**Bank Market Model Performance Analysis**

**Objective:** The objective is to use all this information to predict whether someone will end up saving money with the bank. This helps the bank decide who to focus on when they're trying to get people to save money with them. The Analysis will come across 7 classifiers and each performance for better decision-making. Additionally, the feature importance of various factors will be examined to gain insights into the key drivers influencing the predicted outcomes.

A screen shot of a computer

Description automatically generated**A screenshot of a computer

Description automatically generated**

**A screenshot of a document

Description automatically generated**

**A screenshot of a computer

Description automatically generatedA screenshot of a computer code

Description automatically generated**

**A computer screen shot of a computer code

Description automatically generatedA group of blue and green bars

Description automatically generated with medium confidence**

**A group of different colored bars

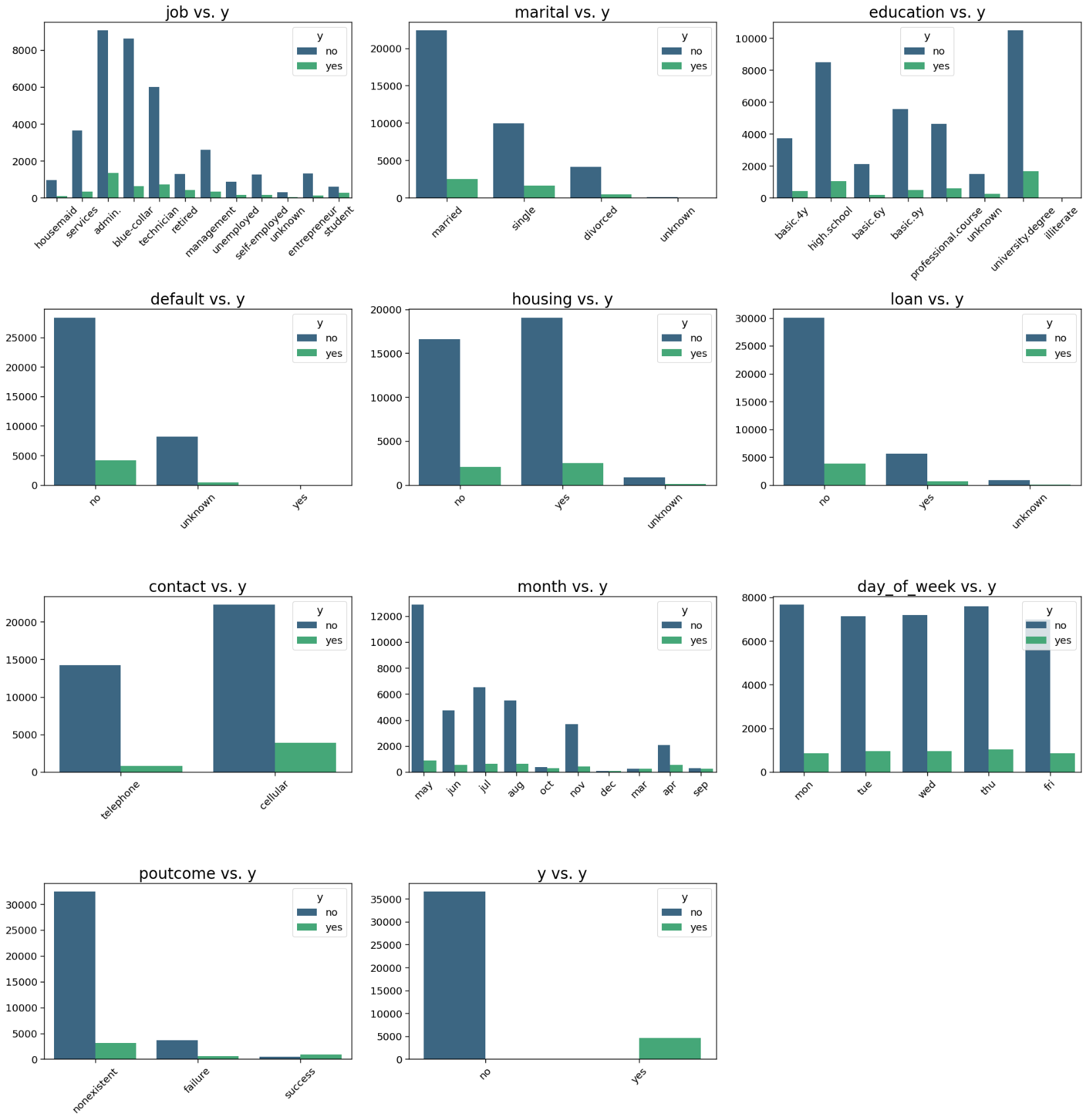
Description automatically generated**

**A white background with green text

Description automatically generatedA screenshot of a computer

Description automatically generatedA computer code on a white background

Description automatically generated**

****

**A computer code on a white background

Description automatically generated**

**A collage of different colored boxes

Description automatically generated**

**A computer code with text

Description automatically generated**

**A table of statistical data

Description automatically generated with medium confidence**

**A screenshot of a computer code

Description automatically generated**

**A computer code with text

Description automatically generated with medium confidence**

**A diagram of a number of variables

Description automatically generated with medium confidence**

**A screenshot of a computer program

Description automatically generated**

**A screenshot of a computer program

Description automatically generated**

**A screenshot of a computer

Description automatically generated**

**A screenshot of a computer program

Description automatically generatedA close-up of a white background

Description automatically generated**

**A screenshot of a computer code

Description automatically generated**

**A screenshot of a computer

Description automatically generatedA screenshot of a computer code

Description automatically generatedA screenshot of a computer

Description automatically generated**

**A computer code with text

Description automatically generated with medium confidenceA screenshot of a computer

Description automatically generated**

* **Logistic Regression**

**A screenshot of a computer program

Description automatically generated**

**A blue and white graph

Description automatically generated**

**Logistic Regression achieved an accuracy of 90.0% and demonstrated good performance in classifying the target variable. It correctly classified 6908 instances of the negative class (no) and 314 instances of the positive class (yes).**

* **Decision Tree**

**A screenshot of a computer program

Description automatically generated**

**A blue rectangular box with numbers and a black text

Description automatically generated with medium confidence**

**Decision Tree achieved an accuracy of 88.3%. It correctly classified 6604 instances of the negative class and 505 instances of the positive class.**

* **A screenshot of a computer program

  Description automatically generatedRandom Forest**

**A blue and white graph with numbers and labels

Description automatically generated**

**Random Forest achieved an accuracy of 90.2% and demonstrated robust performance. It correctly classified 6807 instances of the negative class and 417 instances of the positive class.**

* **Support Vector Machines (SVM)**

**A blue and white graph

Description automatically generatedA screenshot of a computer program

Description automatically generated**

**SVM achieved an accuracy of 90.0%. It correctly classified 6984 instances of the negative class and 234 instances of the positive class.**

* **A screenshot of a computer program

  Description automatically generatedGradient Boosting**

**A blue and white graph

Description automatically generated**

**Gradient Boosting achieved an accuracy of 90.9% and demonstrated excellent performance. It correctly classified 6839 instances of the negative class and 452 instances of the positive class.**

* **K- Nearest Neighbors (KNN)**

A screenshot of a computer program

Description automatically generated

A blue and white graph

Description automatically generated

**KNN achieved an accuracy of 89.2%. It correctly classified 6823 instances of the negative class and 336 instances of the positive class.**

* **Naïve Bayes**

A computer screen shot of a program code

Description automatically generated

A blue and white graph

Description automatically generated

**Naive Bayes achieved an accuracy of 88.9%. It correctly classified 6748 instances of the negative class and 389 instances of the positive class.**

**Summarizing this part: Gradient Boosting achieved the highest accuracy among the classifiers tested, followed closely by Random Forest. These models demonstrated robust performance in predicting the target variable, Let's check it further.**

A screenshot of a computer program

Description automatically generated**Double-checking if the Gradient Boosting and Random Forest are the best among other classifiers comparing through Precision, Recall, and F1 score.**

A screenshot of a computer

Description automatically generatedA screenshot of a computer

Description automatically generatedA screenshot of a computer screen

Description automatically generated

A white background with black text

Description automatically generated

A screenshot of a computer program

Description automatically generated

A screenshot of a computer

Description automatically generated

* **Gradient Boosting**

**Duration:** This feature has the highest importance, indicating that the duration of the call has a significant impact on the outcome.

**Pdays:** The number of days that passed after the client was last contacted from a previous campaign is also a crucial factor.

**Cons.conf.idx and Cons.price.idx:** These are economic indicators, suggesting that the overall economic context plays a role.

**Age Group and Previous Contacts:** These features have relatively lower importance but still contribute to the model.

* **Random Forest**

**Duration:** Similarly, the duration of the call is the most critical predictor in the Random Forest model.

**Cons.conf.idx and Cons.price.idx:** Economic indicators remain significant in this model as well.

**Job and Campaign:** Job type and number of contacts during this campaign also have notable importance.

**Education and Age Group:** These features also contribute significantly to the model's predictions.

* **Conclusion to this part**

Both models highlight the importance of the call duration and economic indicators (cons.conf.idx and cons.price.idx). Other factors such as job type, education level, and age group also play essential roles in predicting the outcome of the marketing campaign. Overall, these insights can guide marketing strategies to focus on specific customer demographics and tailor communication strategies based on economic conditions and call duration.

**A graph of a positive rate

Description automatically generated with medium confidenceA screenshot of a computer program

Description automatically generated**

**A screenshot of a graph

Description automatically generated**

**Conclusion:**

**After integrating all classifiers into the Power BI dashboard and comparing their performance, it's evident that Gradient Boosting and Random Forest consistently outperform other classifiers. This conclusion is drawn from various performance metrics such as Accuracy, Precision, Recall, F1 Score, and AUC. Moreover, analyzing the feature importance reveals that the duration of the call holds significant importance for both classifiers. This insight suggests that investing time in client calls could be an effective strategy for the bank.**