

Deep Learning Introduction

Tech Lead Data Science

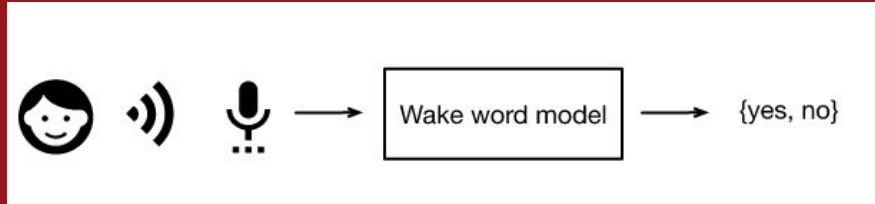
Master en Data Science
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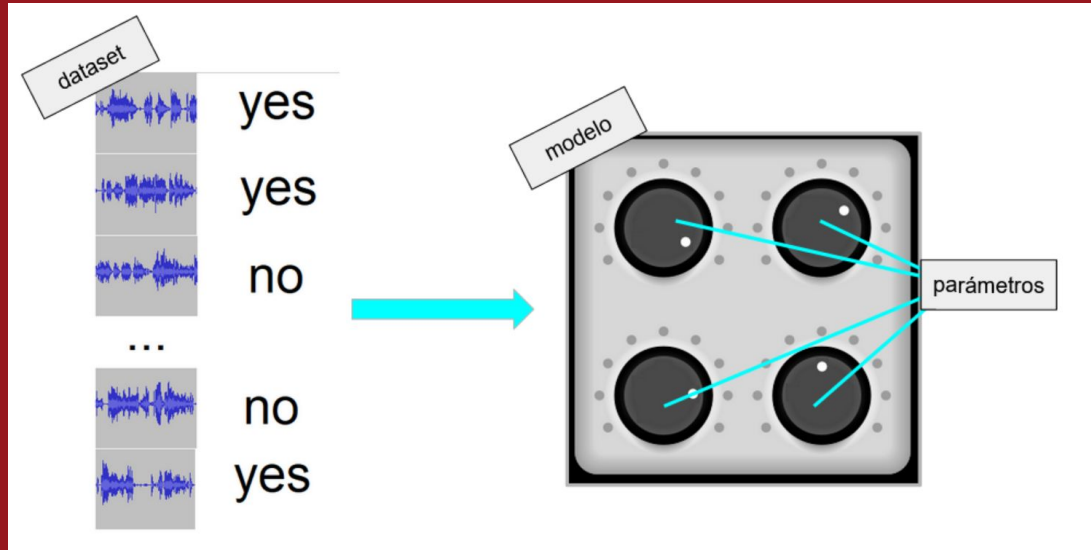
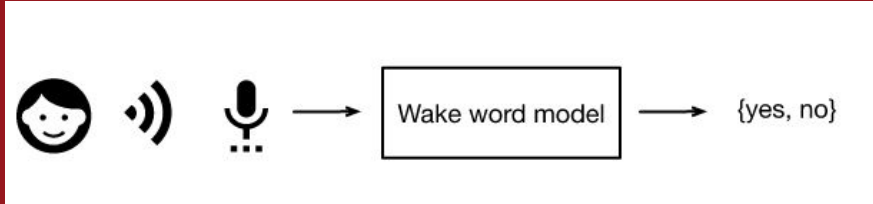
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INTRODUCTION

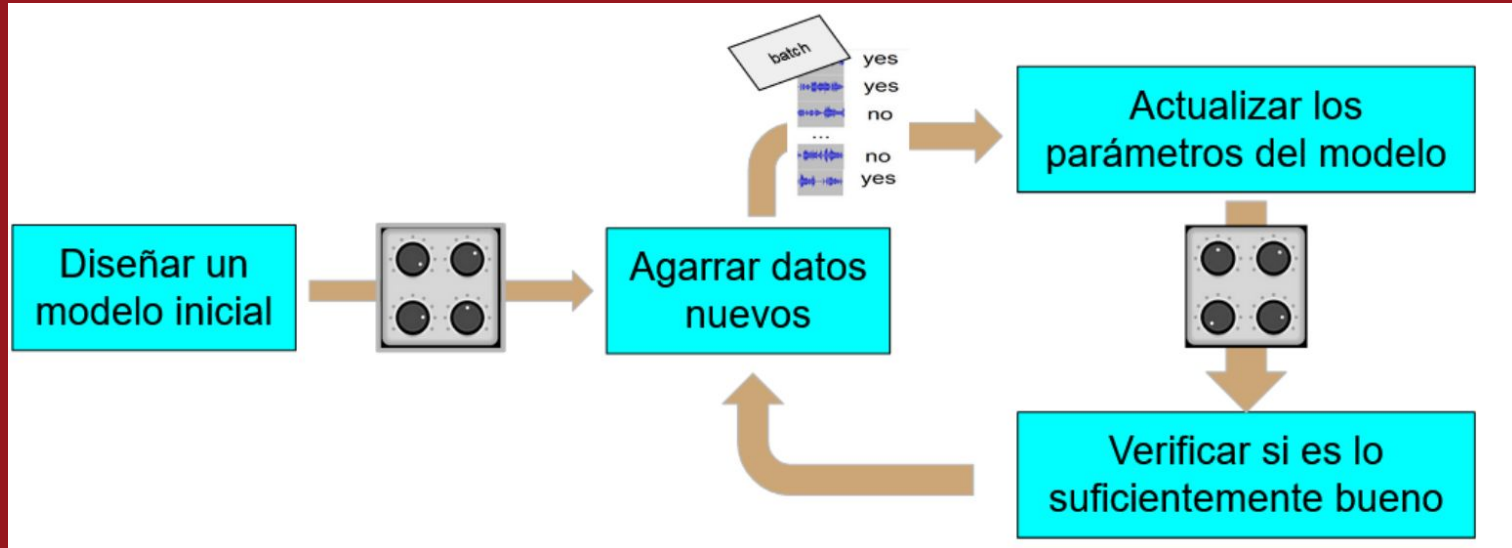
INTRODUCTION



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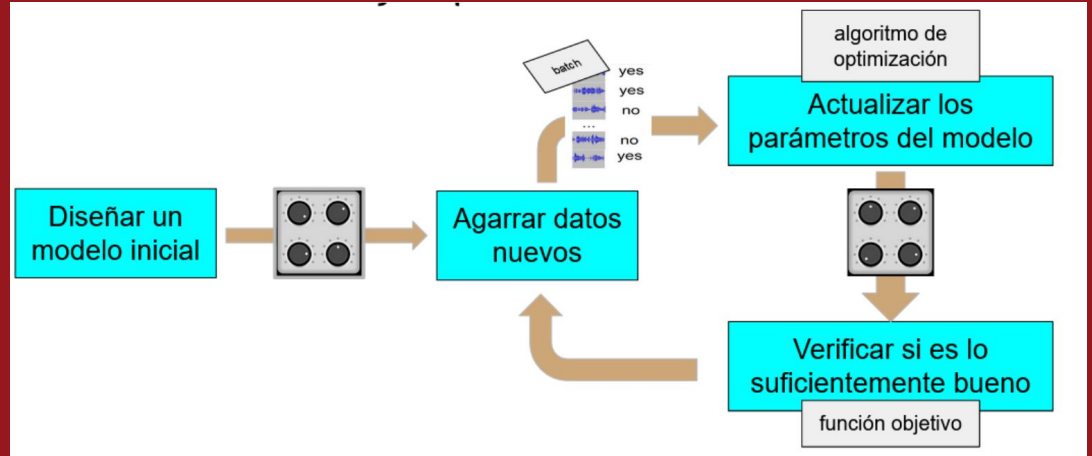
INTRODUCTION



KEY COMPONENTS

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- **Data** from which we can learn.
- A **model** that helps us to make decisions about new data.
- A **loss function** that quantifies how well is the model working.
- An **optimization algorithm** that adjusts the parameters of the model trying to optimize the function.



DATA

DATA

	Feature_1	Feature_2	Target
Observation_1	Independent Variable	Independent Variable	Dependent Variable
Observation_2	Independent Variable	Independent Variable	Dependent Variable
Observation_3	Independent Variable	Independent Variable	Dependent Variable

DATA

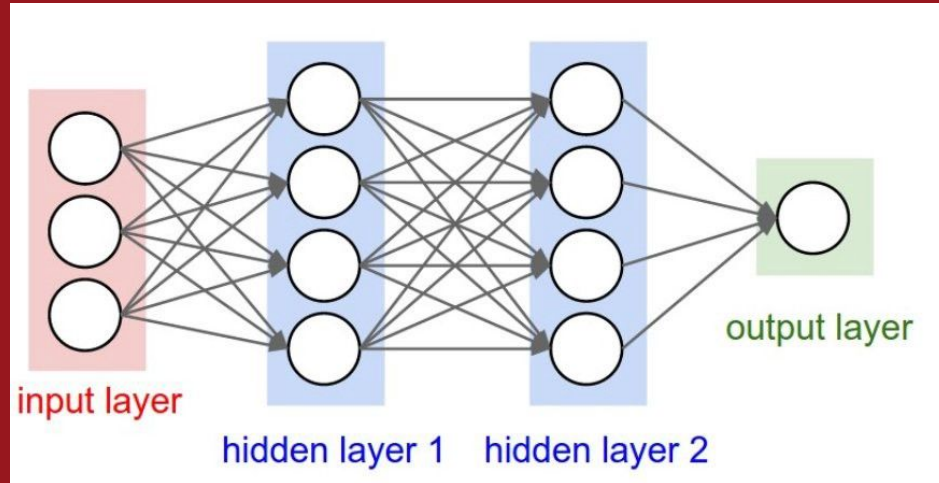
- DL can handle data of variable length.
- DL works better when we train it with huge amount of data.

	Feature_1	Feature_2	Target
Observation_1	Independent Variable	Independent Variable	Dependent Variable
Observation_2	Independent Variable	Independent Variable	Dependent Variable
Observation_3	Independent Variable	Independent Variable	Dependent Variable

MODELS

MODELS

- We'll define a DL model as the computational machinery that uses labeled data to make predictions about new data.
- The models will consist in successive transformations of data that are chained in a top-down logic.



LOSS FUNCTIONS

LOSS FUNCTIONS

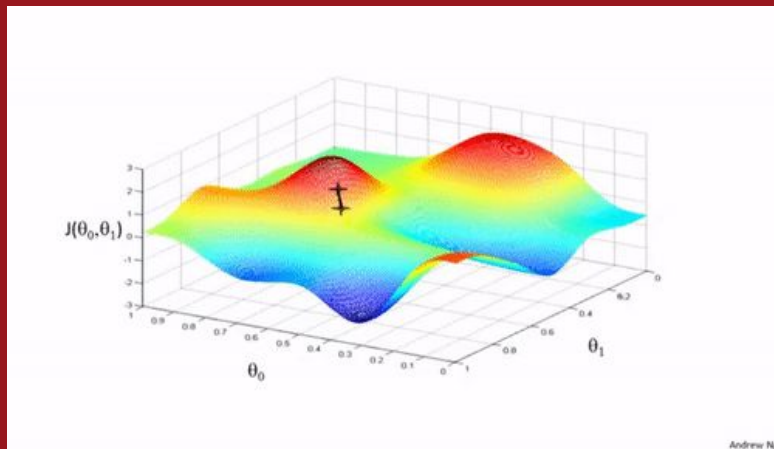
- In the context of an optimization algorithm, the function used to evaluate a candidate solution (i.e. a set of weights) is referred to as the loss or objective function.
- We may seek to maximize or minimize the objective function, meaning that we are searching for a candidate solution that has the highest or lowest score respectively.
- The most common loss functions are:
 - For classification:
Log loss
 - For regression:
Mean squared error loss

OPTIMIZATION ALGORITHMS

OPTIMIZATION ALGORITHMS

In deep learning, the most popular optimization algorithms are based in **gradient descent**:

The idea is to take repeated steps in the opposite direction of the gradient (or approximate gradient) of the function at the current point, because this is the direction of steepest descent.



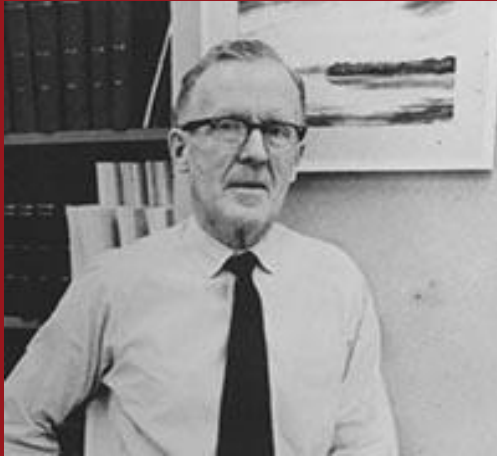
A BIT OF HISTORY



A BIT OF HISTORY

Donald Hebb (1904-1985)

The Organization of Behavior



- Neurons learn from positive reinforcement.
- We must reinforce the desirable behavior and decrease undesirable behavior to obtain good parameter fitting in a neural network.