

# Assignment 1 Extension: Streamlit Deployment

## Data Sample Introduction

We've completed the extension of the Assignment 1 and have our Streamlit app ready! Sample data points have been created to test our app with, we need to make sure that the outputs we get from the app and from our notebook are the same.

*Note: we added a section 6 within our current notebook on which we add what is needed for the assignment extension.*

We have three different samples:

1. **Data Point 1:** Young professional with stable finances (likely to subscribe)
2. **Data Point 2:** Retired person with moderate finances (moderate likelihood)
3. **Data Point 3:** Student with minimal contact history (less likely)

```
# Data Point 1: Young professional with good finances - likely to subscribe
"age": 32,
"job": "management",
"marital": "single",
"education": "tertiary",
"default": "no",
"balance": 5000,
"housing": "yes",
"loan": "no",
"contact": "cellular",
"day": 15,
"month": "may",
"duration": 300,
"campaign": 2,
"pdays": 30,                                # Previously contacted
"previous": 1,
"poutcome": "success",
"pdays_contacted": True,                     # Engineered feature
"pdays_clean": 30.0                          # Engineered feature
```

```
# Data Point 2: Retired person with moderate finances – moderate likelihood
"age": 65,
"job": "retired",
"marital": "married",
"education": "secondary",
"default": "no",
"balance": 2500,
"housing": "no",
"loan": "no",
"contact": "telephone",
"day": 10,
"month": "jun",
"duration": 180,
"campaign": 3,
"pdays": -1,                      # Never contacted before
"previous": 0,
"poutcome": "unknown",
"pdays_contacted": False,          # Engineered feature
"pdays_clean": np.nan               # Engineered feature
```

```
# Data Point 3: Student with minimal contact – less likely
"age": 22,
"job": "student",
"marital": "single",
"education": "tertiary",
"default": "no",
"balance": 500,
"housing": "no",
"loan": "yes",
"contact": "cellular",
"day": 20,
"month": "aug",
"duration": 100,
"campaign": 5,
"pdays": -1,                      # Never contacted before
"previous": 0,
"poutcome": "unknown",
"pdays_contacted": False,          # Engineered feature
"pdays_clean": np.nan               # Engineered feature
```

## Notebook Test

Before working with our app, we'll perform a likelihood to subscribe test on our notebook with our top performing model.

```
=====
PREDICTION RESULTS (to compare with Streamlit)
=====
```

```
■ Data Point 1:  
Prediction: yes  
Probabilities: no=22.7%, yes=77.3%
```

```
■ Data Point 2:  
Prediction: yes  
Probabilities: no=25.2%, yes=74.8%
```

```
■ Data Point 3:  
Prediction: no  
Probabilities: no=54.0%, yes=46.0%
```

```
=====
SUMMARY TABLE
=====
```

Data Point	Prediction	Prob(no)	Prob(yes)
1	yes	22.7%	77.3%
2	yes	25.2%	74.8%
3	no	54.0%	46.0%

Here we have our reference predictions.

# App Introduction

Now we'll go over our Streamlit app, which has been created so that we can introduce all the sample data points manually to check how likely someone is to say yes to the bank's offer.

## Bank Term Deposit Subscription Prediction

Predict whether a customer will subscribe to a term deposit based on their profile.

Model Test Accuracy: 0.8682 (86.82%)

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### Input Customer Information

Fill in the values for each feature and click Predict to get the model's prediction.

#### Numerical Features

age	32	balance	5000
day	15	duration	300
campaign	2	pdays	30
previous	1	pdays_clean	30

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#### Categorical Features

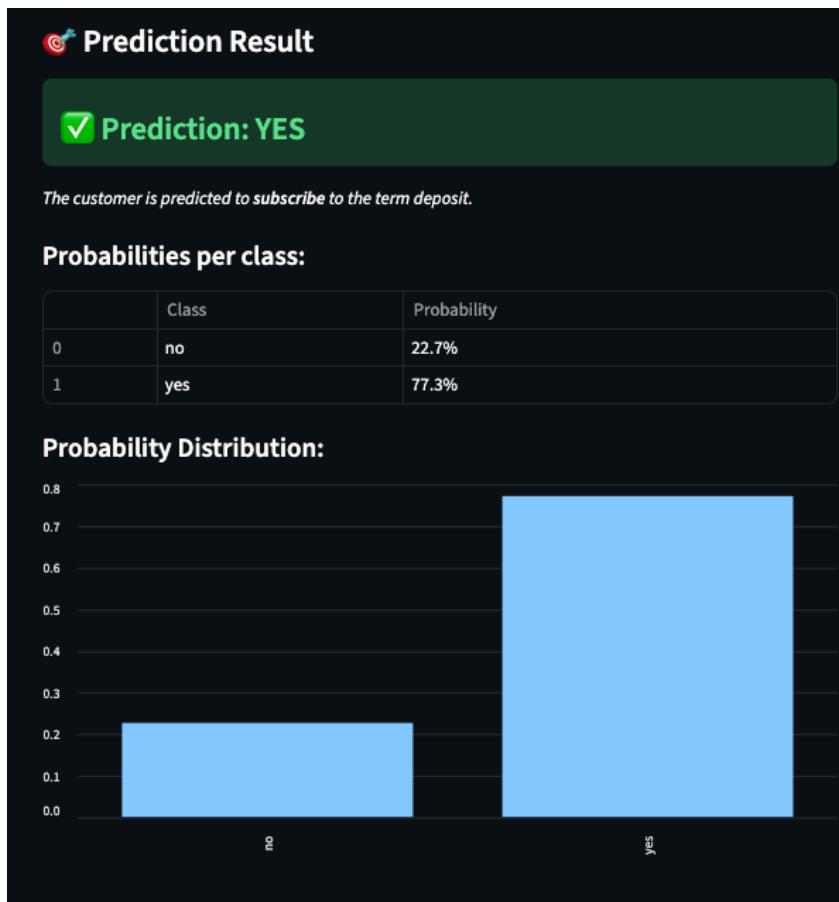
job	management	marital	single
education	tertiary	default	no
housing	yes	loan	no
contact	cellular	month	may
poutcome	success	pdays_contacted (was previously contacted?)	True

---

 Predict

*The app's very beautiful I might add.*

## Sample Test #1



For this example, we predict that the customer will say yes, given the 22.7/77.3 result. So we can see that it perfectly matches the probabilities provided by our model within the notebook!

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SUMMARY TABLE

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Data Point	Prediction	Prob(no)	Prob(yes)
1	yes	22.7%	77.3%
2	yes	25.2%	74.8%
3	no	54.0%	46.0%

## Sample Test #2

First we enter de sample data

### Numerical Features

age	balance
65	2500
day	duration
10	180
campaign	pdays
3	-1
previous	pdays_clean
0	Leave empty if not contacted

---

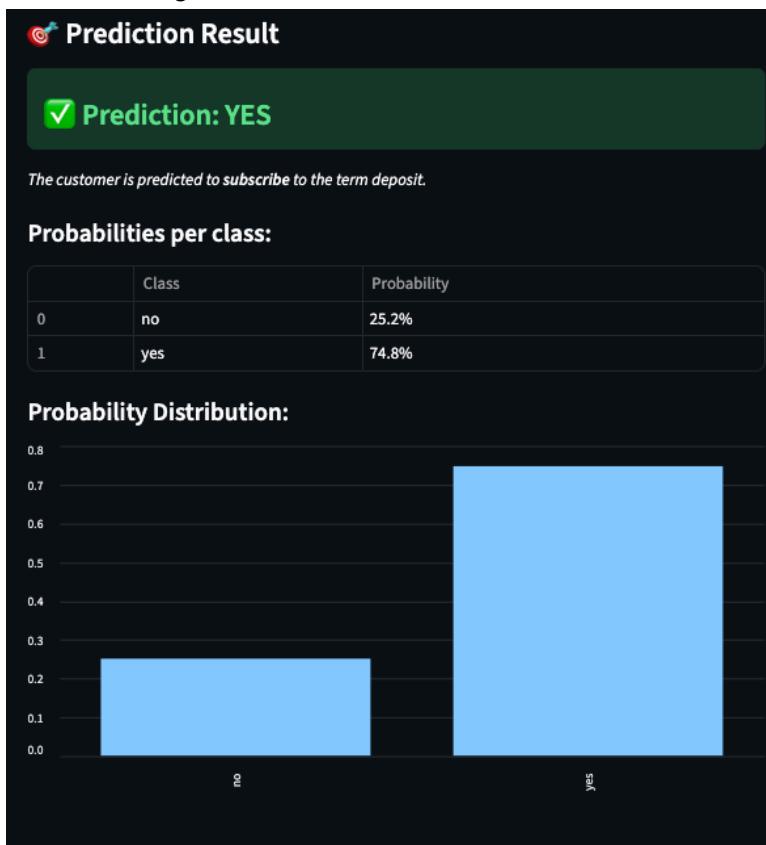
### Categorical Features

job	marital
retired	married
education	default
secondary	no
housing	loan
no	no
contact	month
telephone	jun
poutcome	pdays_contacted (was previously contacted?)
unknown	False

---

 Predict

And then we get the results:



The predictions are 25.2/74.8, so we think the customer will accept the offer.  
Again, we got the same results as we did with our notebook!

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**SUMMARY TABLE**

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Data Point	Prediction	Prob(no)	Prob(yes)
1	yes	22.7%	77.3%
2	yes	25.2%	74.8%
3	no	54.0%	46.0%

## Sample Test #3

Lastly, we'll go through our sample test #3 and introduce the sample data.

### Numerical Features

age	balance
22	500
day	duration
20	100
campaign	pdays
5	-1
previous	pdays_clean
0	Leave empty if not contacted

---

### Categorical Features

job	marital
student	single
education	default
tertiary	no
housing	loan
no	yes
contact	month
cellular	aug
poutcome	pdays_contacted (was previously contacted?)
unknown	False

---

 Predict

Then we click on predict and see that...

## Prediction Result

**✗ Prediction: NO**

*The customer is predicted to not subscribe to the term deposit.*

**Probabilities per class:**

	Class	Probability
0	no	54.0%
1	yes	46.0%

**Probability Distribution:**

A bar chart titled "Probability Distribution" comparing two categories: "no" and "yes". The vertical axis represents probability from 0.00 to 0.55. The horizontal axis labels are "no" and "yes". The "no" bar reaches approximately 0.54, and the "yes" bar reaches approximately 0.46. Both bars are light blue.

Bank Marketing Prediction Model - Assignment 1 Extension  
Machine Learning for Business Decision Making - UC3M

The prediction is “NO” with a 54/46 exactly matching what our notebook predicted!

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**SUMMARY TABLE**

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Data Point	Prediction	Prob(no)	Prob(yes)
1	yes	22.7%	77.3%
2	yes	25.2%	74.8%
3	no	54.0%	46.0%

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