



UNIVERSIDAD DISTRITAL FRANCISCO JOSÉ DE CALDAS
FACULTAD DE INGENIERIA

SYLLABUS

MAESTRÍA EN INGENIERÍA INDUSTRIAL

NOMBRE DEL DOCENTE:

ESPACIO ACADÉMICO (Asignatura): MACHINE LEARNING: MODELS & TOOLS

Obligatorio (X) : Básico () Complementario ()

Electivo () : Intrínsecas () Extrínsecas ()

CÓDIGO:

NUMERO DE ESTUDIANTES:

GRUPO:

NÚMERO DE CREDITOS: 4

TIPO DE CURSO: TEÓRICO PRACTICO TEO-PRAC:

Alternativas metodológicas:

Clase Magistral (X), Seminario (), Seminario – Taller (), Taller (X), Prácticas (), Proyectos tutoriados (), Otro: _____

I. OVERVIEW

We are in the Data Era: almost every conceivable human or otherwise automated activity generates continuous streams of raw data containing a rich source of hidden, precious information about the actions or phenomena that generates them. Discovering such underlying information (clue: Learning) requires suitable algorithms and computation machinery to perform this task efficiently and automatically (clue: Machine) yielding decision-makers or controllers useful insights about how to improve, grow or benefit from models built upon their data.

This course will guide graduate students through different machine learning models and tools focusing on business and industrial applications (clue: Practical); it will provide advice on concepts and pragmatic skills needed to appropriately apply machine learning on hands-on analytics projects.

II. WHY THIS COURSE?

Machine learning is a flavor of artificial intelligence enabling computer systems to learn from examples, data, and experience rather than follow pre-programmed rules. In this way, these “machines” are able to discover patterns, detect anomalies and adapt models to execute complex tasks usually associated to human intelligence.

Recent years have seen an increasing usage of machine learning in common day situations, such as image recognition systems used in medical diagnostics, video analysis systems in self-driving vehicles, voice recognition systems used by virtual personal assistants, and recommender

systems deployed in online shops. As long as research progresses in this field, machine learning would become a disruptive technology in many areas of engineering, originating significant opportunities for social and economic development.

CONTENIDO SINTÉTICO

UNIT 1 MACHINES THAT LEARN

- Machine learning vs Data mining vs Data Science vs Analytics
- Tools for ML: programming languages and software suites.

UNIT 2 SUPERVISED LEARNING

- Classification: binary, multi-class.
- Regression & prediction.
- Kernel machines.
-

UNIT 3 UNSUPERVISED LEARNING

- Clustering.
- Dimensionality reduction.
- Novelty detection.

UNIT 4 MACHINE LEARNING IN PRACTICE

- Data & feature preparation.
- Model validation.
- Generalization vs overfitting.
- Prototyping & production.
- Ensemble learning.

BIBLIOGRAFÍA BÁSICA

- Ethem Alpaydin. *Introduction to Machine Learning*, 3rd Edition, MIT Press, 2014.
- Sarah Guido & Andreas Müller. *Introduction to Machine Learning with Python*, O'Reilly Media, 2016.
- Sebastian Raschka & Vahid Mirjalili. *Python Machine Learning*, 2nd Edition. Packt Publishing, 2017.
- Kelleher, Mac Namee & D'Arcy. *Fundamentals of Machine Learning for Predictive Data Analytics*, MIT Press, 2015.
- Peter Harrington. *Machine Learning in Action*, Manning Publications, 2012.
- Brink, Richards, and Fetherolf. *Real-World Machine Learning*, Manning Publications, 2016.