a military officer, I understood very early on, how to decide with data and make good decisions. I have seen translating everyday business questions as well as more complex problems into Machine Learning tasks help achieve these goals. In order to make truly data-driven decisions, I aim to get everyone on board starting with Data Analytics to attain the final goal using Machine and Deep Learning.

- Lt Col Rakibul Hassan

Document Revision History

Document Editor	Date	Revision	Additional Document
Lt Col Rakibul Hassan	26-1-2021	1.0	None
Lt Col Rakibul Hassan	20-3-2021	1.1	Proof of Concepts
Lt Col Rakibul Hassan	06-8-2021	1.2	Book links

Overview

Our lives are centered on the idea of “intuition”, - just knowing that something is right or wrong - that we have thought of as God gifted power to individuals. In fact, according to many studies, more than half of the world still relied on their “guts” to decide what to believe, even when confronted with evidence that speaks to the contrary. While “gut feeling” can be a useful tool, it would be a mistake to make all the decisions around the gut feeling only. Here comes the idea of making data-driven decisions.

Data-driven decision-making is the process of using data to inform your decision-making process and confirm action before committing to it. The role of data scientist is to assist the organizations to decide better.

For the last four years in a row, the role of data scientist has been named the world's first preferred job in several subjects. In addition, various Labor Statistics statistics report that the demand for data science skills will boost the 30 percent increase in employment in the sector by 2026. Not only is there a great need, but there is also a significant shortage of data scientists. Here is a flexible, modular, online system designed to fully equip future data professionals, offering a variety of entry points into the world of data science.

Machine Learning and Scientific Research

Whether we have a tendency to take it without any consideration or not, deep learning algorithms have become an indivisible part of our daily lives. Personalized feeds, face and voice recognition, web search, good speakers, digital assistants, email, and plenty of different applications that we have a tendency to can't use half ways that will use deep learning algorithms below the hood.

It is true that, when formulating a problem, it is important to consider whether deep learning provides the right set of tools to solve it. “ “In several settings, deep learning might not be the most effective technique to begin with or best suited to the matter,” many opined. That is why basic understanding of machine learning and deep learning is paramount.

This is how we wanted to circumvent the basic problem.

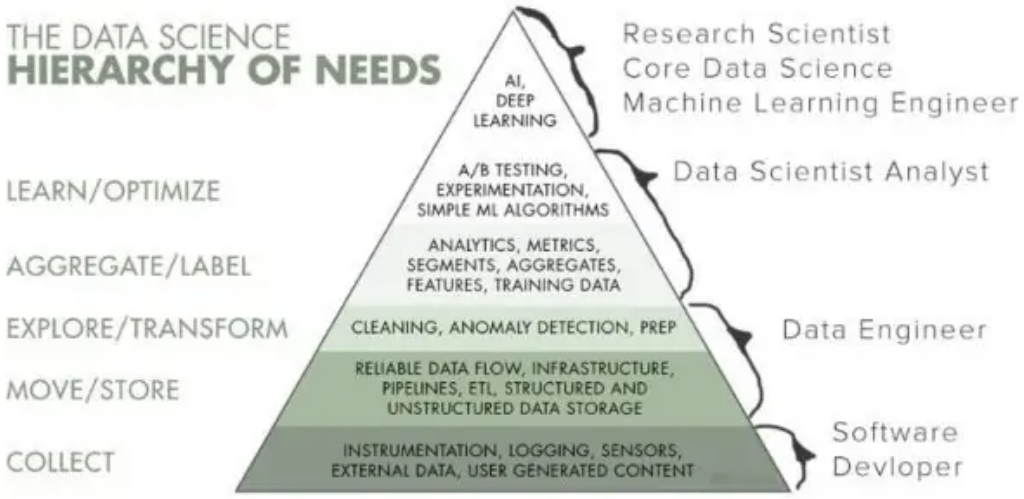
Goals: Becoming Executive Data Scientist

1. The objective of the data scientist is to explore, sort and analyze data from various sources in order to take advantage of them and reach conclusions to optimize Organizational business processes or for decision support.
2. Predictive analytics, fueled by Big Data and Data Science, allows users to scan and analyze all data feeds to stay updated on the latest industry trends. This is useful for assessing risks and taking necessary action for mitigation well in advance.
3. The principal purpose of Data Science is to find patterns within data. It uses various statistical techniques to analyze and draw insights from the data. From data extraction, wrangling and pre-processing, a Data Scientist must scrutinize the data thoroughly.

Finally, he has the responsibility of making predictions from the data. The goal of a Data Scientist is to derive conclusions from the data. Through these conclusions, he is able to assist companies in making smarter business decisions.

Basic Specifications

A skilled Data Scientist will know how to dig out meaningful information with whatever data he comes across. He helps the organization in the right direction. All organizations require strong data-driven decisions at which he's an expert.



The Data Scientist is an expert in various underlying fields of Statistics and Computer Science. He uses his analytical aptitude to solve business problems.

In a path to a career in data science. In this program, we'll learn in-demand skills that will have you understand how to start with data science and make use of it.

Here are some fundamentals that all Data Scientist have in common:

1. Data analytics
2. Machine Learning (Data Engineers)
3. Deep Learning (Data Scientists)
4. Basic understanding of Artificial Intelligence

Data analytics

Data analytics is the collection, transformation, and organization of data in order to draw conclusions, make predictions, and drive informed decision making. It involves manipulating, transforming, and visualizing data in order to infer meaningful insights from the results. Individuals, businesses,and even governments often take direction based on these insights.

Skills we'll gain will include: Data cleaning, problem solving, critical thinking, data ethics, and data visualization

Platforms and tools we will learn include: Presentations, Spreadsheets, SQL, Tableau and Power BI

Machine learning

Machine learning is the science of designing algorithms that learn on their own from data and adapt without human correction. As we feed data to these algorithms, they build their own logic and, as a result, create solutions relevant to aspects of our world as diverse as fraud detection, web searches, tumor classification, and price prediction.

Skills we'll gain will include: Data visualisation for analysis, how these are connected to provide Insight

Platforms and tools we will learn include: R, R Studio, Google Colab for Python and Scikit Learn Environment

Why Machine Learning is Useful in Data Analysis

Machine learning constitutes model-building automation for data analysis. When we assign machines tasks like classification, clustering, and anomaly detection — tasks at the core of data analysis — we are employing machine learning. We can design self-improving learning algorithms that take data as input and offer statistical inferences. Without relying on hard-coded programming, the algorithms make decisions whenever they detect a change in pattern.

Deep Learning

In deep learning, a subset of machine learning, programs discover intricate concepts by building them out of simpler ones. These algorithms work by exposing multilayered (hence "deep") neural networks to vast amounts of data. Applications for machine learning, such as natural language processing, dramatically improve performance through the use of deep learning.

Skills we'll gain will include: Deep neural network layering concept, CNN, etc.

Platforms and tools we will learn include: Google Colab for Python and Tensorflow Environment

Basic understanding of Artificial Intelligence

AI (Artificial Intelligence) is the ability of a machine to perform cognitive functions as humans do, such as perceiving, learning, reasoning and solving problems. The benchmark for AI is the human level concerning teams of reasoning, speech, and vision.

Scope: Not Included, future delivery.

Milestones and Learning Objectives

Total estimation of man Weeks: 04 | Number of Classes each Week: 04 | Total: 16

Modules	Lessons	Learning Objectives
1 - Data Analytics and Decision Science		
1.1	Define and explain key concepts involved in data analytics including data, data analysis, and data ecosystem	Dimensions of data analytics, Discovering data skill sets
1.2	Conduct an analytical thinking self assessment giving specific examples of the application of analytical thinking	How data informs better decisions, Key data analyst skills
1.3	Explain how each step of the problem-solving road map contributes to common analysis scenarios.	Learn how to ask effective questions to make data-driven decisions
1.4	Describe best practices for organizing data, Importing data from spreadsheets and databases	Gain an understanding of data-driven decision-making and how data analysts present findings
1.5	Learn how to form a compelling narrative through data stories	Discover how to use Tableau to create effective visualizations
2 - Basics of Machine Learning (R and Python)		

2.1	What is ML and how to start with Kaggle?	Machine learning definition, how this is connected to kaggle
2.2	How Models Work, Basic Data Exploration, Getting Started With R tutorial for the Kaggle Titanic competition	Data exploration, Exploratory data analysis, Features
2.3	Project Titanic and 7 lines of code for prediction, Your First Machine Learning Model, The Gender-Class Model	data frame, Pandas, R programming, Classification model
2.4	Exploring the possibility of who would survive? Predict the fate of the passengers aboard the RMS Titanic	predictive analysis, classification model with various tools, connecting with Titanic project
2.5	Titanic: Getting Started With R: Decision Trees, same with Python	R programming and python, how to use R to understand from the basics
2.6	Data visualisation for analysis, how these are connected to provide Insight	
3 - Deep Learning, Jupyter Notebook, Python, TensorFlow		
3.1	A Single Neuron: Learn about linear units, the building blocks of deep learning	Neuron, linear units, blocks
3.2	Deep Neural Networks: Add hidden layers to your network to uncover complex relationships	Layers, tensor, non-linearity, scaler, vector, matrix, numpy array
3.3	Deep neural network layering concept, CNN, how to apply?	MNIST datasets, The Activation Function, rectified linear unit or ReLU, Stacking Dense Layers
3.4	Stochastic Gradient Descent: Use Keras and Tensorflow to train your first neural network	The loss function, regression problems mean absolute error, the optimizer, Learning Rate and Batch Size
3.5	Overfitting and Underfitting: Improve performance with extra capacity or early stopping	Interpreting the Learning Curves, Capacity, early stopping, call back, train a model with early stopping
3.6	Dropout and Batch Normalization: Add these special layers to prevent overfitting and stabilize training	Adding dropout, adding batch normalisation, using dropout and batch normalisation
3.7	Binary Classification: Apply deep learning to another common task	Accuracy and Cross-Entropy, Making Probabilities with the Sigmoid Function Binary Classification
4 - Project: MNIST Andriod App (Self Learning)		
5.1	Digit classification using a mnist data set, Using tensorflow Lite, Use of inference in mobile devices	Use of an app to build a machine learning back and solution
5.2	Use of Android studio, Tensorflow Lite, model download and installation inside the app	Understanding how Android an tensorflow ecosystem works

Initial Tool Deployment

Modules Delivered	Timeframe	Tools
1 - Data Analytics and Decision Science	5 Classes	MS Excel, Google Sheet, Tableau and Power BI
2 - Basics of Machine Learning (R and Python)	6 Classes	R, R Studio, Google Colab for Python and Scikit Learn Environment
3 - Deep Learning, Jupyter Notebook, Python, TensorFlow	7 Classes	Google Colab for Python and Tensorflow Environment
4 - Project: MNIST Android App (Self Learning)	Self Learning worth 2 Classes	Android Studio, Google Colab for Python and Tensorflow Environment

Learning Management Delivery

1. Google Meet or
2. Zoom

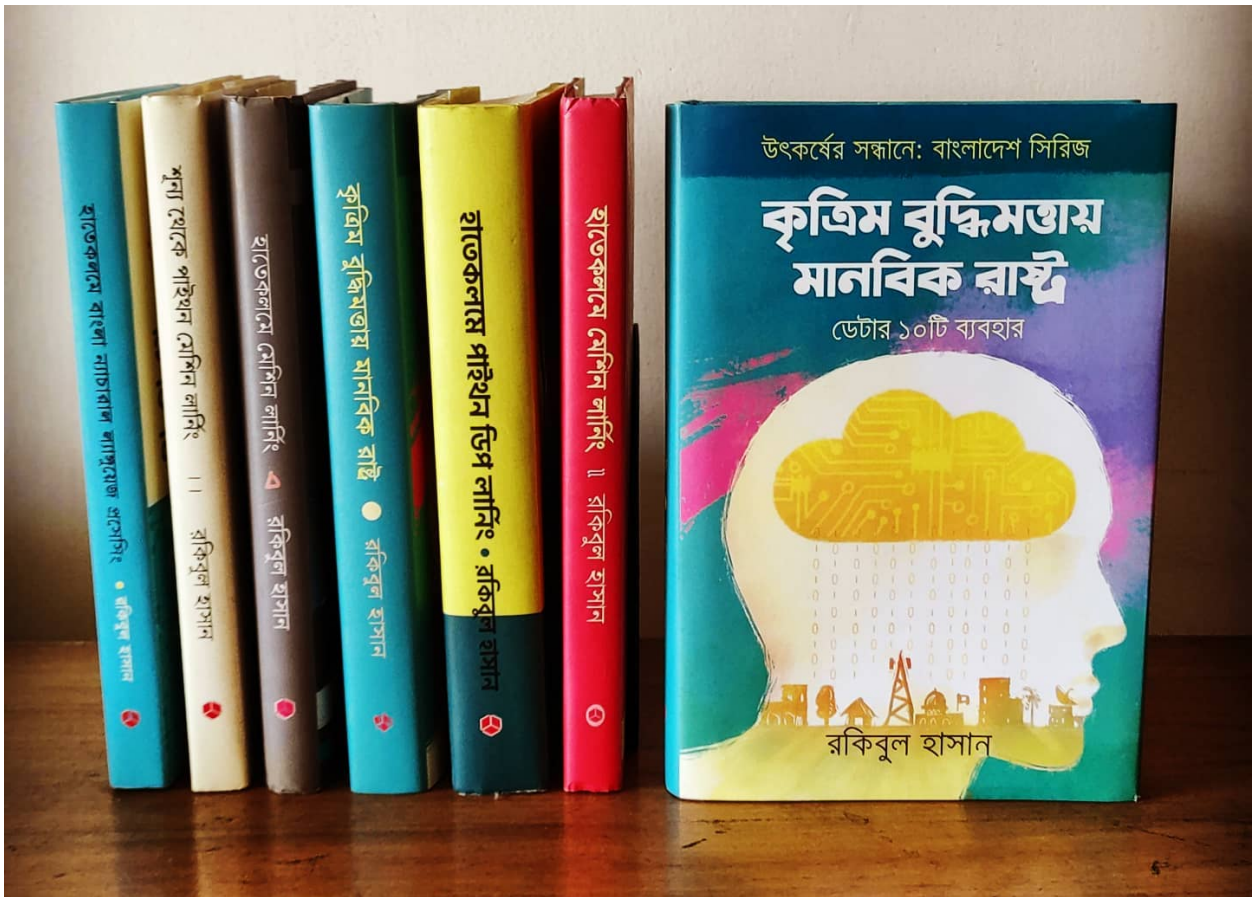
No Special Hardware Required

All the hands-on training and tutorials will be done on a cloud platform, namely on R Studio cloud and Google Colab.

Milestones and Learning Objectives are Subjected to Change

a. Based on the Dynamic input parameters from the students, the teaching milestones and learning objective will change since it mostly depends on students uptake.
b. It's what the student can do after each unit has been introduced. Their choice of materials, topics and logical structured presentation of a lesson has a direct influence on the objectives or goals I want your students to achieve.

Study Materials



Proof of Concept

c. https://aiwithr.github.io/mentorship/
d. https://aiwithr.github.io/courses/
e. https://aiwithr.github.io/ai-policy-makers/

Assisted Programs, I'm indebted to:

f. Grow with Google 3 Courses
g. Coursera 12 Courses
h. Microsoft 3 Courses
i. kaggle Python, ML courses
j. And Many more.

Popular Learning Tracks:

1. Machine Learning (ML) with RStudio Cloud
2. ML with Python
3. Deep Learning with Python
4. And Many more.

Signatures

Trainer	Procurement Entity
Date:	Date: