



# ARTIFICIAL INTELLIGENCE PROFESSIONAL CERTIFICATE



CAIPC® Version 062021

**CertiProf**®

## Artificial Intelligence Professional Certificate CAIPC<sup>®</sup>

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## Introduction

In 1959, Arthur Samuel, a computer scientist who pioneered the study of artificial intelligence, described machine learning as “the study that gives computers the ability to learn without being explicitly programmed.” Alan Turing’s seminal paper (Turing, 1950) introduced a benchmark standard for demonstrating machine intelligence, such that a machine has to be intelligent and responsive in a manner that cannot be differentiated from that of a human being.

Machine Learning is an application of artificial intelligence where a computer/machine learns from the past experiences (input data) and makes future predictions. The performance of such a system should be at least at human level.

This certification focuses on clustering problems for unsupervised machine learning with K-Means algorithm. For Supervised machine learning we will describe the classification problem with a demonstration of design trees algorithm and the regression one with an example of linear regression.

## Learning Objectives

- Understand the fundamentals of artificial Intelligence and machine learning
- Describe the methods of machine learning: supervised and unsupervised
- Use the data analysis for decision-Making
- Understand the limits of algorithms
- Understand and grasp Python programming, essential mathematics knowledge in AI, basic programming methods

## Exam Format and Duration

This study program has an exam in which the candidate must achieve a score to obtain the certification in Artificial Intelligence Professional Certificate CAIPC®

- Format: Multiple choice
- Questions: 40
- Language: English, spanish and portuguese
- Pass Score: 32/40 or 80%
- Duration: 60 minutes
- Open book: No
- Delivery: This examination is available Online
- Supervised: it will be at the discretion of the Partner

## Eligibility for Certification

- Anyone interested in expanding their knowledge in artificial intelligence and Machine
- Engineers, analysts, marketing managers
- Data Analysts, Data Scientists, Data Stewards
- Anyone interested in Data Mining and Machine Learning techniques

## Content

### Machine Learning Fundamentals

Machine Learning Fundamentals

#### I.1 Key Points

Supervised Machine Learning  
Unsupervised Machine Learning  
Reinforcement Machine Learning

#### I.2 Introduction to K-Nearest Neighbors

Introduction  
Introduction to the Data  
K-nearest Neighbors  
Euclidean Distance  
Calculate Distance for All Observations  
Randomizing and Sorting  
Average Price  
Functions for Prediction

#### I.3 Evaluating Model Performance

Testing Quality of Predictions  
Error Metrics  
Mean Squared Error  
Training Another Model  
Root Mean Squared Error  
Comparing MAE and RMSE

#### I.4 Multivariate K-Nearest Neighbors

Recap  
Removing Features  
Handling Missing Values  
Normalize Columns  
Euclidean Distance for Multivariate Case  
Introduction to Scikit-learn  
Fitting a Model and Making Predictions  
Calculating MSE using Scikit-Learn  
Using More Features  
Using All Features

#### I.5 Hyperparameter Optimization

Recap  
Hyperparameter Optimization  
Expanding Grid Search

Visualizing Hyperparameter Values

## **I.6 Cross Validation**

Concept

Holdout Validation

K-Fold Cross Validation

## **I.7 Guided Project: Predicting Car Prices**

Guided Project: Predicting Car Prices

## **II Calculus For Machine Learning**

Calculus For Machine Learning

Understanding Linear and Nonlinear Functions

Understanding Limits

Finding Extreme Points

## **III Linear Algebra For Machine Learning**

Linear Algebra For Machine Learning

Linear Systems

Vectors

Matrix Algebra

Solution Sets

## **IV Linear Regression For Machine Learning**

Linear Regression For Machine Learning

The Linear Regression Model

Feature Selection

Gradient Descent

Ordinary Least Squares

Processing And Transforming Features

Guided Project: Predicting House Sale Prices

## **V Machine Learning in Python**

Logistic Regression

Introduction to Evaluating Binary Classifiers

Multiclass Classification

Overfitting

Clustering Basics

K-means Clustering

Guided Project: Predicting the Stock Market

## **VI Decision Tree**

Decision Tree

Why use Decision Trees?

Decision Tree Terminologies

How Does the Decision Tree Algorithm Work

Pruning: Getting an Optimal Decision Tree

Advantages of the Decision Tree

Disadvantages of the Decision Tree

Python Implementation of Decision Tree

Guided Project: Predicting Bike Rentals

References and Bibliography