Momento de Retroalimentación: Módulo 2 Análisis y Reporte sobre el desempeño del modelo. (Portafolio Análisis)

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In [121…
```
import pandas as pd
import matplotlib.pyplot as plt
import random
from sklearn import linear_model
from sklearn.model_selection import train_test_split
from sklearn import metrics
from sklearn.preprocessing import StandardScaler

from google.colab import drive
drive.mount('/content/drive')
```

```
Drive already mounted at /content/drive; to attempt to forcibly remount, call drive.m
ount("/content/drive", force_remount=True).
```

In [122…
```
data = pd.read_csv('/content/drive/MyDrive/ML Data/Valhalla23.csv')
scaler = StandardScaler()
data[['Celsius']] = scaler.fit_transform(data[['Celsius']])

'''
Noté que usando los valores normales de Celsius, SDGRegressor me regresaba la tendenci
eran muy grandes, asi que decidí escalarlos, y se obtuv[].
'''
x_train, x_test, y_train, y_test = train_test_split(data[['Celsius']], data[['Valks']]
x_train, x_validate, y_train, y_validate = train_test_split(x_train, y_train, test_siz

model = linear_model.SGDRegressor(max_iter = 100000000, random_state=4050, eta0=0.0001
model.fit(x_train, y_train)
```

```
/usr/local/lib/python3.10/dist-packages/sklearn/utils/validation.py:1183: DataConvers
ionWarning: A column-vector y was passed when a 1d array was expected. Please change
the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

Out[122]:
```
SGDRegressor(eta0=0.0001, max_iter=100000000, random_state=4050)
```

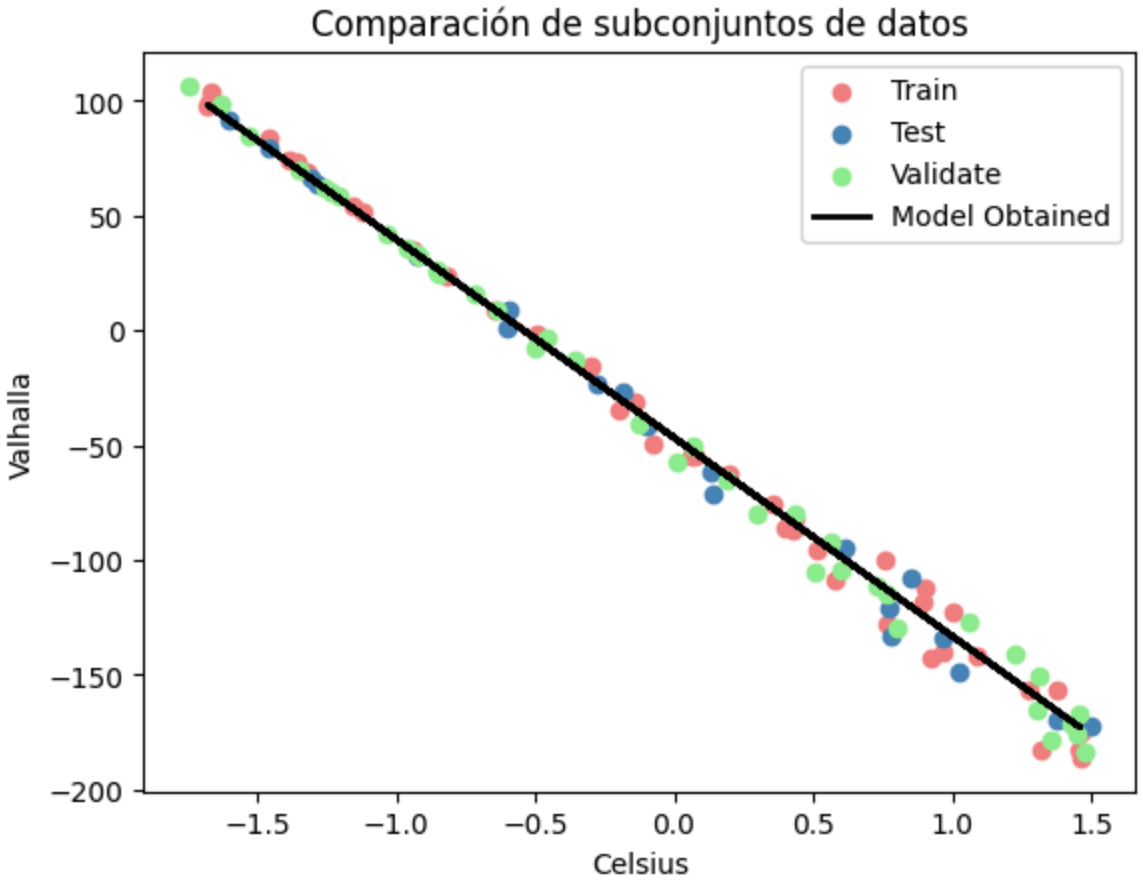
In [123…
```
mse_train_base = metrics.mean_squared_error(y_train, model.predict(x_train))
mse_validate_base = metrics.mean_squared_error(y_validate, model.predict(x_validate))
mse_test_base = metrics.mean_squared_error(y_test, model.predict(x_test))

print("MSE Entrenamiento: ", mse_train_base)
print("MSE Validación: ", mse_validate_base)
print("MSE Prueba: ", mse_test_base)
```

```
MSE Entrenamiento:  58.5209997863365
MSE Validación:  36.01624933419069
MSE Prueba:  54.06523315194054
```

In [124…

```
plt.scatter(x_train, y_train, color='lightcoral')
plt.scatter(x_test, y_test, color='steelblue')
plt.scatter(x_validate, y_validate, color="lightgreen")
plt.plot(x_train, model.predict(x_train), color='black', linewidth=2)
#Escribir la leyenda
plt.legend(["Train", "Test", "Validate", "Model Obtained"])
plt.title("Comparación de subconjuntos de datos")
plt.xlabel("Celsius")
plt.ylabel("Valhalla")
plt.show()
```



In [125…

```
sizes = [2]
while len(sizes) != 20:
  random_number = random.randint(3, 39)
  if random_number not in sizes:
    sizes.append(random_number)
sizes
```

Out[125]:

```
[2, 3, 32, 10, 22, 30, 18, 9, 15, 36, 6, 29, 34, 28, 12, 39, 38, 37, 17, 8]
```

In [126…

```
mse_train_list, mse_validate_list = [], []

for size in sizes:
  x_train_size, _, y_train_size, _ = train_test_split(x_train[["Celsius"]], y_train[['
  mse_train_average, mse_validate_average = 0, 0
  for _ in range(100):
```

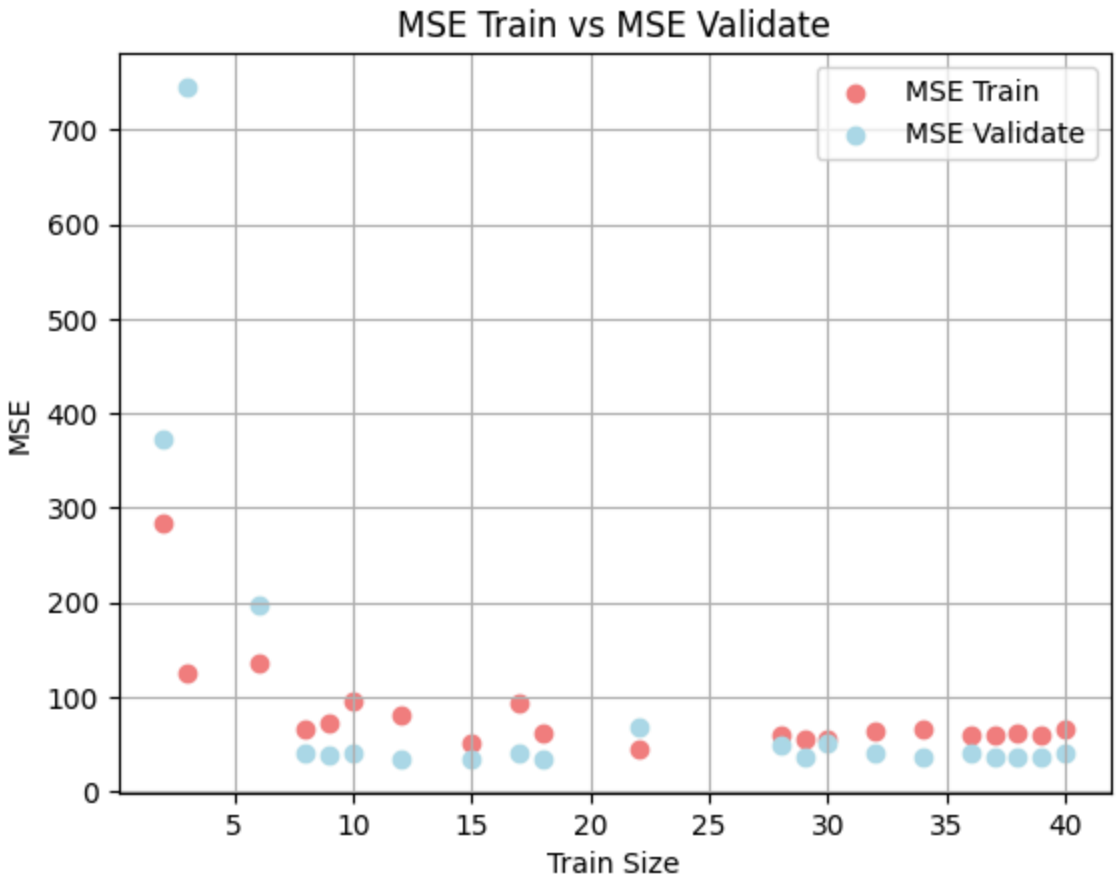
```
    model.fit(x_train_size, y_train_size)
    mse_train = metrics.mean_squared_error(y_train_size, model.predict(x_train_size))
    mse_validate = metrics.mean_squared_error(y_validate, model.predict(x_validate))
    mse_train_average += mse_train
    mse_validate_average += mse_validate
  mse_train_average /= 100
  mse_validate_average /= 100
  mse_train_list.append(mse_train_average)
  mse_validate_list.append(mse_validate_average)
```

In [127…

```
sizes.append(len(x_train))
mse_train_list.append(mse_train)
mse_validate_list.append(mse_validate)
```

In [128…

```
plt.scatter(sizes, mse_train_list, color='lightcoral', marker='o', linestyle='-', labe
plt.scatter(sizes, mse_validate_list, color='lightblue', marker='o', linestyle='-', la
plt.title("MSE Train vs MSE Validate")
plt.xlabel("Train Size")
plt.ylabel("MSE")
plt.legend()
plt.grid()
plt.show()
```



Considero que la cantidad mejor de muestras es el que nos otorga un error minimo cuadrado

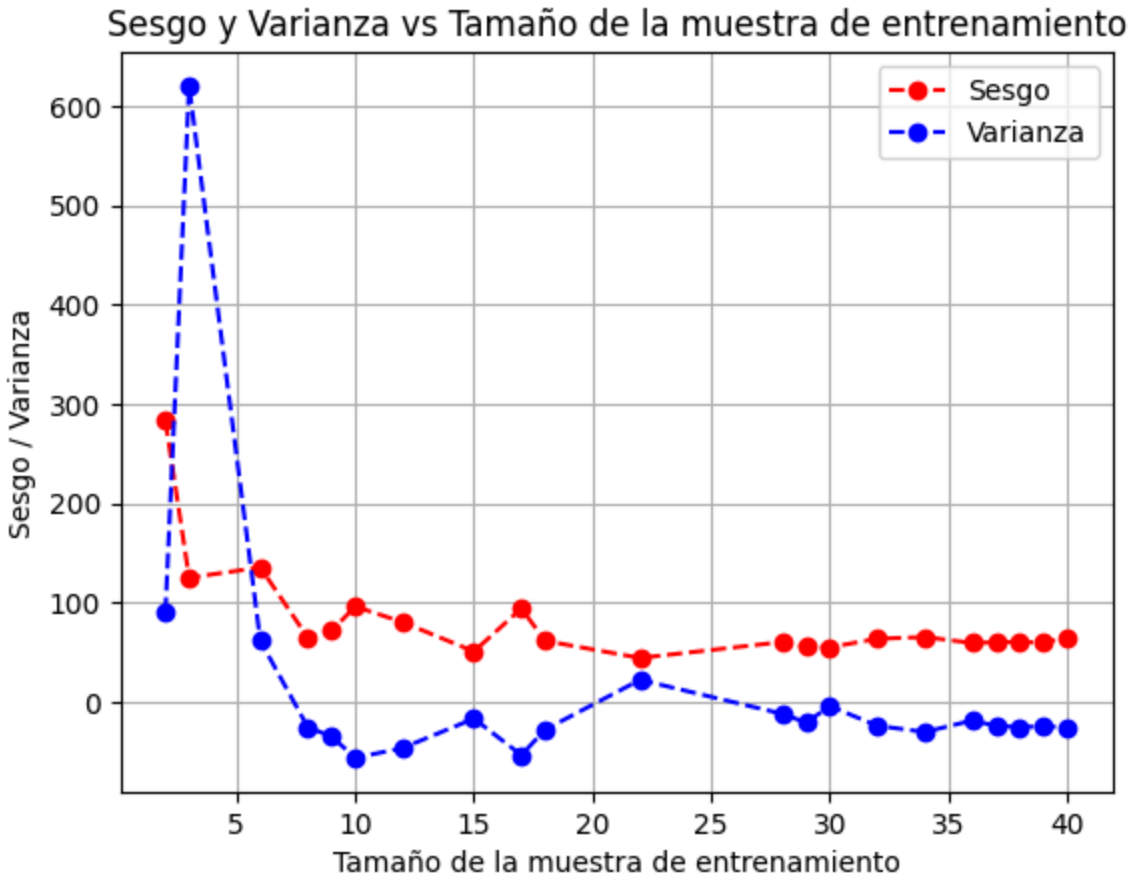
In [129…

```
optimal_size = sizes[mse_validate_list.index(min(mse_validate_list))]
optimal_size
```

Out[129]: 18

In [130…
```
bias_list = mse_train_list
variance_list = [mse_validate - mse_train for mse_train, mse_validate in zip(mse_train
combined = list(zip(sizes, bias_list, variance_list))
combined_sorted = sorted(combined, key=lambda x: x[0])
sizes_sorted, bias_list_sorted, variance_list_sorted = zip(*combined_sorted)

plt.plot(sizes_sorted, bias_list_sorted, color='red', marker='o', linestyle='--', labe
plt.plot(sizes_sorted, variance_list_sorted, color='blue', marker='o', linestyle='--',
plt.title("Sesgo y Varianza vs Tamaño de la muestra de entrenamiento")
plt.xlabel("Tamaño de la muestra de entrenamiento")
plt.ylabel("Sesgo / Varianza")
plt.legend()
plt.grid(True)
plt.show()
```



Con la gráfica podemos entender que cuando los valores de entrenamientos son menores (2) hay una gran sesgo y varianza, en comparación cuando hay muchos más valores de entrenamiento

In [131…
```
x_train_size, _, y_train_size, _ = train_test_split(x_train, y_train, train_size=optim
  model.fit(x_train_size, y_train_size)
  mse_train_size = metrics.mean_squared_error(y_train_size, model.predict(x_train_size
  mse_validate_size = metrics.mean_squared_error(y_validate, model.predict(x_validate)
  mse_test_size = metrics.mean_squared_error(y_test, model.predict(x_test))

  print("Optimal Size MSE Train Subset: ", mse_train_size)
```

```
  print("Optimal Size MSE Test: ", mse_test_size)
  print("Optimal Size MSE Validate: ", mse_validate_size )
```

```
Optimal Size MSE Train Subset:  90.09218559343947
Optimal Size MSE Test:  106.846637207059
Optimal Size MSE Validate:  92.20795398608645
```

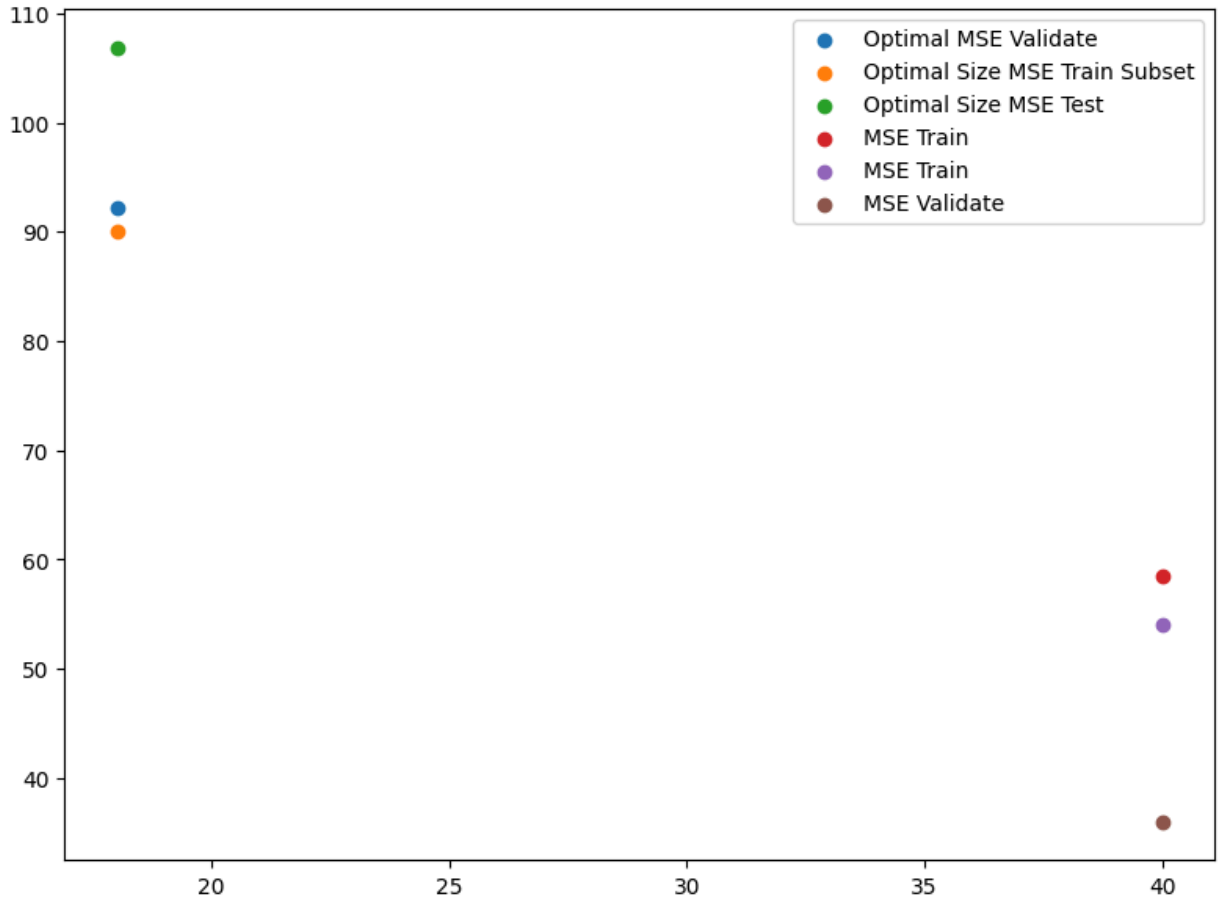
```
/usr/local/lib/python3.10/dist-packages/sklearn/utils/validation.py:1183: DataConversionWarning: A column-vector y was passed when a 1d array was expected. Please change the shape of y to (n_samples, ), for example using ravel().
  y = column_or_1d(y, warn=True)
```

In [132…

```
plt.figure(figsize=(8, 6))
plt.scatter(optimal_size, mse_validate_size, label="Optimal MSE Validate")
plt.scatter(optimal_size, mse_train_size, label="Optimal Size MSE Train Subset")
plt.scatter(optimal_size, mse_test_size, label="Optimal Size MSE Test")

plt.scatter(len(x_train), mse_train_base, label="MSE Train")
plt.scatter(len(x_train), mse_test_base, label="MSE Train")
plt.scatter(len(x_train), mse_validate_base, label="MSE Validate")

plt.legend(fontsize='medium')
plt.tight_layout()
plt.show()
```



Considero que funciono mejor el modelo base, puesto que los valores de los errores medios cuadrados son menores que con el supuesto modelo con tamaño ideal

In [134…

```
!jupyter nbconvert --to html /content/drive/MyDrive/ColabNotebooks/AnálisisReporteDese
```

```
[NbConvertApp] Converting notebook /content/drive/MyDrive/ColabNotebooks/AnálisisRepo
rteDesempeño.ipynb to html
[NbConvertApp] Writing 790482 bytes to /content/drive/MyDrive/ColabNotebooks/Análisis
ReporteDesempeño.html
```