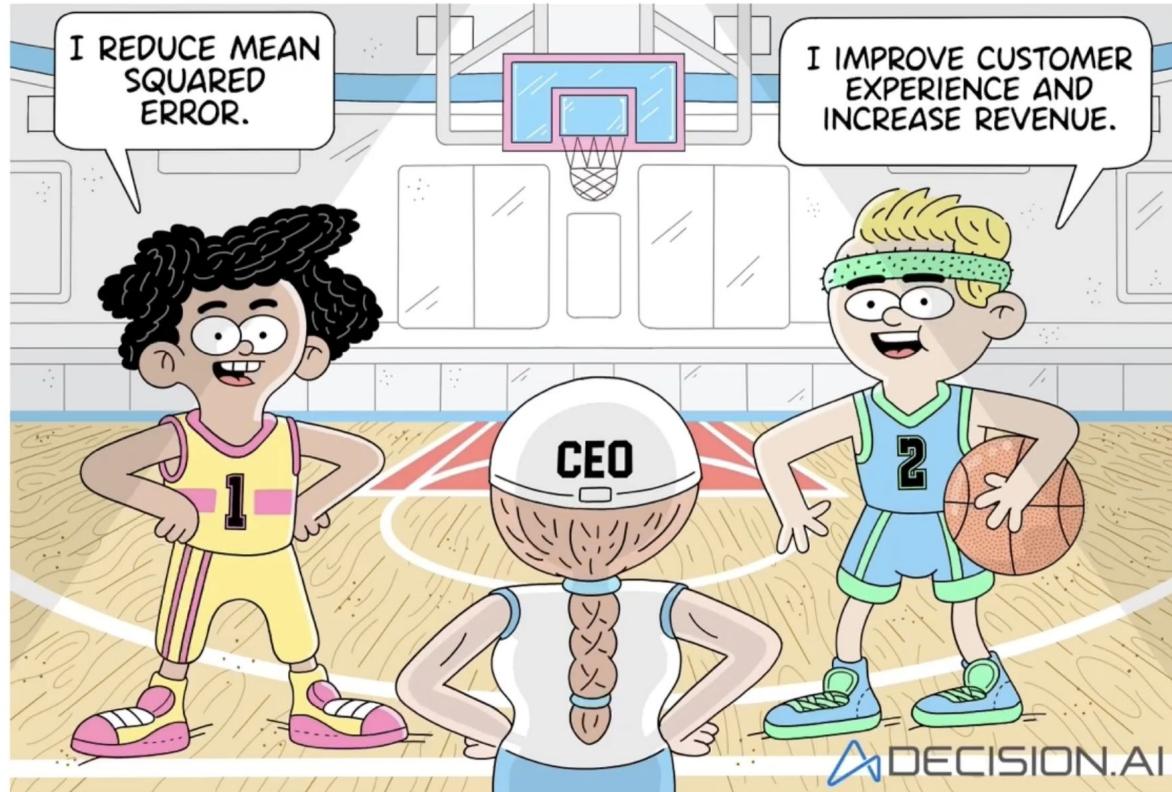


Conectando métricas de negocio con nuestros modelos de ML.

Por: Jose Alberto Arango S.



¿Cuál DS crees que ella elegirá?



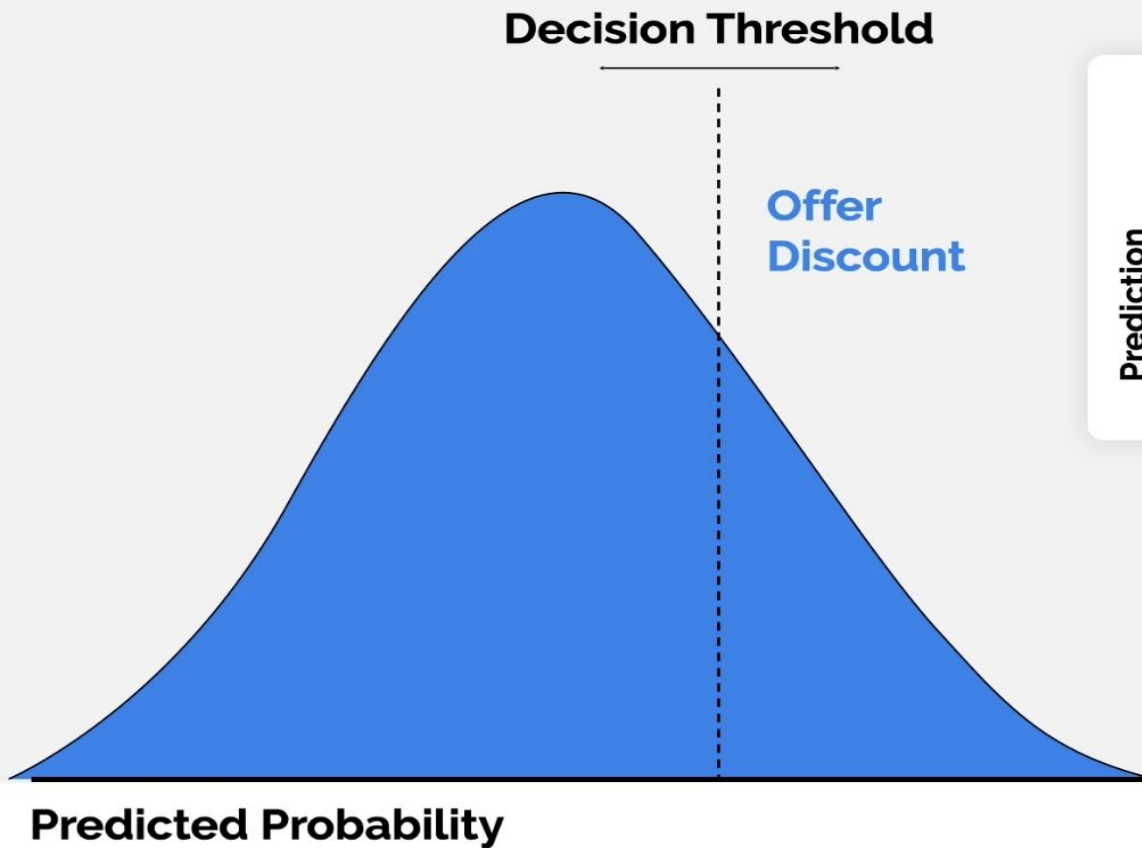
Problema

Standard Churn Model Scenario

 Churn	 Contract	 Years as Customer	 Home Phone
0	Monthly	7	0
0	Annual	1	0
1	Monthly	3	1
0	Monthly	3	0

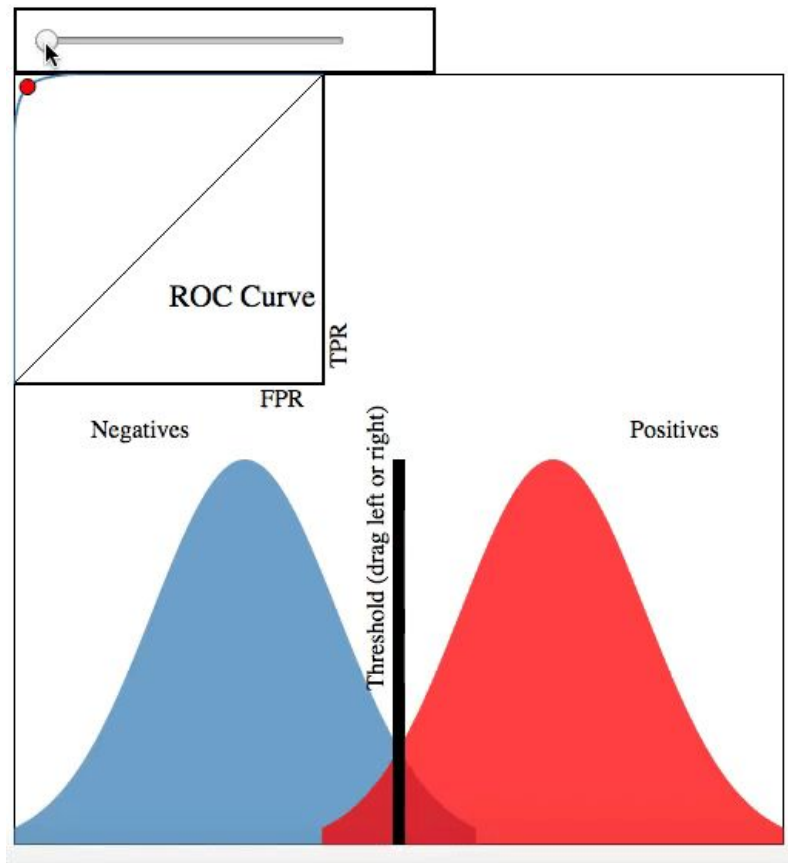
Prediction Target

Course Outline



		Churn	
		Yes	No
Prediction	Yes	150,000	80,000
	No	20,000	3,000,000

¿Cómo escogemos el umbral de decisión?





Profit Curve!



Traducir los resultados de
nuestro modelo en impacto
financiero

Profit matrix

		Churned	
		Yes	No
Discount	True	\$200	-\$30
	False	\$0	\$0

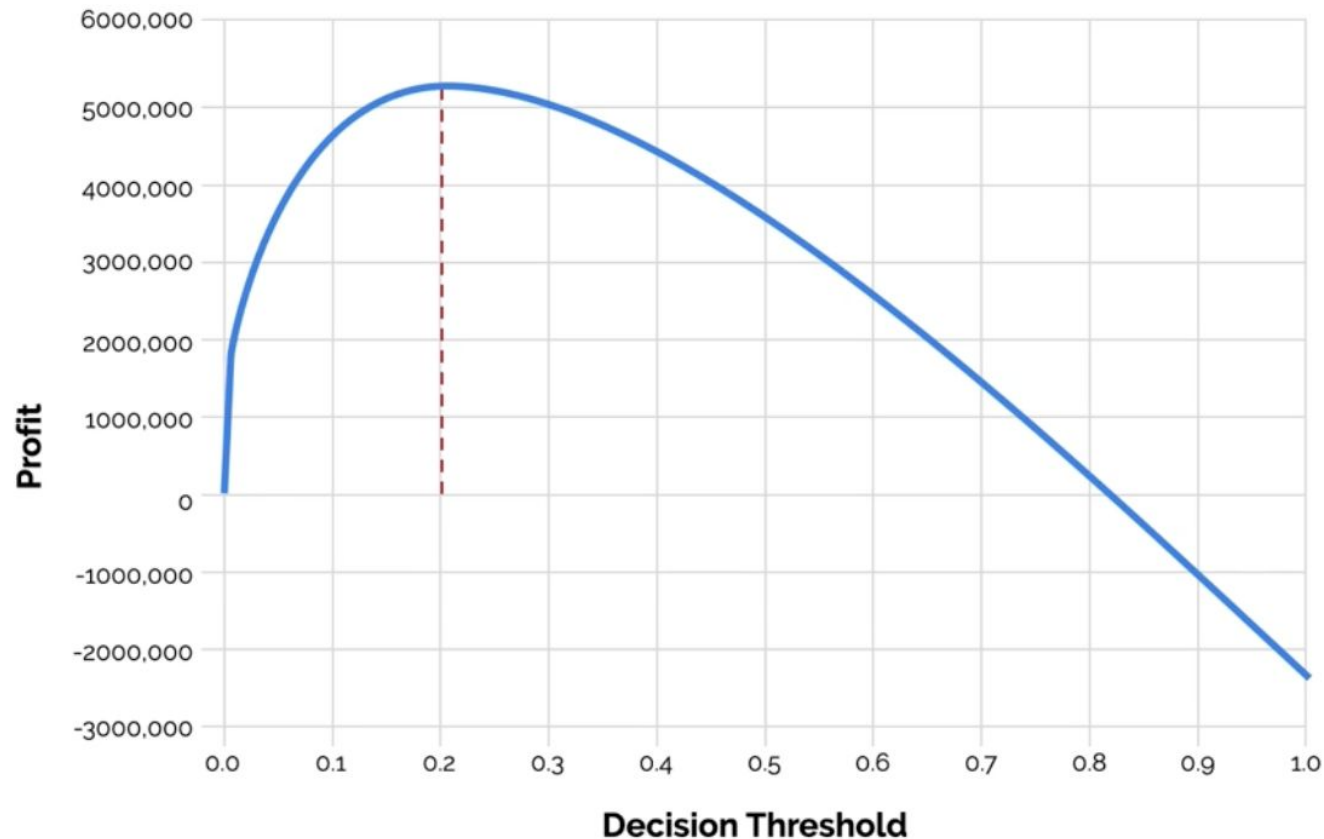
Traducir los resultados en impacto financiero

		Churned	
		Yes	No
Discount	True	150,000	80,000
	False	20,000	3,000,000

		Churned	
		Yes	No
Discount	True	\$200	-\$30
	False	\$0	\$0

$$\begin{aligned} & 150,000 * 200 \\ & - 80,000 * 30 \\ \hline & = \$27,600,000 \end{aligned}$$

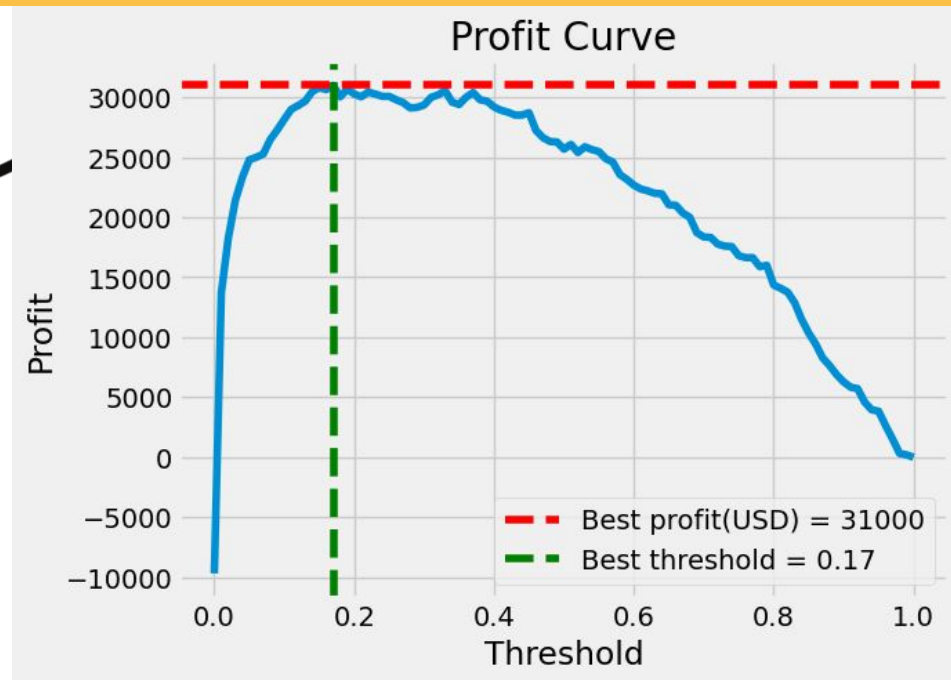
Profit curve



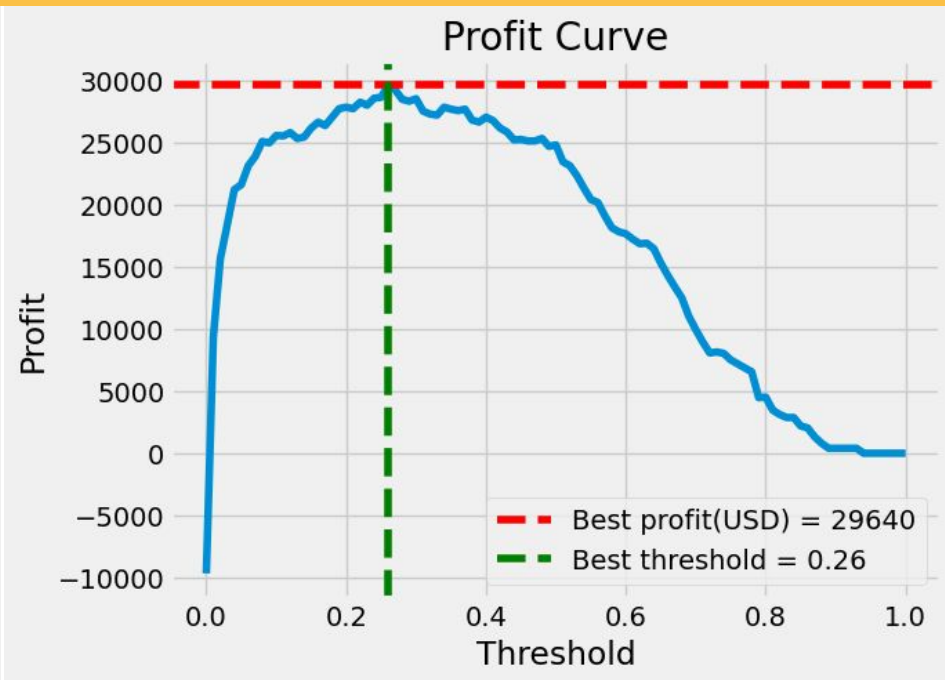
Limitaciones:

- No saber los valores de los TP y FP
- Solo problemas de clasificación
- Valores heterogéneos

La importancia de una variables



Todas las variables



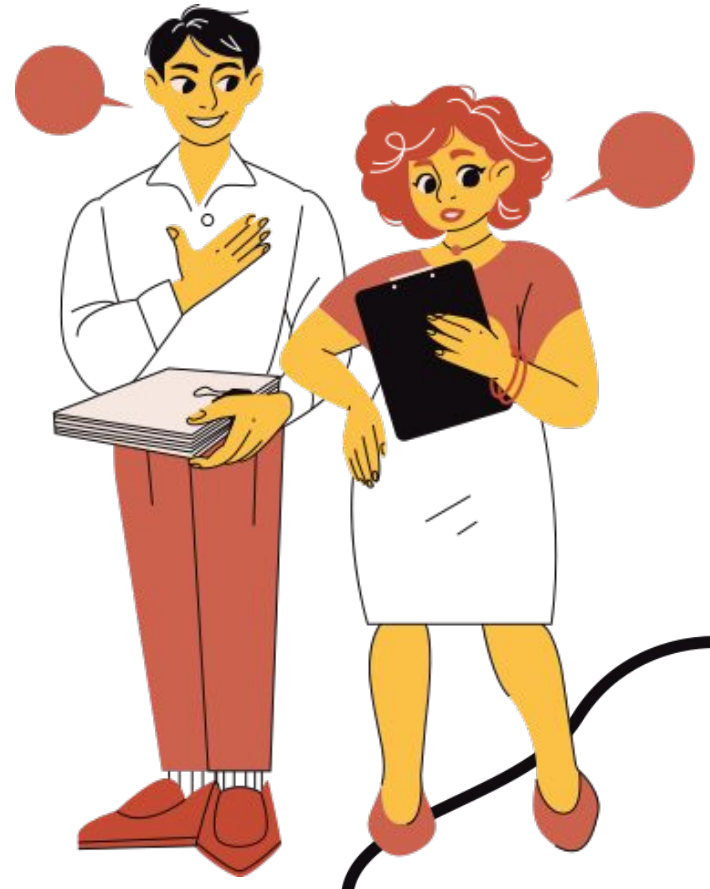
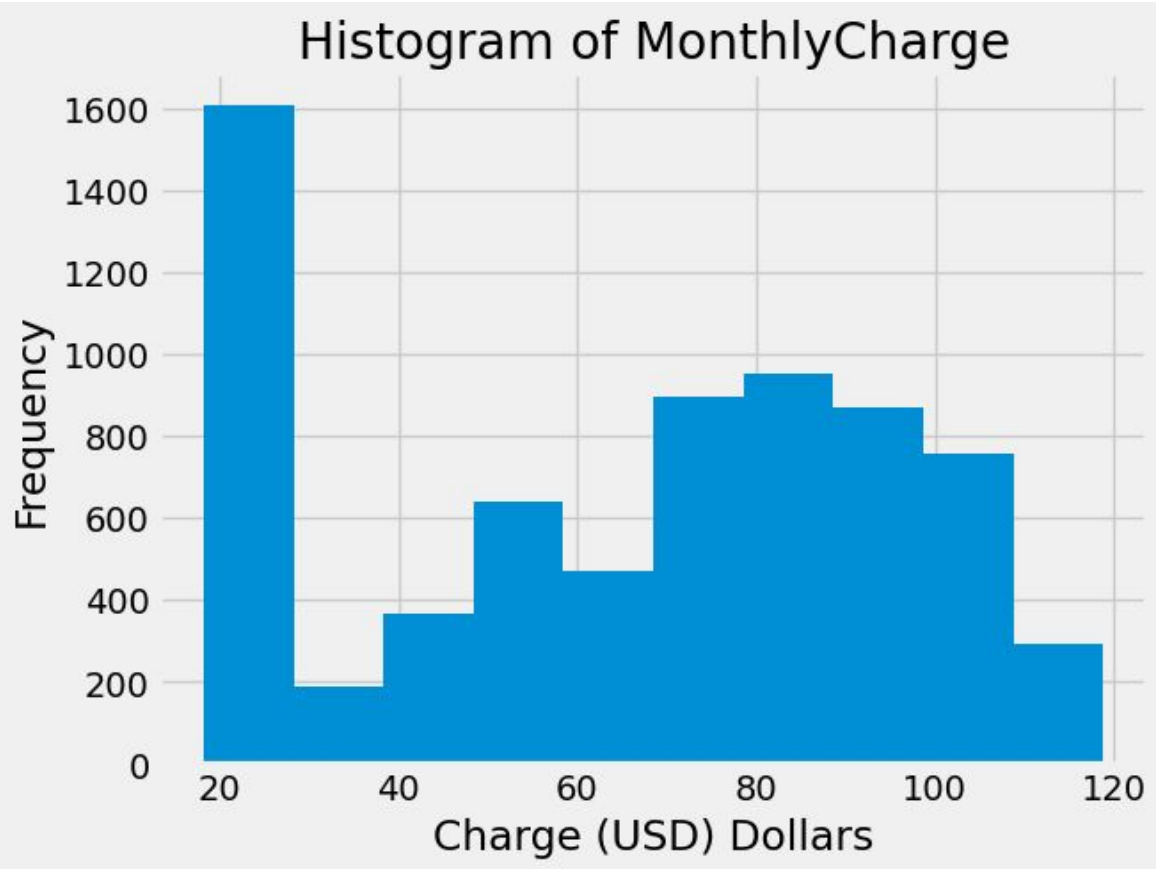
Falta 1 variable

Total pérdida: 1.360 USD

Más allá de los umbrales de decisión



Diferentes grupos de clientes

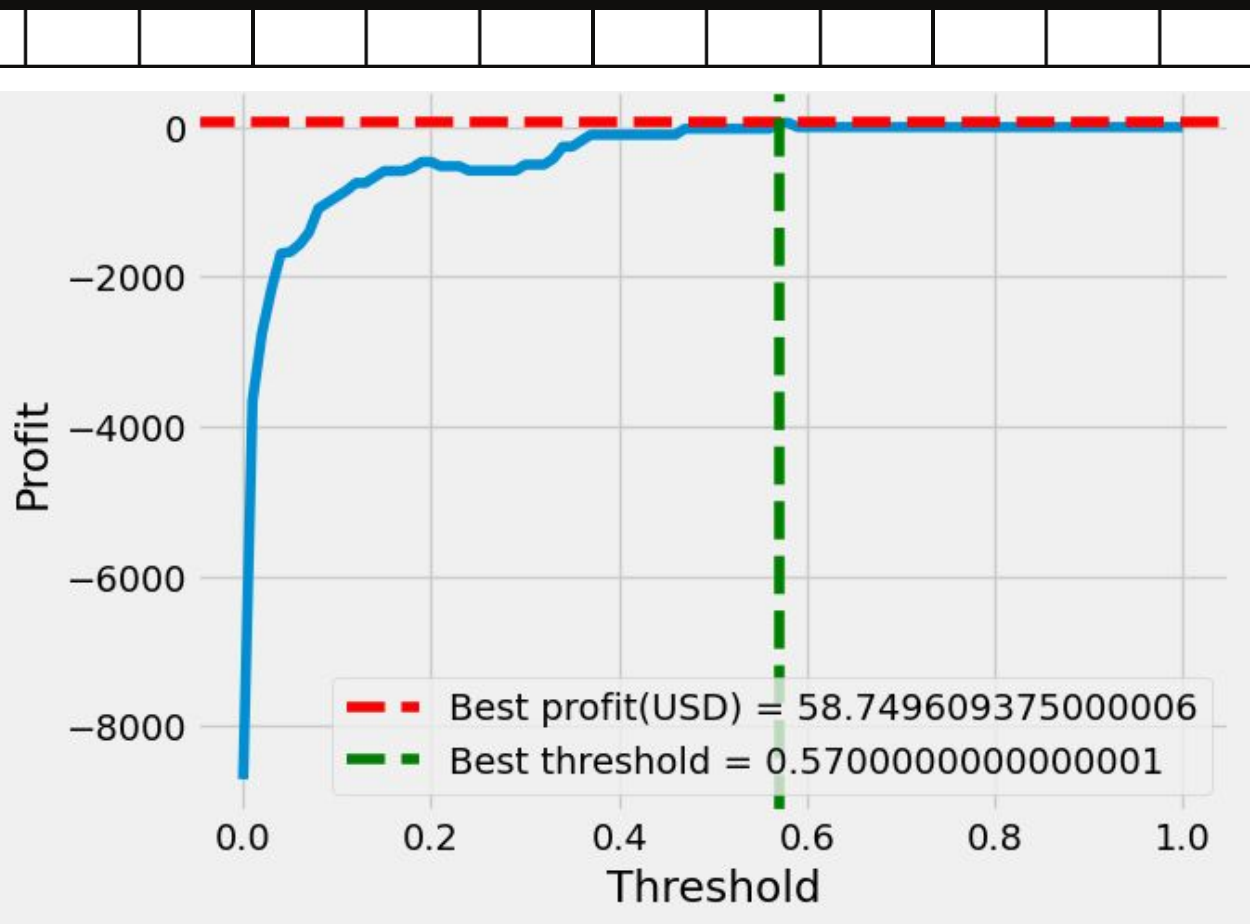


Profit matrix

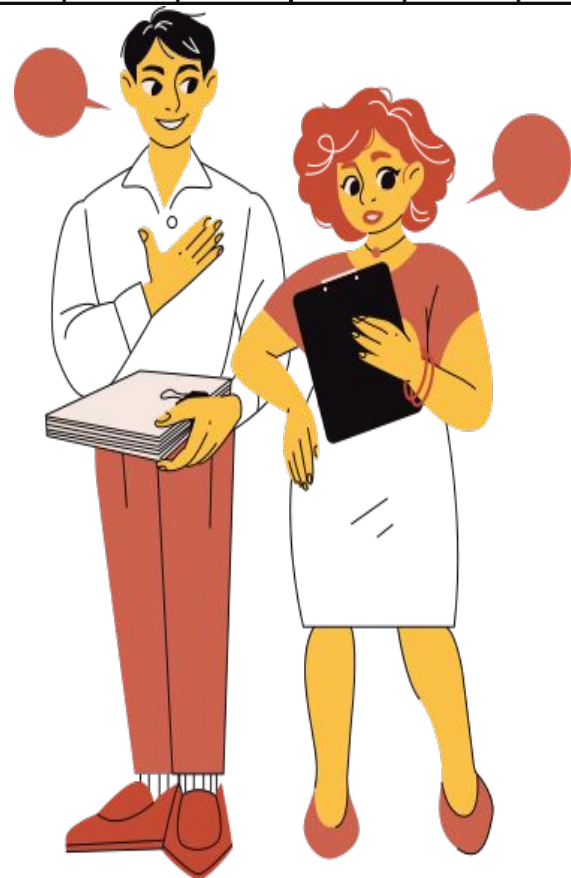
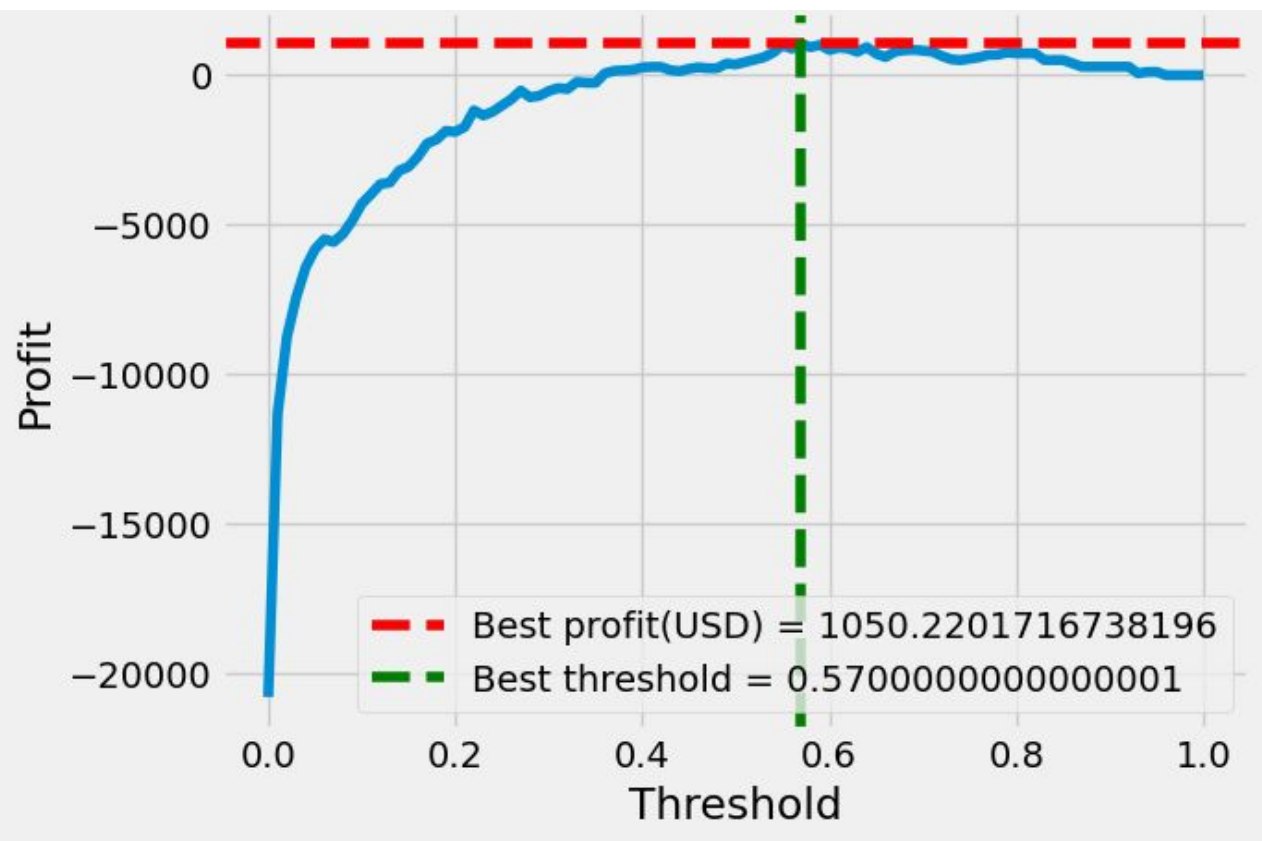
		Churned	
		Yes	No
Discount	True	$\$3 * \text{mean_monthly_charge}$	-\$80
	False	\$0	\$0



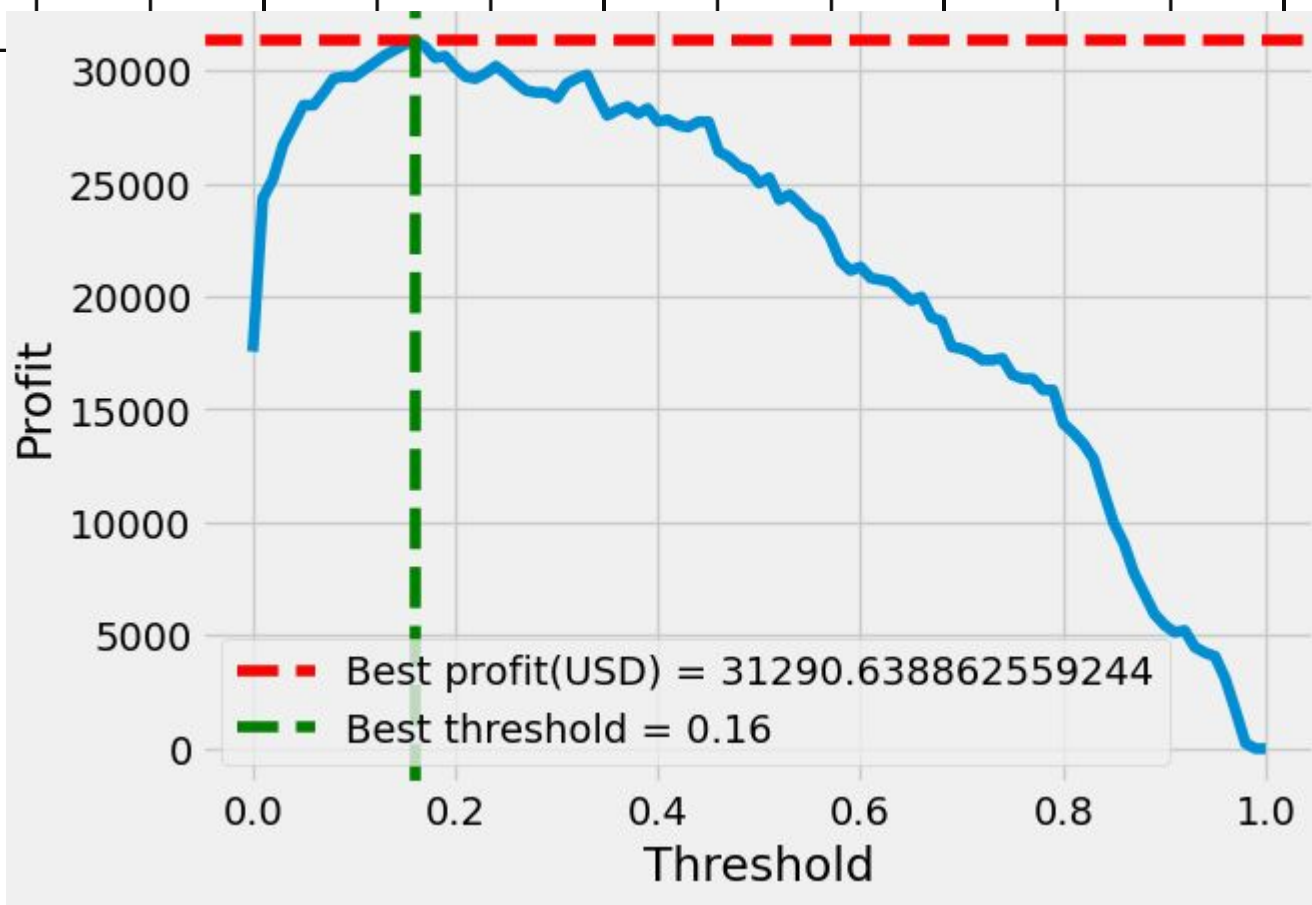
Umbral para clientes que pagam menos de \$20 al mes



Umbral para clientes que pagan entre \$20 y \$60/mes



Umbral para clientes que pagan entre \$60 y \$100/mes

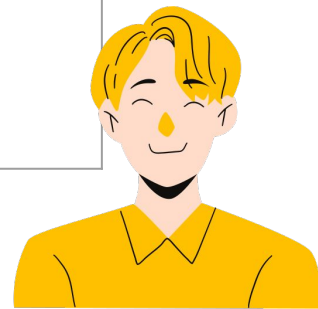


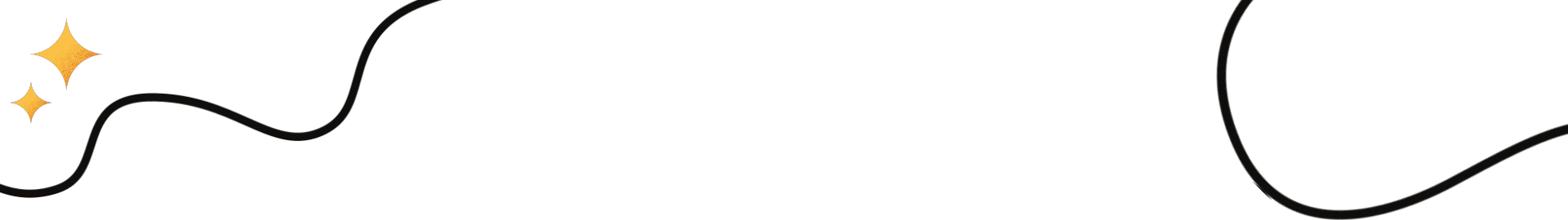
Umbral para clientes que pagan más de \$100/mes



Tipos de umbral

Tipo de Umbral	Ganancia esperada
Umbrales flexibles	44.232 USD
Umbral estático	31.000 USD
Diferencia	13.232 USD





Mejoras del modelo

¿Debo seguir mejorando este modelo o pasar a un nuevo proyecto?



Datos sintéticos que sean precisos.

```
errors = y_pred - y_true
```



Datos sintéticos que sean precisos.

```
synth_data = y_pred - errors * closeness_factor
```



Datos sintéticos que sean precisos.

```
synth_data_AUC = roc_auc_score(y_true, synth_data)
```



```
1 def make_synt_h_accurate_data(y_pred, y_true, closeness_factor=0.1):
2     """Create synthetic data that is accurate.
3
4     Args:
5         y_pred (array-like): Predicted probabilities.
6         y_true (array-like): True labels.
7         closeness_factor (float): A measure of how much to increase the accuracy of the synthetic data.
8
9     Returns:
10         array: Synthetic data.
11     """
12     errors = y_pred - y_true
13     synth_data = y_pred - errors * closeness_factor
14     synth_data_AUC = roc_auc_score(y_true, synth_data)
15     print(
16         f"closeness_factor: {closeness_factor:.2f}.    AUC of synthetic data: {synth_data_AUC:.2f}"
17     )
18     return synth_data
```

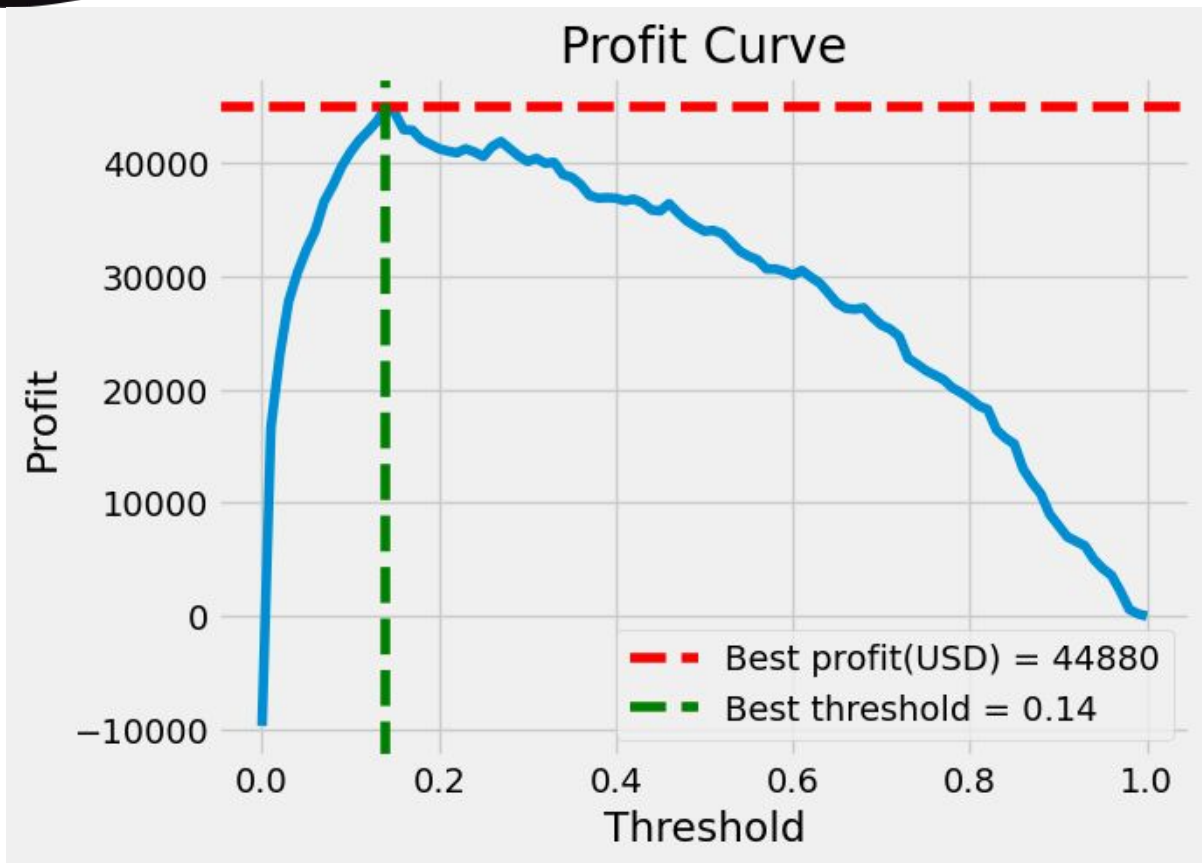
Diferentes valores de closeness_factor

```
for i in np.linspace(0, 0.2, 11):  
    make_synt_h accurate_data(y_pred, y_test, closeness_factor=i)
```

closeness_factor: 0.00.	AUC of synthetic data: 0.81
closeness_factor: 0.02.	AUC of synthetic data: 0.83
closeness_factor: 0.04.	AUC of synthetic data: 0.84
closeness_factor: 0.06.	AUC of synthetic data: 0.85
closeness_factor: 0.08.	AUC of synthetic data: 0.86
closeness_factor: 0.10.	AUC of synthetic data: 0.87
closeness_factor: 0.12.	AUC of synthetic data: 0.88
closeness_factor: 0.14.	AUC of synthetic data: 0.89
closeness_factor: 0.16.	AUC of synthetic data: 0.90
closeness_factor: 0.18.	AUC of synthetic data: 0.91
closeness_factor: 0.20.	AUC of synthetic data: 0.92

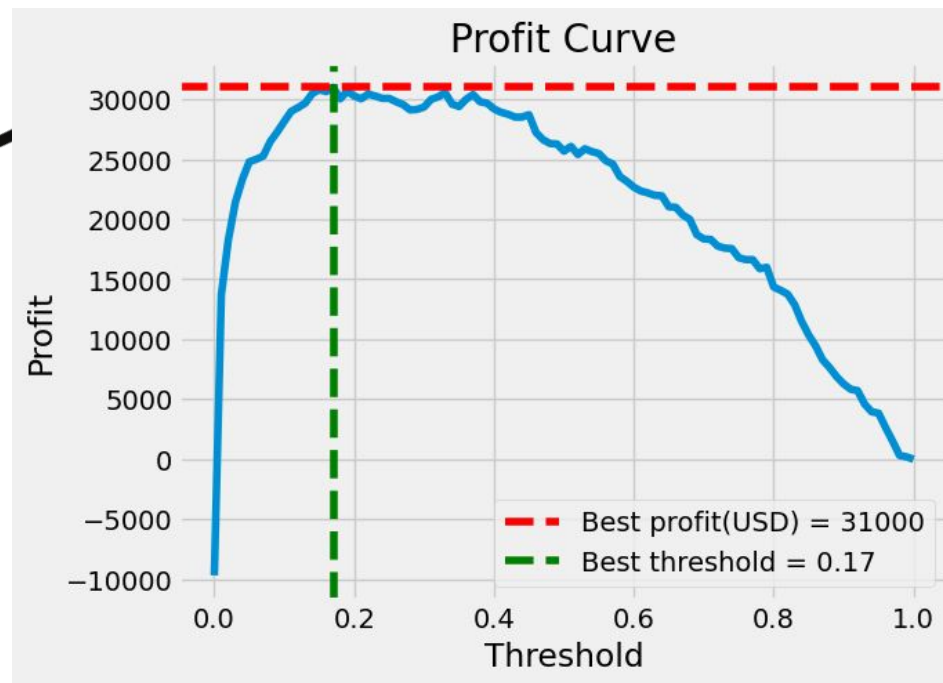


Profit curve esperada con la mejora

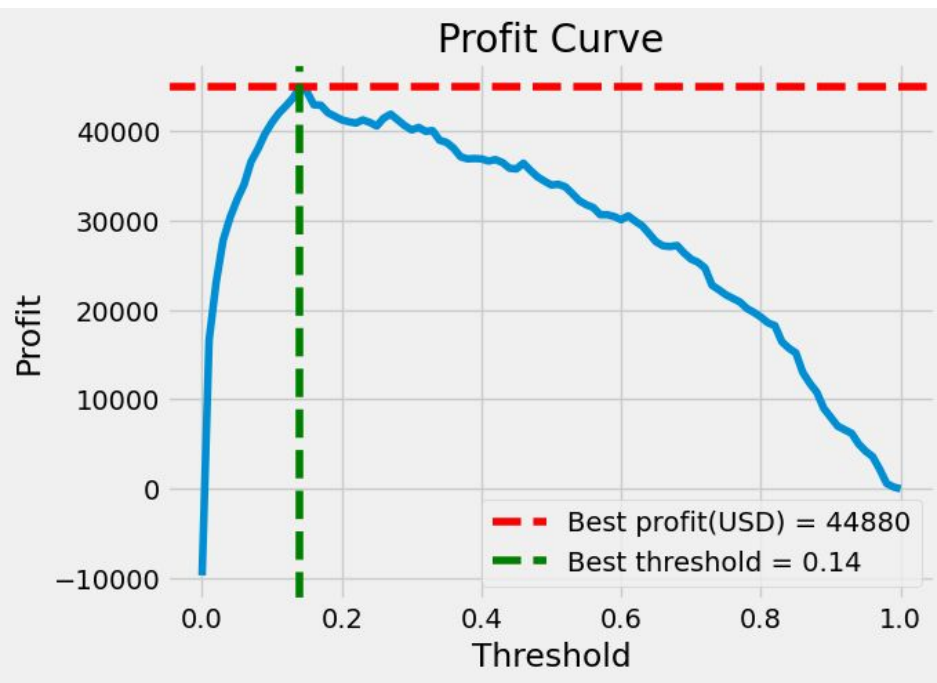


- Closeness factor: 0.14.
- AUC of synthetic data: 0.89

Actual vs Esperada




Actual



Esperada

Total ganancia: **13.880 USD**

Referencias

- 
1. Dataset usado: [Telco Customer Churn](#)
 2. [Machine Learning for Business Decision Optimization W&B AI Academy](#)
 3. [Decision.AI](#)



Muchas Gracias!!!

¿Alguna pregunta?

