



Data Glacier

Your Deep Learning Partner

Exploratory Data Analysis

Bank Marketing Campaign

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Data Science (LISUM09)

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Introduction :



- ABC Bank wants to sell its term deposit product to customers.
- Before launching the product, they want to develop a **model** that will help them in understanding whether a particular customer **will buy** their product or **not**.
- They want their marketing channel to **focus only** on those **customers** whose chances of **buying the product** are higher.

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Summary:

From the collected data that was provided :

- It was possible to extract various **insights** about the customers that subscribed in the data.
- Provide **recommendations** based on the insights by identifying which customers to target.

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Problem statement:

- The data is related with **direct marketing** campaigns of a Portuguese banking institution. The marketing campaigns were based on **phone calls**.
- The classification **goal** is to **predict** if the client will **subscribe** (yes/no) a **term deposit** (variable y).
- **Two** data sets were provided, the second one contains randomly selected data from the first one.

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Problem statement:

- Data contains 17 features:
 - Age , Job , Marital status, Education.
 - Default: has credit in default?
 - Balance: average yearly balance, in euros.
 - Housing: has housing loan? , Loan: has personal loan?
 - Contact: contact communication.
 - Day: last contact day of the month, Month: last contact month.
 - Duration: last contact duration, in seconds.
 - Campaign: number of contacts performed during this campaign and for this client.
 - Pdays: number of days that passed by after last contact.
 - Previous: number of contacts before this campaign and for this client.
 - Poutcome: outcome of the previous marketing campaign.
 - y: has the client subscribed a term deposit? (binary: "yes","no").

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Proposed approach:

- **Cleaning** data by checking null values and duplicate values.
- Adding columns for **Age group**, **Balance group**, **Duration time**, **Campaign number**, **contacted**.
- Describing the data and finding **correlation** between numerical features to search for possible **outliers** and removing them.

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Proposed approach:

- Analyzing data by searching :
 - Numbers of subscribers.
 - Subscribers per age group, marital status, default credit, education, balance group, housing, loan status.
 - Subscribers per contact mean and contact duration.
 - Months and days with most subscribers .
 - Subscribers per campaign number, contact and outcome.
- Making a recommendation.
- Choosing a model.

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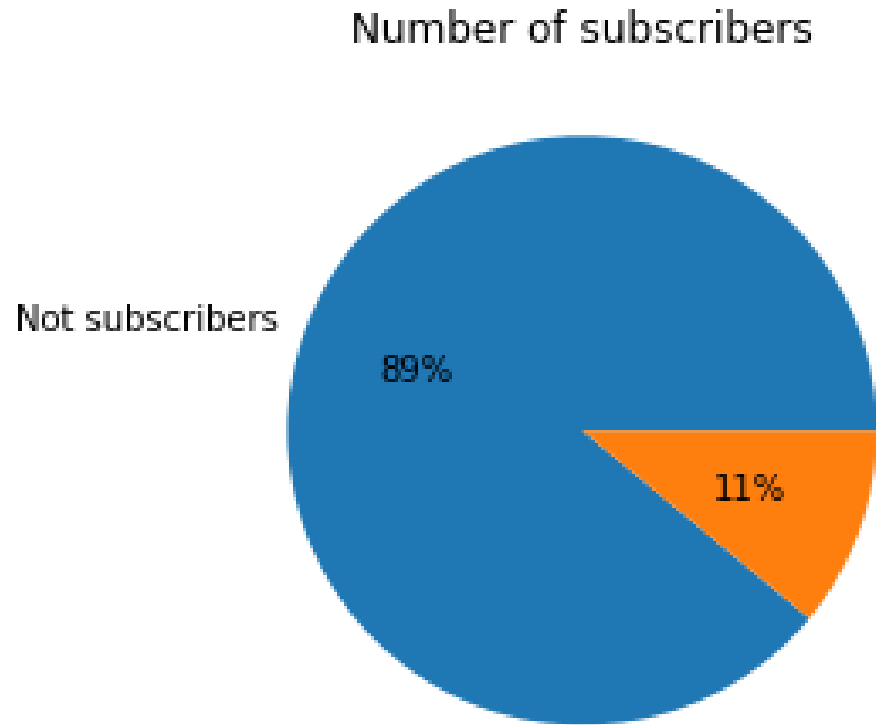
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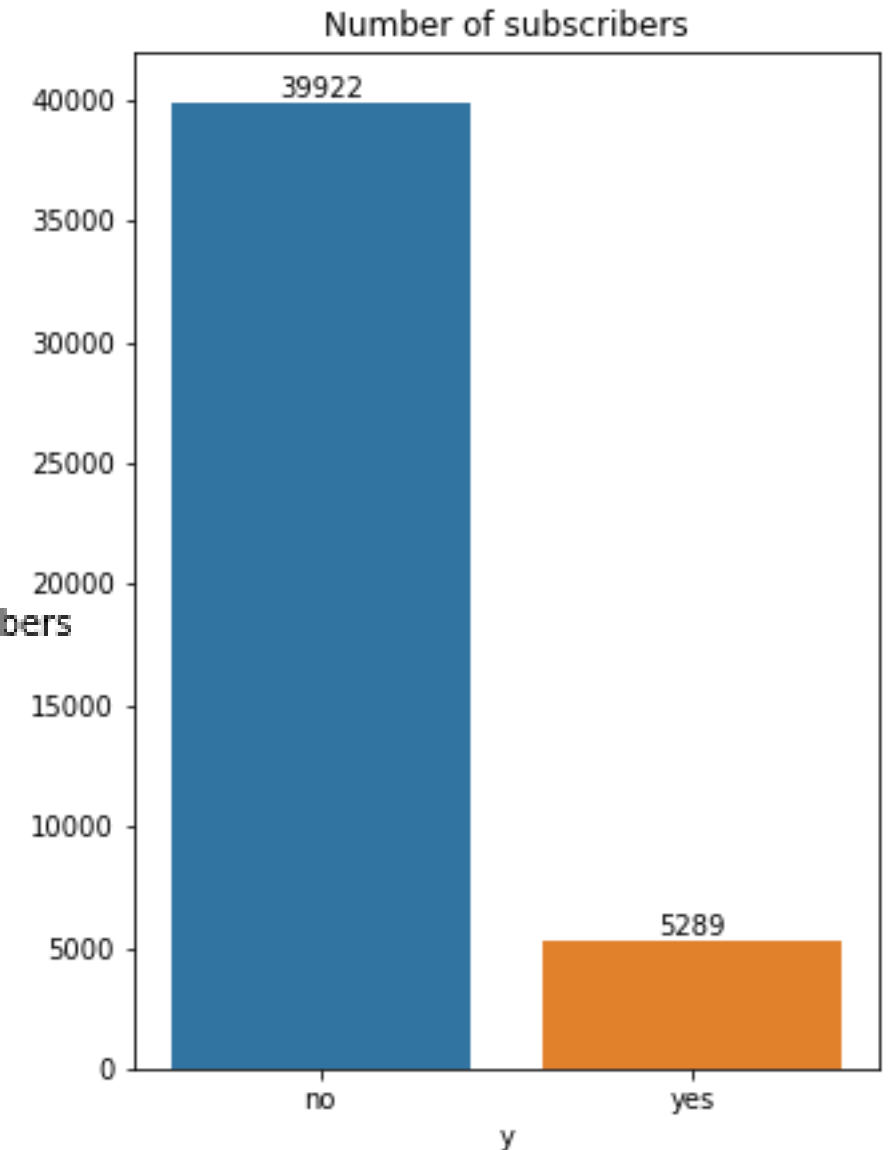
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Number of subscribers:



- 11% of the customers in the data chose to subscribe.



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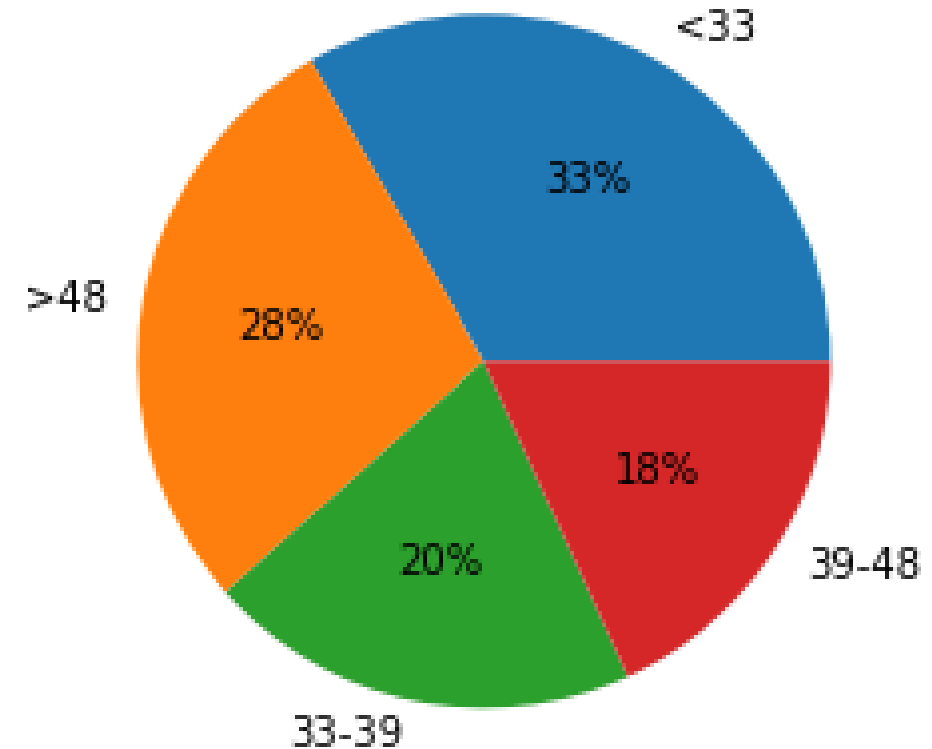
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Subscribers per age group

- 33% of the customers that chose to subscribe are under 33.
- 28% of them are over 48.
- 20% are between 33-39.
- 18% are between 39-48.

Subscriptions per age group for subscribe



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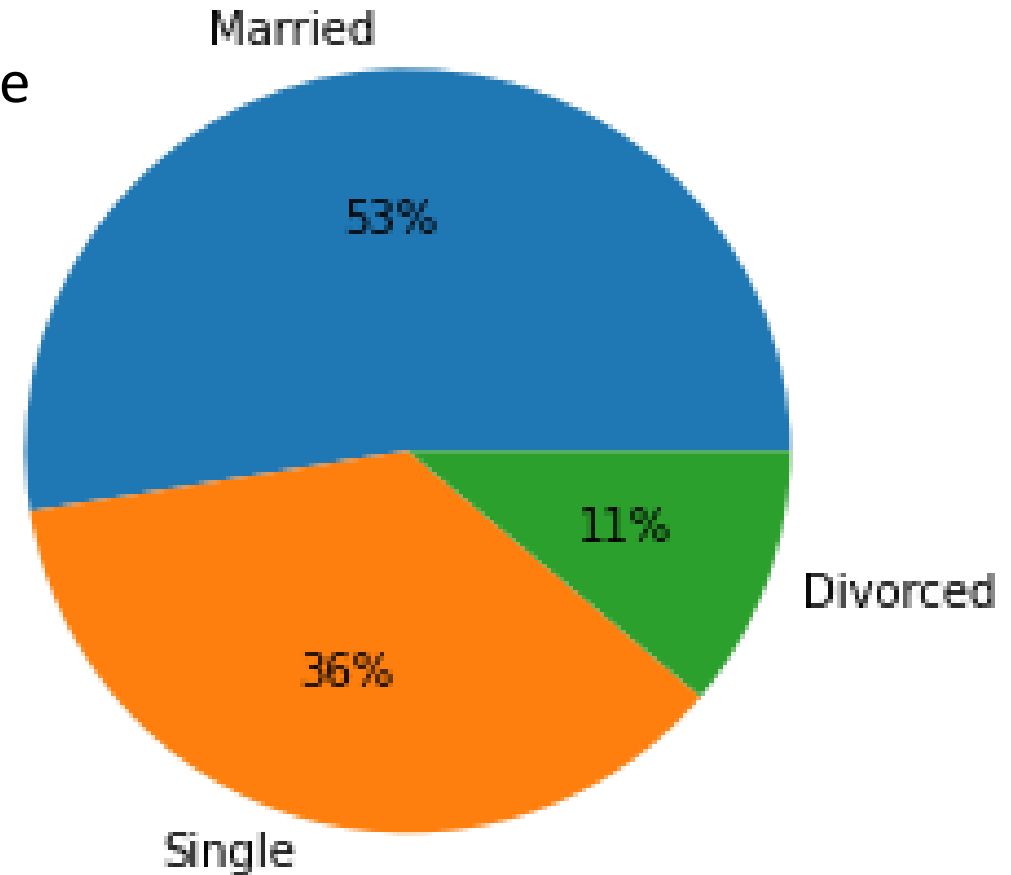
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Subscribers per marital status

Subscriptions per marital for subscribers

- 52% of the customers that chose to subscribe are married.
- 36% of them are single.
- 11% are between divorced.



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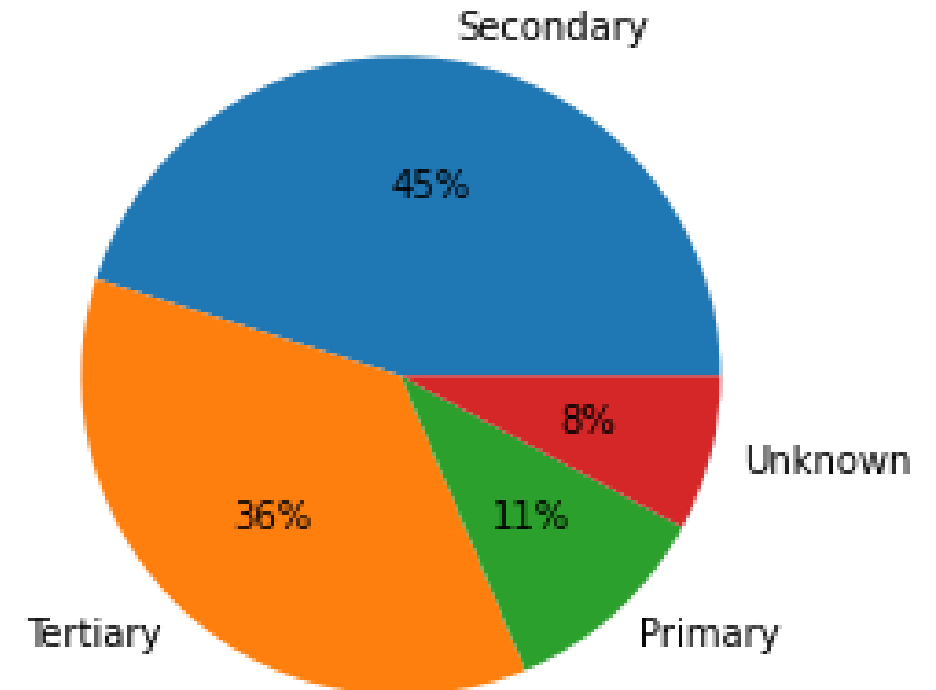
Subscribers per default credit

- 99% of subscribers do **not** have **default credit**.

Subscribers per education

- 46% of subscribers have **secondary** education.
- 37% of them have **tertiary** education.
- 11% have **primary** education.
- 8% of subscribers education is **unknown**.

Subscriptions per education for subscribers



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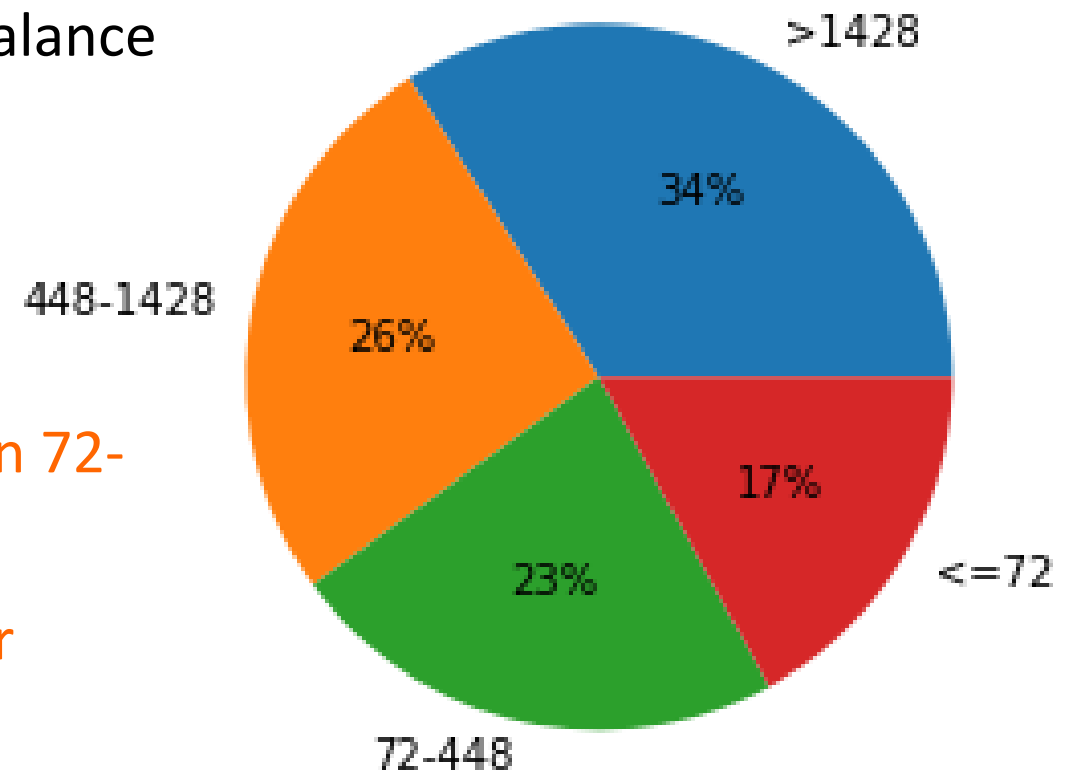
Subscribers per housing

- 63% of subscribers do **not** have a **house**.
- 37% of them **have** a **house**.

Subscribers per balance group

Subscriptions per balance group for subscribe

- 34% of subscribers have a balance above 1428.
- 26% of them have a balance between 448-1428.
- 23% have a balance between 72-448.
- 17% have a balance lower or equal than 72.



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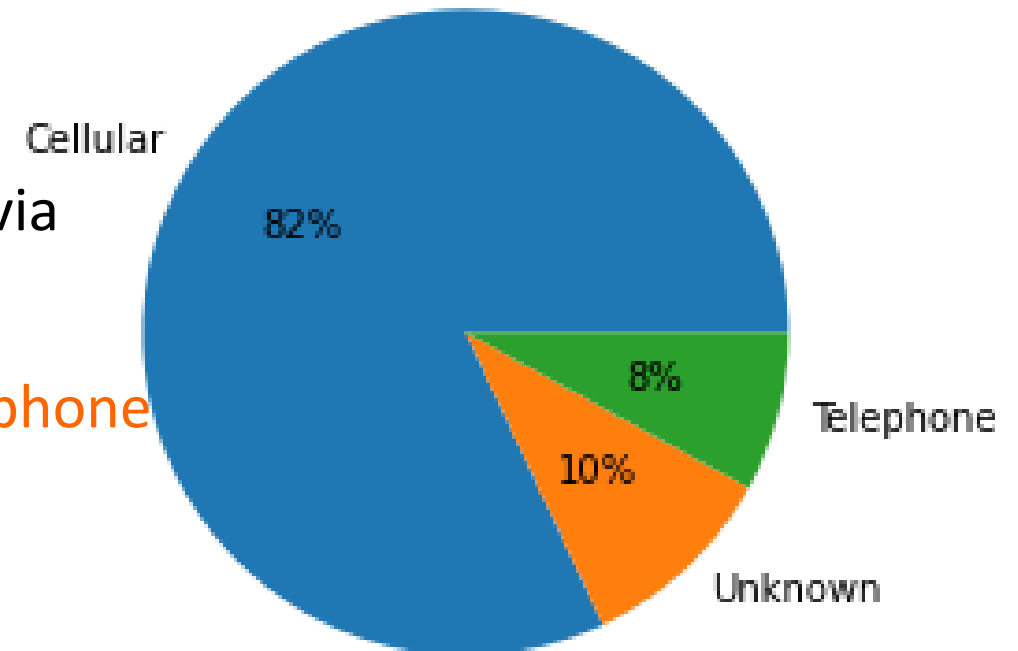
Subscribers per loan status

- 90% of subscribers do **not** have a **loan status**.
- 10% of them **have** one.

Subscribers per contact mean

Subscriptions per contact mean for subscribers

- 82% of subscribers were contacted via **cellular**.
- 10% of them were contact via **unknown** means.
- 8% were contacted via **telephone**



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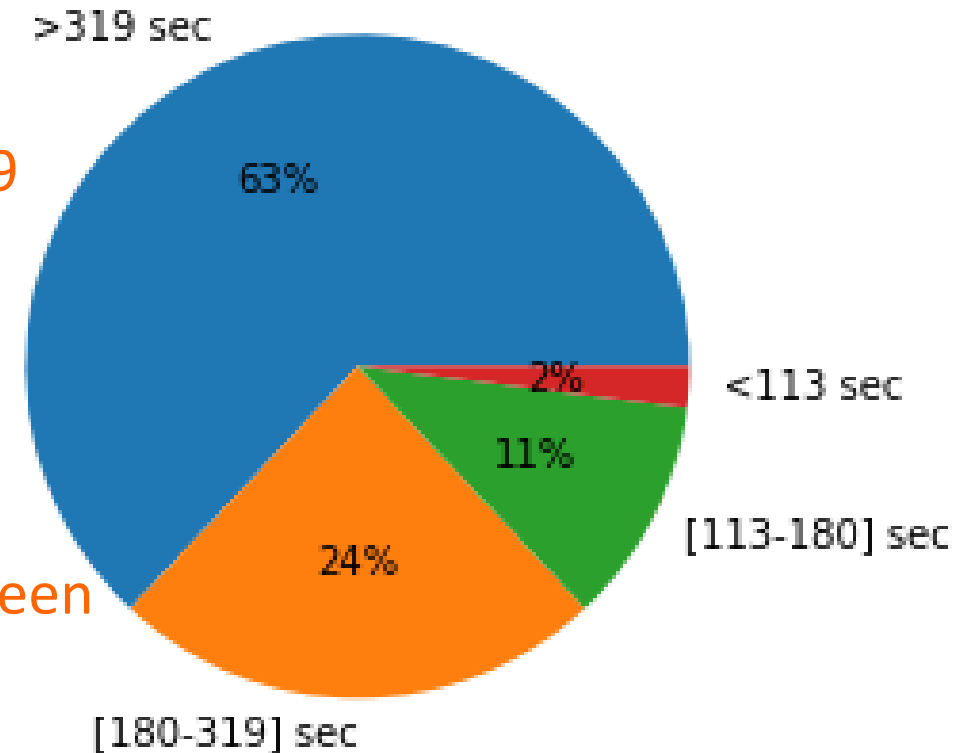
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Subscribers per contact duration time

Subscriptions per duration time for subscribers

- 63% of subscribers were contacted for a duration **over 319 seconds**.
- 24% of them for a duration **between 180 and 319 seconds**.
- 11% of them for a duration **between 113 and 180 seconds**.
- 2% of them for a duration **less than 113 seconds**.



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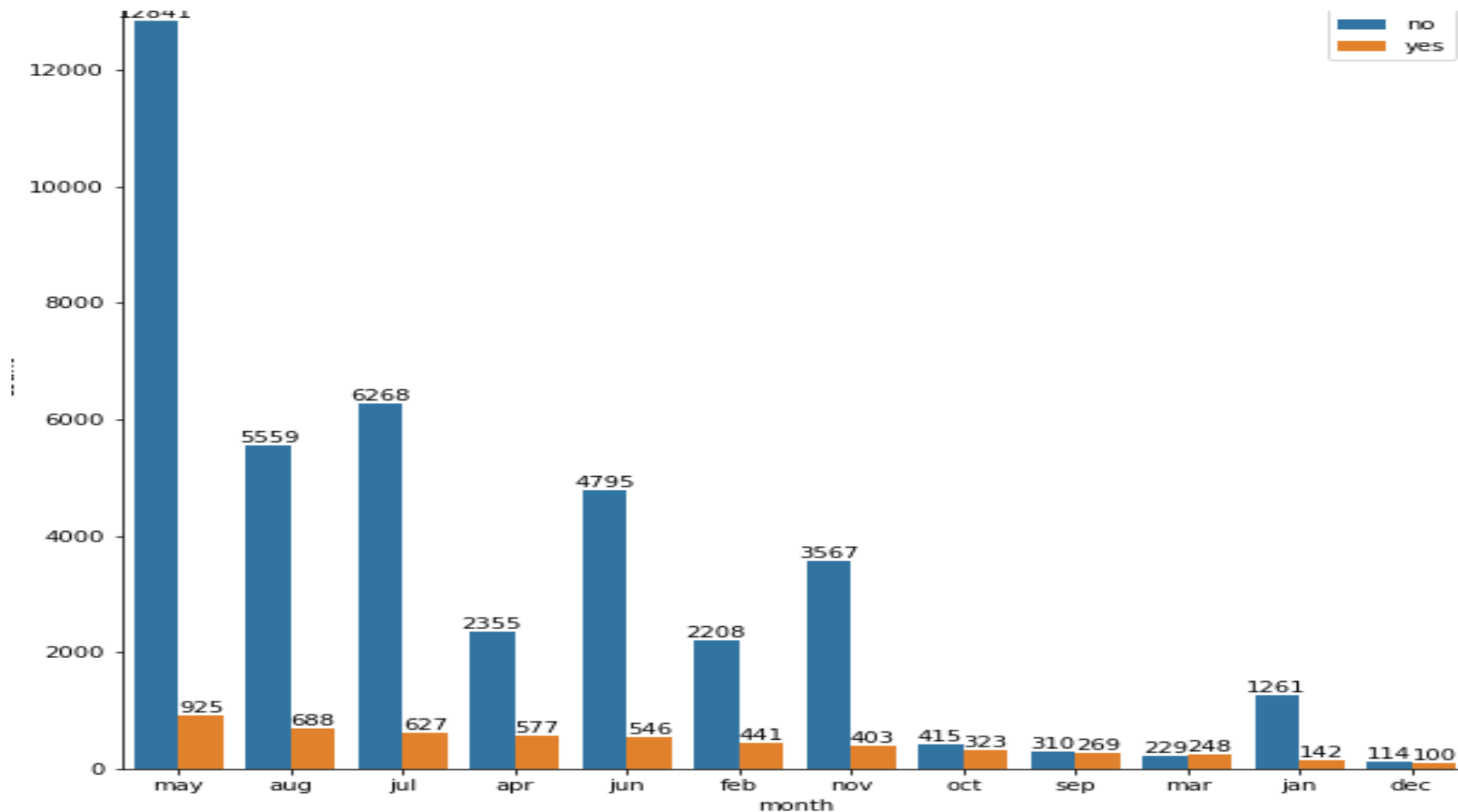
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Months with most subscribers

- Months with most subscribers are : may, august and july.



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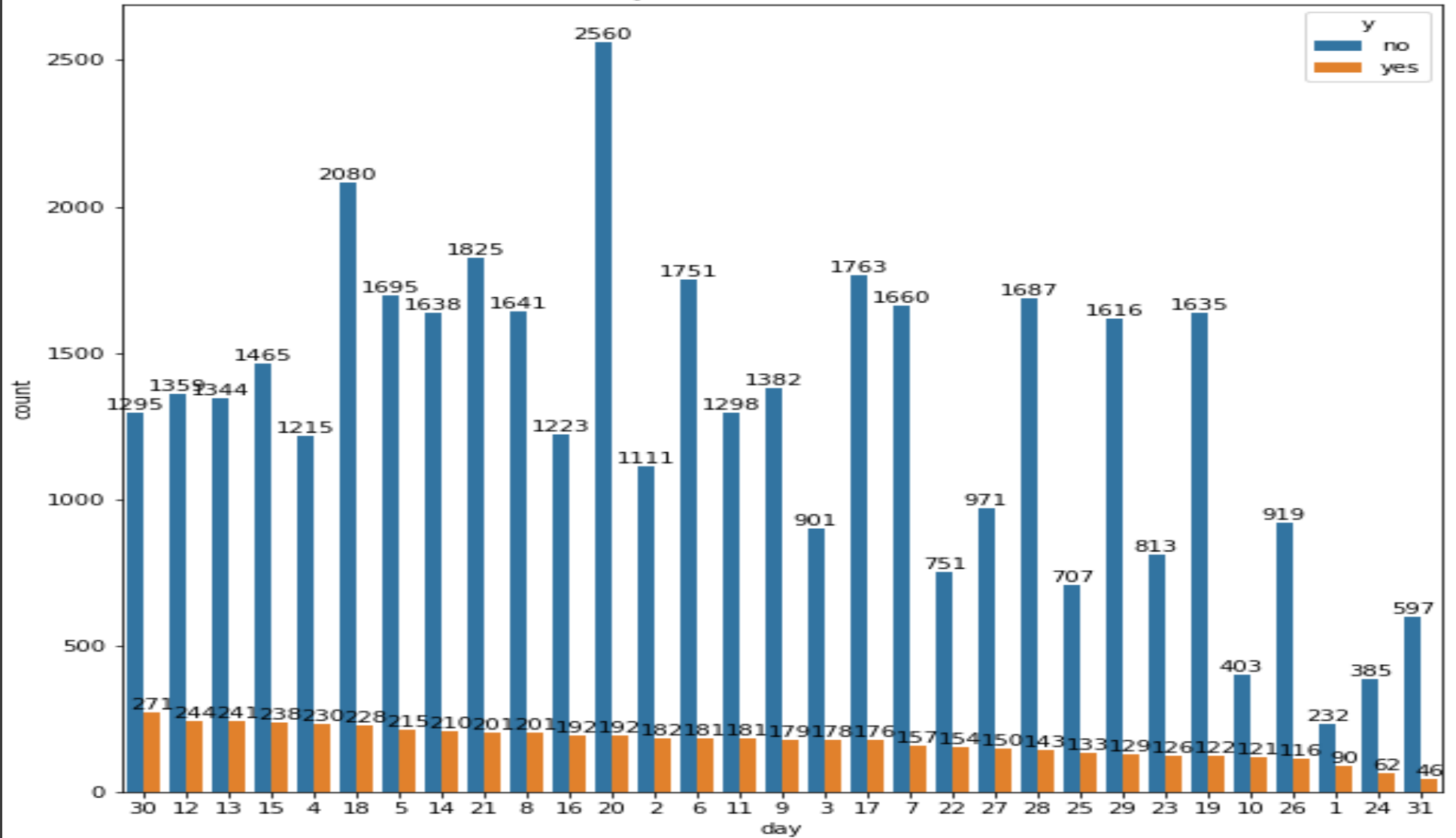
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Days with most subscribers

- Day with most subscribers are : 30,12,13,15.



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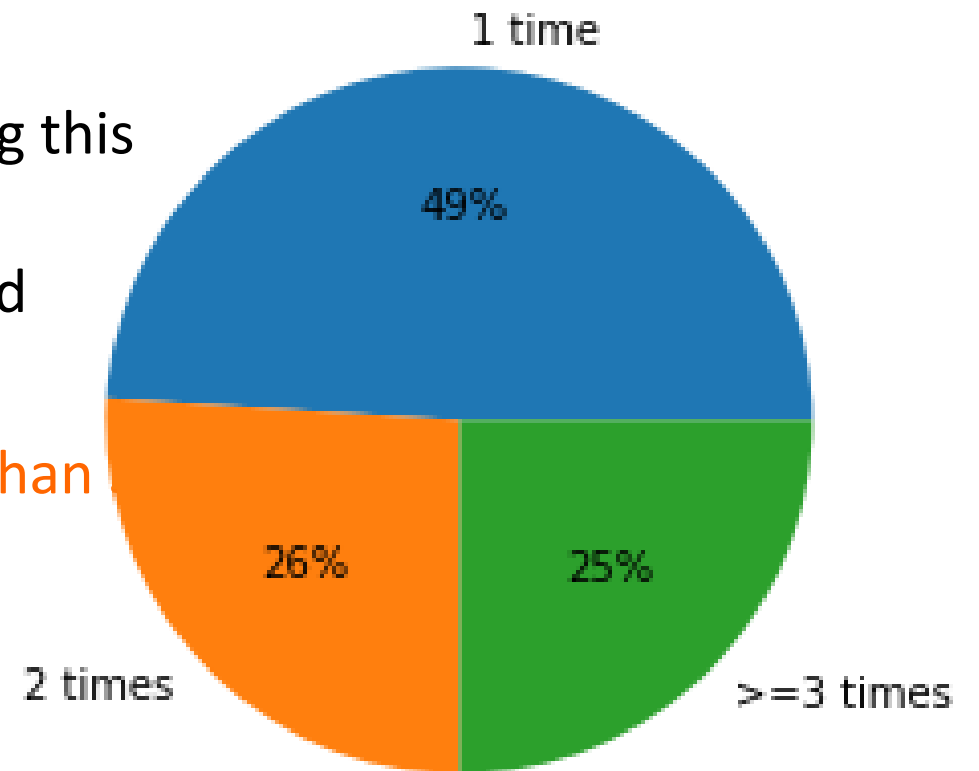
Subscribers per contact

- 64% of subscribers were **never contacted** in any previous campaigns.
- 36% were **contacted** in a previous campaign.

Subscribers per campaign number

Subscriptions per campaign number for subscribers

- 49% of subscribers were contacted **1 time** only during this campaign.
- 26% of them were contacted **2 times**.
- 25% were contacted **more than times**.



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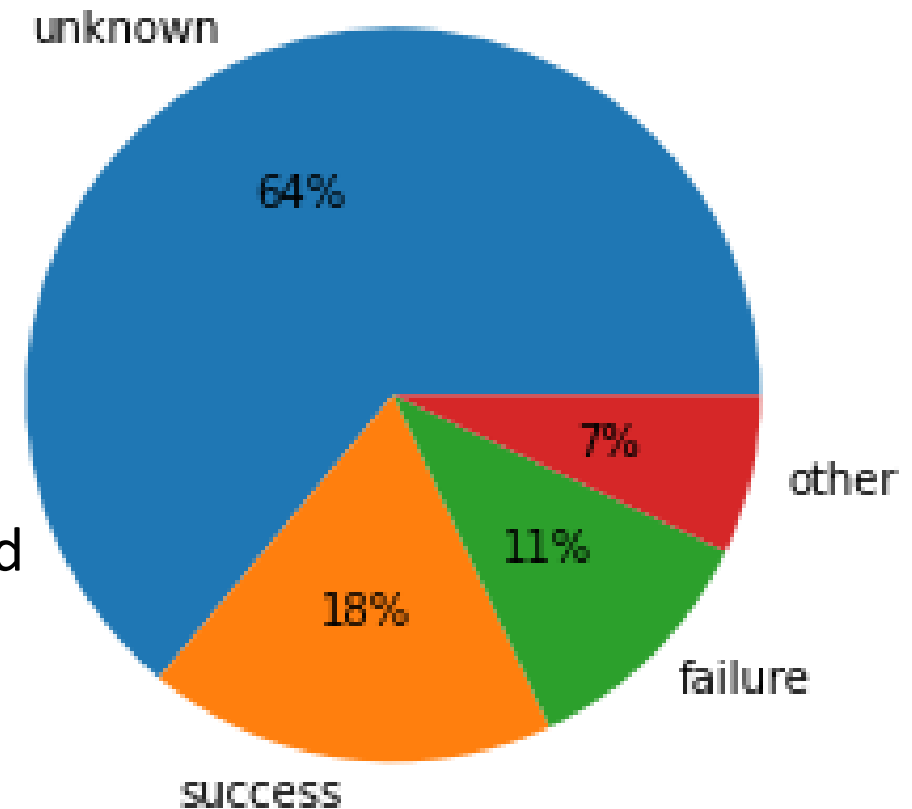
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Subscribers per outcome

Subscriptions per outcome for subscribers

- 64% of subscribers outcome was unknown.
- 18% of the outcome was considered a success.
- 11% of the outcome was considered a failure.
- 7% of the outcome was classed as other.



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EDA Summary:

- 11% of the customers in the data chose to subscribe.
- 33% of the customers that chose to subscribe are under 33.
- 52% of the customers that chose to subscribe are married.
- 99% of subscribers do not have default credit.
- 46% of subscribers have secondary education.
- 63% of subscribers do not have a house.
- 34% of subscribers have a balance above 1428.

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EDA Summary:

- 90% of subscribers do **not** have a **loan status**.
- 82% of subscribers were contacted via **cellular**.
- 63% of subscribers were contacted for a duration **over 319 seconds**.
- **Months** with most subscribers are : **may, august and july**.
- **Day** with most subscribers are : **30,12,13,15**.
- 64% of subscribers were **never contacted** in any previous campaigns.
- 49% of subscribers were contacted **1 time** only during this campaign.
- 64% of subscribers outcome was **unknown**.

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Recommendations :

- From the previous summary, we recommend the bank should consider advertising to:
 - People that are **under 33**.
 - **Married** people.
 - Customers that **do not have a default credit**.
 - Customers with **at least a secondary education**.
 - Customers with **a balance higher than 1428**.
 - Customers that **do not own a house**.
 - Customers **without a loan**.

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Recommendations :

- The bank should consider contacting their customers via **cellular** and spend **at least 319 seconds** contacting them.
- The bank should consider advertising **during the months of May, August, and July**. Either during **the end of the months or the middle of the months**.
- The bank should mainly focus on **contacting customers one time** and should **prioritize customers that have never participated in a campaign**.

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Recommendations :

- Since the **outcome** of the model is a **yes or no**, this can be seen as a **classification problem**.
- For classification problems, most known methods that can be used are **K means**, **KNN** (K nearest neighbor), **SVM** (Support Vector Machine) or **Random forest**.
- Some methods can be used for regression and classification problems such as **decision trees** or **neural networks** which can also work for this problem.

Thank You