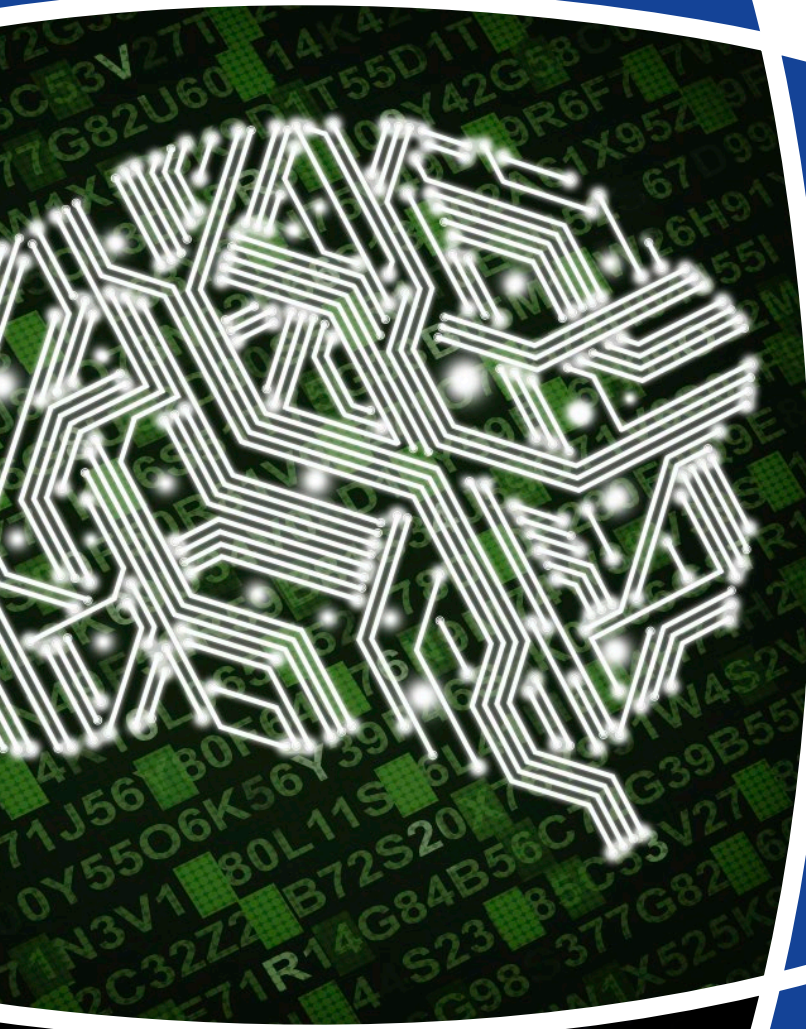




CSA Global
Mining Industry Consultants



TRAINING OUTLINE

INTRODUCTION TO MACHINE LEARNING



This two-day training course is designed for geologists, geophysicists or professionals working in the mining industry.

Be introduced to the practice and theory of machine learning.

REALISE YOUR POTENTIAL

Machine learning is a collection of computer algorithms that iteratively learn from data how to solve problems with minimal human intervention.

This technique has been used successfully to predict exploration targets, classify rocks, and generate automatic 3D geological interpretations, among other applications. Its popularity in the mining industry is growing at an accelerated rate and will become an essential tool in the near future.

We will demonstrate the basics of machine learning techniques and workflows, including when to use it, how to prepare data, and how to recognize that datasets have limitations to solve certain machine learning problems. This course will also explore how to select features in the dataset, including how to validate, test and interpret results.

LEARNING OUTCOMES

Upon completion of this course, you will be able to:

- Understand what machine learning is and what it is used for.
- Identify different types of software to conduct machine learning.
- Recognise general concepts and workflows.
- Learn how to select meaningful features from a database.
- Become familiar with data preparation and data issues.
- Acquire skills to train, validate and test machine learning algorithms.
- Understand large groups of machine learning techniques for classification and regression.
- Possess the tools and skills to conduct machine learning with their own set data.

WHO IS THIS COURSE FOR?

This two-day training course is designed for geologists, geophysicists and professionals working in the mining industry.

A strong background in mathematics or previous knowledge of machine learning is not required to undertake this course. If you are already a data scientist, then you may find our advanced course is more suitable.

If your role is to make sense of your data or to automatize tedious tasks, such as core logging, then this training course is for entirely for you.

DELIVERY-MODE

- In classroom, on site or online.
- This course is presented as a two-day (16 hour) program.
- Online courses are offered in four separate sessions comprising of 4 hours each.

The benefits of studying in a classroom setting offers participants an opportunity to share first-hand experiences, ideas and questions with peers and your expert facilitator. You'll study alongside like-minded people from industry and help to strengthen your network.

COST:

\$CAD1400.00

TIME

9:00 AM – 5:00 PM

WHAT'S INCLUDED?

- Comprehensive course notes
- Practical exercises and demonstrations using software with graphical interface
- Exposure to Python programming language
- Sample data
- FREE software use
- Morning tea, lunch, and afternoon tea (optional)

WHAT DO I REQUIRE?

Your laptop with 64 bits Windows 7 or higher, including internet connection.

OUR FACILITATOR

Our facilitator is an experienced practitioner with a robust mix of academic and practical expertise.



ADRIAN MARTINEZ VARGAS
P.Ge, Ph.D. in Geological Sciences, ISMM Maa.
Specialist in Geostatistics (CFSG), Paris Mining
School. B.Eng. Geology, ISMM Maa

Adrian is both a geologist and a geostatistician. He produces open source software for geostatistics and mineral resources in Python, Fortran, Cython, C and SQL.

He has worked as a consultant since 2002 covering many commodities including gold, copper, nickel, chromium, and raw material for cement industry.

Adrian has considerable experience using multiple indicator kriging for resource estimation of gold deposits with high nugget and dominating issues; with non-linear geostatistics and with conditional simulations for resource estimation and model validation.

Adrian has previously worked as an Assistant Professor in Cuba and Ethiopia, teaching geology and geostatistics.

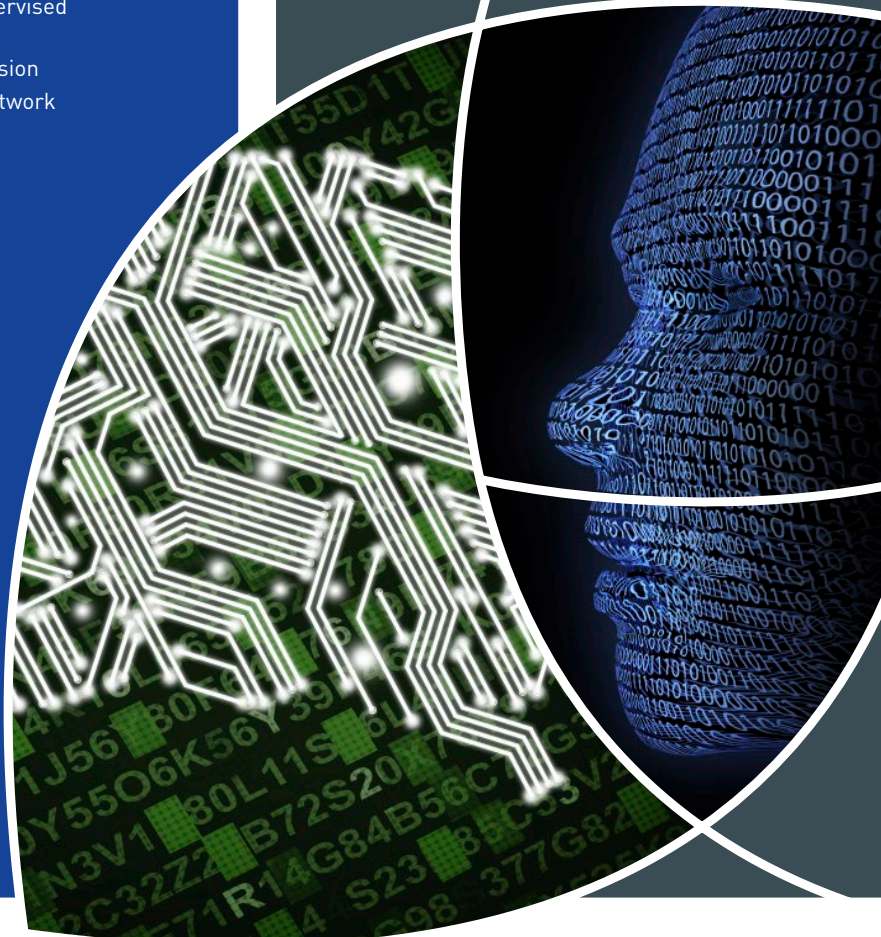
AGENDA ● ● ● ●

Day 1

- Introduction to machine learning
 - Exercise 1: Installing the software
 - Some general concepts: The learning workflow; data collection and analysis; unbalanced datasets; variable scale
 - Exercise 2: Reviewing data and EDA
 - Data preparation tasks: Cleanup, feature selection, data representation, data splits
 - Exercise 3: Feature selection
 - Exercise 4: Data preparation
 - Training, validating and testing
 - Exercise 5: Validation
 - Machine learning techniques and models for: supervised classification
 - Exercise 6.1: Nearest neighbor
 - Exercise 6.2: Naïve Bayes.
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Day 2

- Exercise 6.3: Logistic Regression
- Exercise 6.4: Classification Tree
- Exercise 6.5: Random Forest and AdaBoost
- Exercise 6.6: SVS for rock classification
- Exercise 6.7: Interpreting results
- Exercise 6.8: Using results in production
- Exercise 7: SVS for 3D lithology modeling
- Machine learning techniques and models for: unsupervised classification
- Machine learning techniques and models for: regression
- Machine learning techniques and models: Neural network and deep learning
- Exercise 8: Deep learning game
- Conclusions.





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