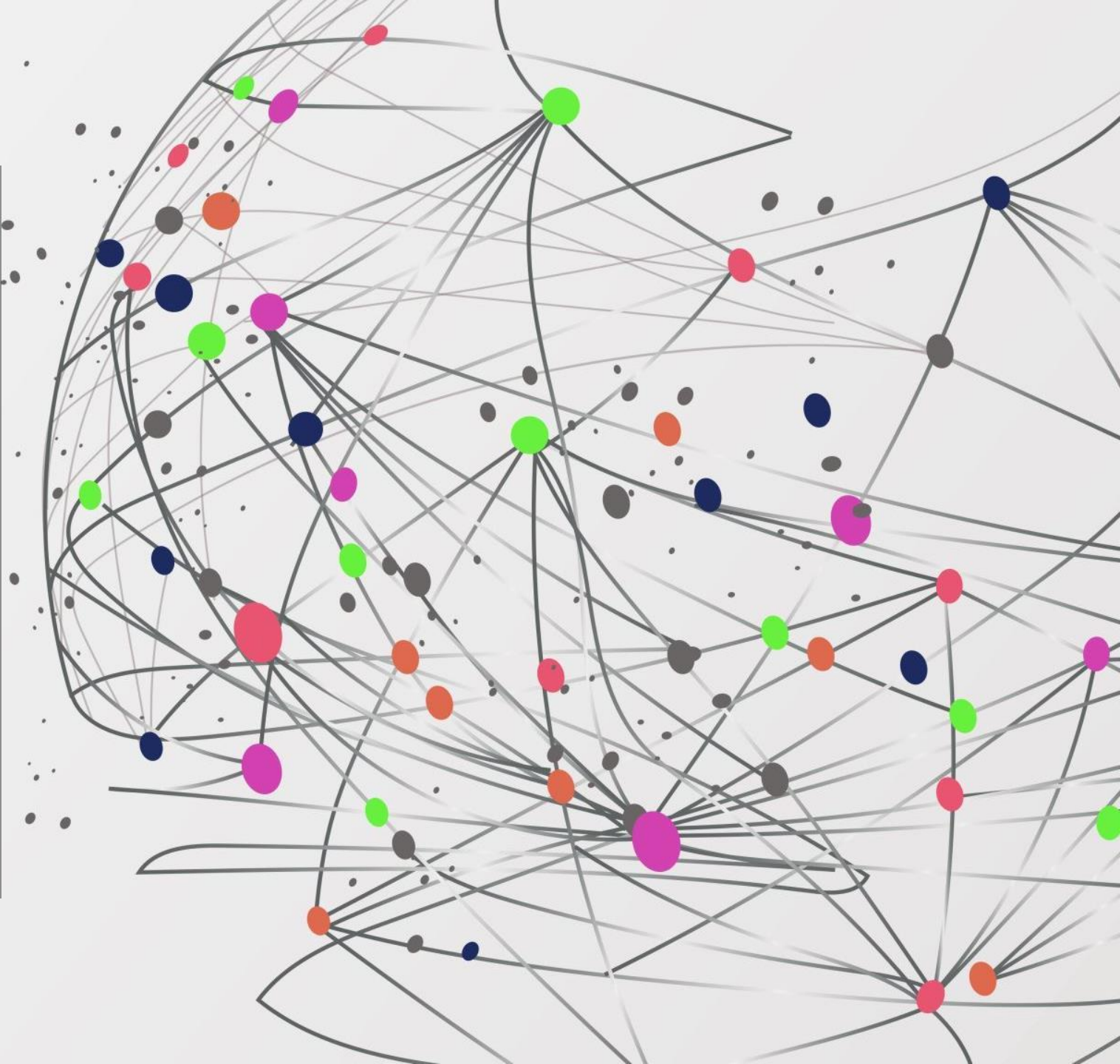
Machine Learning Intro



Why the need of using Machine Learning Techniques

Traditional Programming vs. Machine Learning

- Specially useful for complex problems (e.g., recognizing handwriting, detecting fraud, predicting customer behavior).
- ML allows computers to learn patterns from data rather than requiring explicit programming.

Why the need of using Machine Learning Techniques

Explosion of data

- We generate massive amounts of data daily (social media, sensors, medical records, etc.).
- Extracting meaningful insights from this data manually is impossible.

Why the need of using Machine Learning Techniques

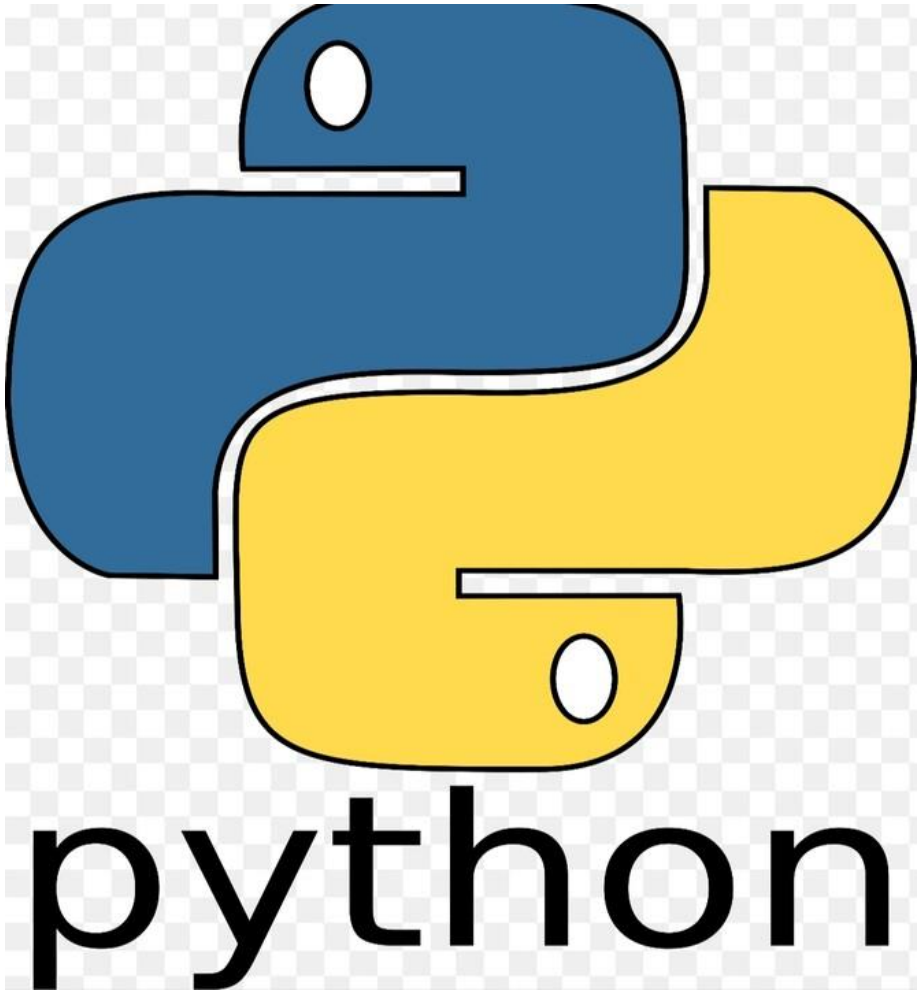
Handling Complexity

- Many real-world problems involve relationships that are too complex to model with simple equations.
- ML models, especially deep learning, can handle high-dimensional, non-linear data more effectively than traditional approaches.

Why the need of using Machine Learning Techniques

Applications in Real Life

- **Healthcare:** Disease diagnosis, personalized medicine.
- **Finance:** Fraud detection, algorithmic trading.
- **Marketing:** Recommendation systems (Netflix, Amazon).
- **Autonomous Systems:** Self-driving cars, robotics.
- **Natural Language Processing:** Chatbots, language translation.



Why Python?

- Ease of Learning & Readability
- Rich Ecosystem & Libraries
- Python has one of the largest **open-source communities**, providing **strong support** through forums like Stack Overflow and GitHub.

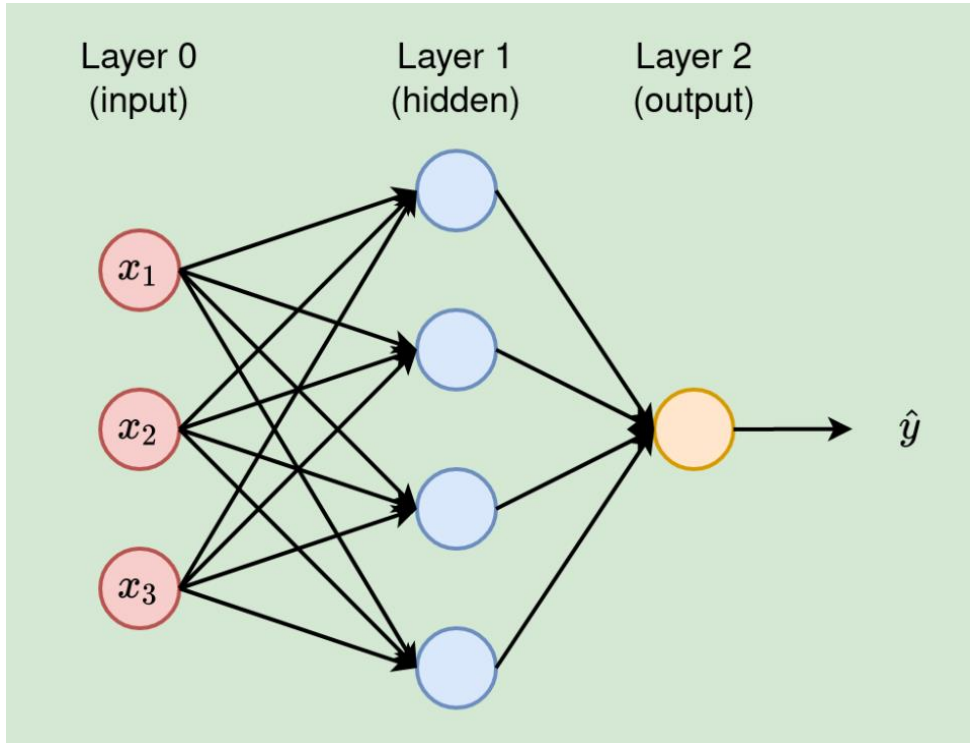
Course Structure

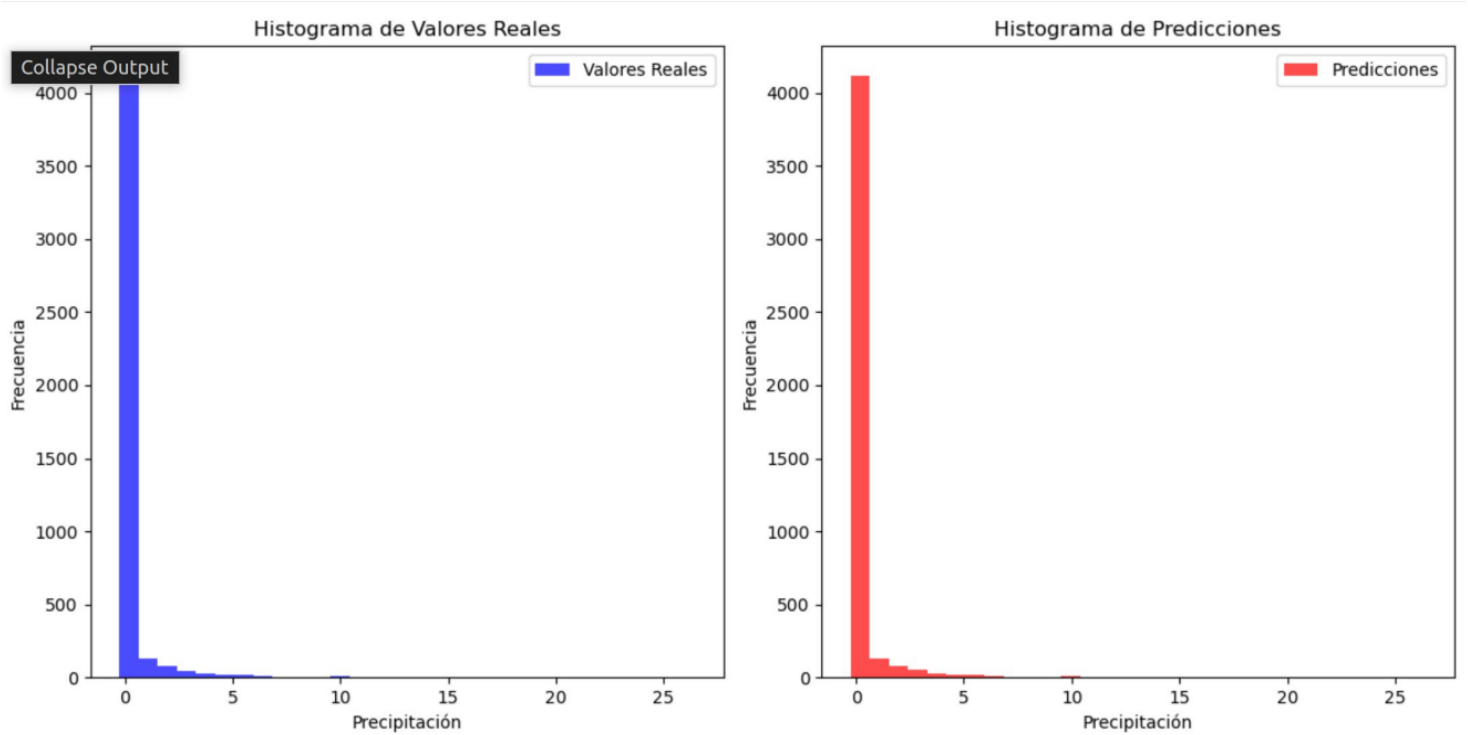
- Python Intro(2 weeks)
- Comprehensions
- Numpy
- Pandas
- Machine Learning models(2 weeks)
- Image Processing
- Natural Language Processing

Past Projects

- Predicción de Precipitaciones utilizando una Red Neuronal Feedforward

El objetivo de este proyecto era desarrollar un modelo de predicción de precipitaciones para ESPOLETA Tecnologías, permitiendo la integración de esta funcionalidad en sus estaciones meteorológicas

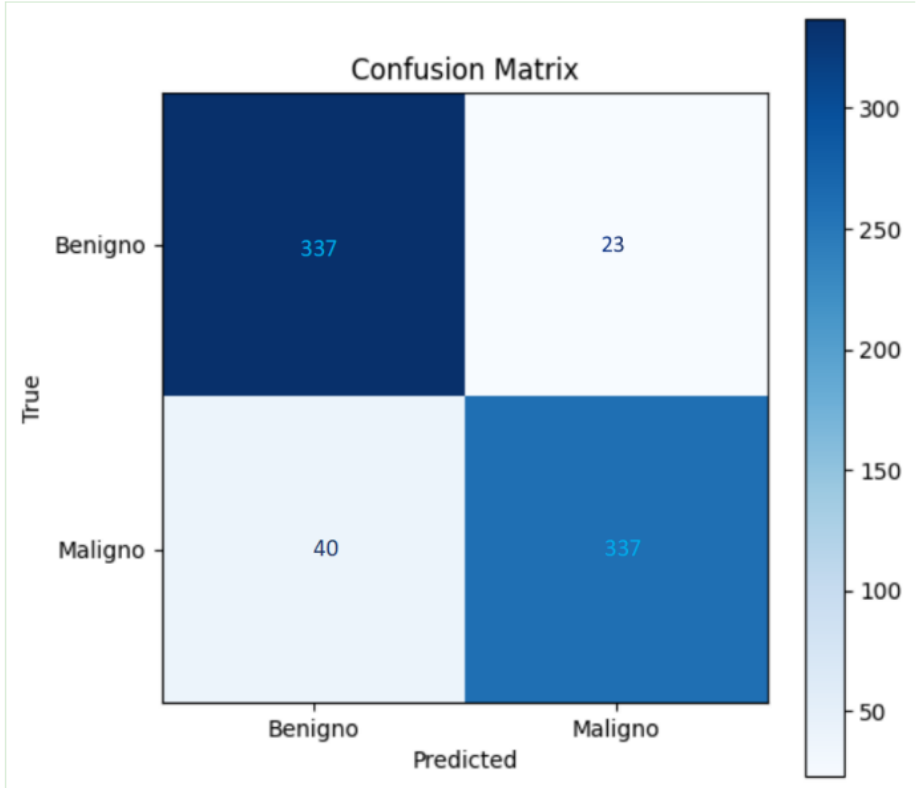

Layer 0
(input)
Layer 1
(hidden)
Layer 2
(output)
x_1
x_2
x_3
$\hat{y}$

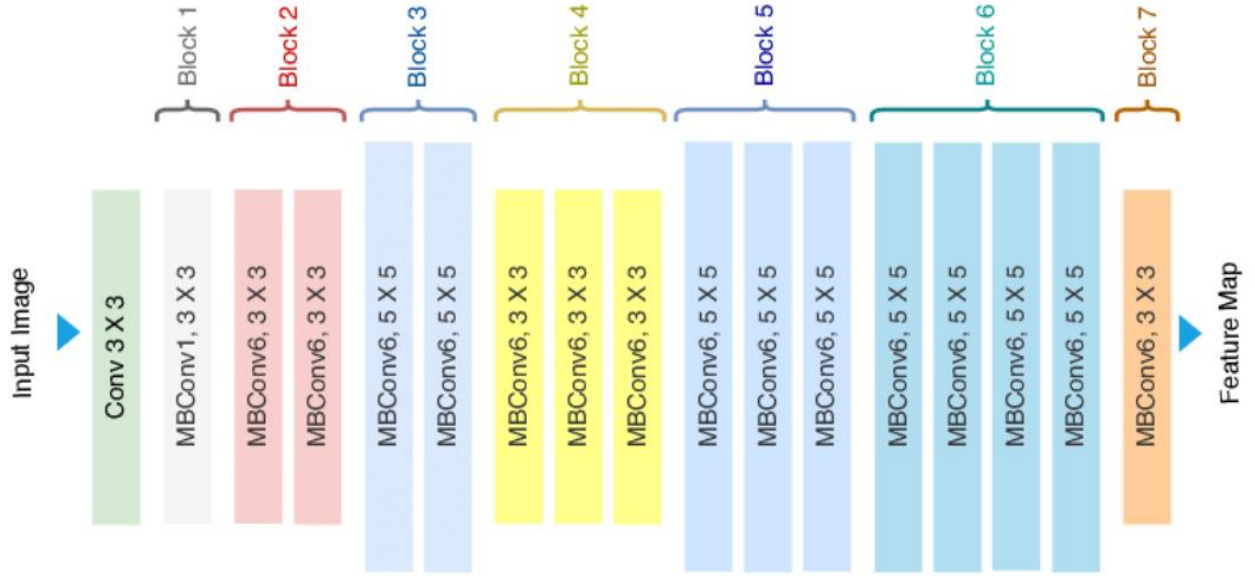

Collapse Output
Histograma de Valores Reales
Valores Reales
Frecuencia
Precipitación
Histograma de Predicciones
Predicciones
Frecuencia
Precipitación

Past Projects

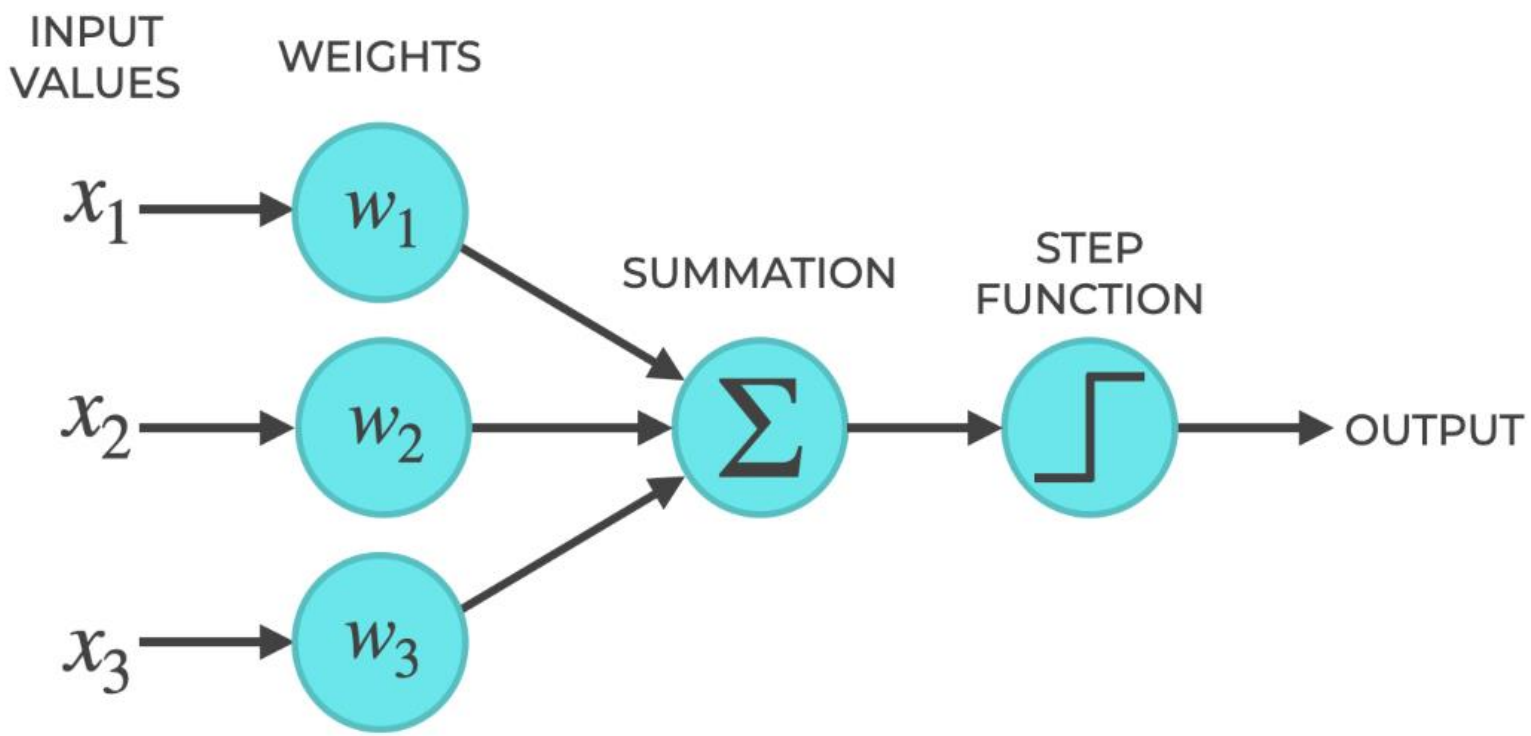
Clasificación de lesiones cutáneas

El cáncer de piel representa una de las neoplasias más prevalentes a nivel global. Con el fin de automatizar y optimizar el trabajo de los profesionales de la salud en el diagnóstico temprano de esta patología. el presente proyecto tiene como objetivo principal Entrenar el modelo EfficientNet-B0 para procesar y analizar imágenes de lesiones cutáneas.


Confusion Matrix
Benigno
Maligno
True
337
23
40
337
Benigno
Maligno
Predicted
300
250
200
150
100
50


Block 1
Block 2
Block 3
Block 4
Block 5
Block 6
Block 7
Input Image
Conv 3 X 3
MBConv1, 3 X 3
MBConv6, 3 X 3
MBConv6, 3 X 3
MBConv6, 5 X 5
MBConv6, 5 X 5
MBConv6, 3 X 3
MBConv6, 3 X 3
MBConv6, 3 X 3
MBConv6, 5 X 5
MBConv6, 5 X 5
MBConv6, 5 X 5
MBConv6, 5 X 5
MBConv6, 5 X 5
MBConv6, 5 X 5
MBConv6, 5 X 5
MBConv6, 3 X 3
Feature Map

Perceptron


INPUT VALUES
WEIGHTS
x_1
x_2
x_3
w_1
w_2
w_3
SUMMATION
Σ
STEP FUNCTION
OUTPUT