

Team Bravo

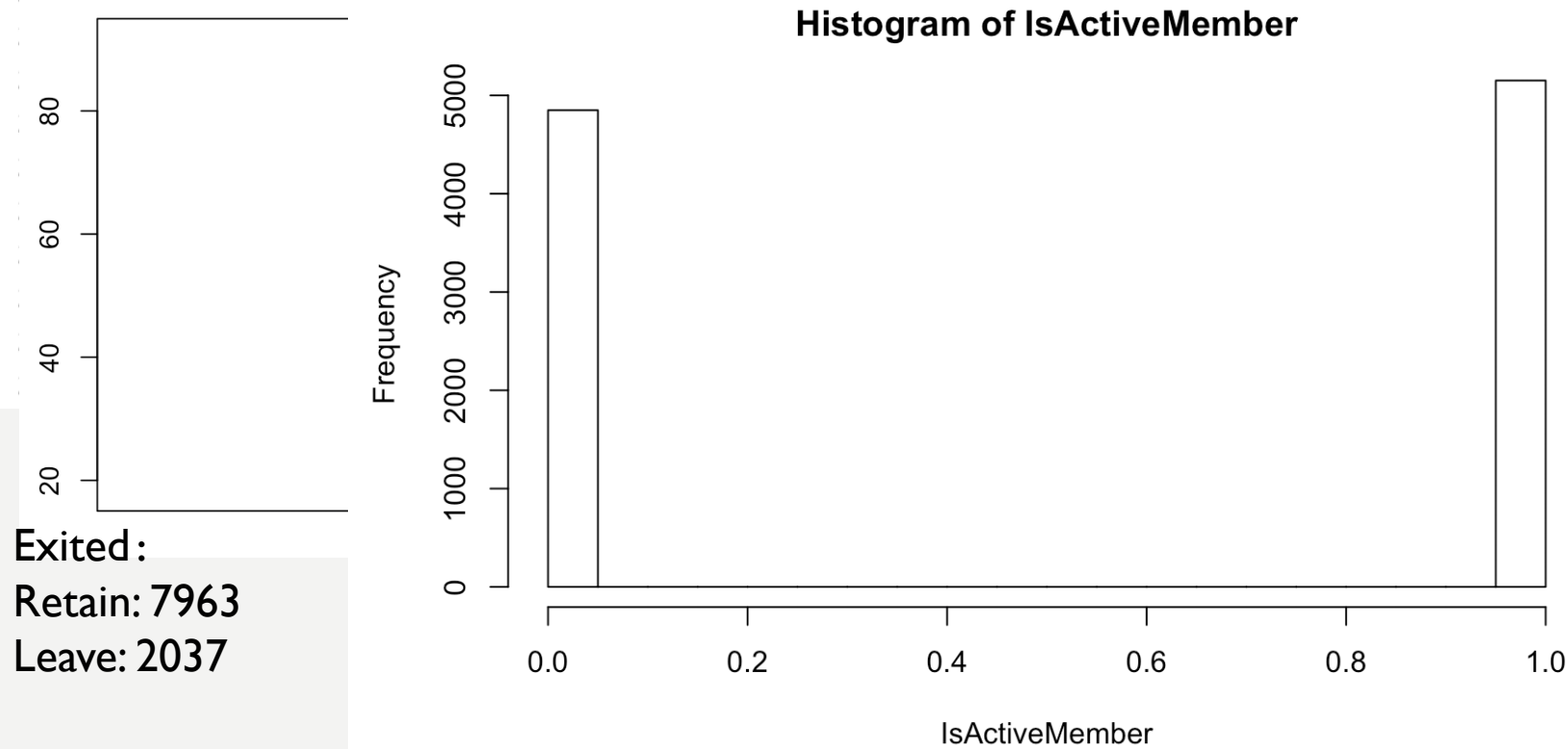
The background is white with several decorative elements. In the top left, there are five horizontal bars of varying lengths in orange and yellow. Scattered across the slide are numerous circles of different sizes and colors, including orange, yellow, and light beige. A large yellow circle with a double white border is centered on the slide, containing the main title. To its left is a large orange circle containing the names of the team members. Other smaller circles are placed around the central circle, some overlapping it.

How to improve customer retention of bank

Junchi Tian
Bixuan Huang

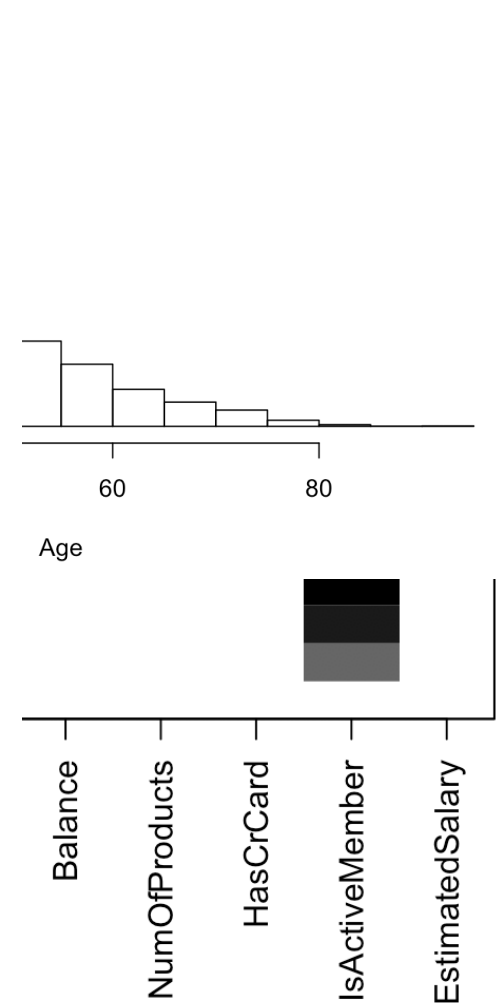
EXPLORATORY DATA ANALYSIS

```
'data.frame': 10000 obs. of 11 variables:  
 $ CreditScore : int 619 608 502 699 850 645 822 376 501  
 $ Geography : Factor w/ 3 levels "France", "Germany", "Spain": 1 1 1 1 1 1 1 1 1  
 $ IsActiveMember : Factor w/ 2 levels "Exited", "Retain": 1 1 1 1 1 1 1 1 1  
 $ NumOfProducts : Factor w/ 3 levels "Basic", "Gold", "Silver": 1 1 1 1 1 1 1 1 1  
 $ Balance : Factor w/ 3 levels "Basic", "Gold", "Silver": 1 1 1 1 1 1 1 1 1  
 $ HasCrCard : Factor w/ 2 levels "No", "Yes": 1 1 1 1 1 1 1 1 1  
 $ EstimatedSalary : Factor w/ 3 levels "Low", "Medium", "High": 1 1 1 1 1 1 1 1 1
```



Exited:
Retain: 7963
Leave: 2037

Histogram of Age



MODEL DIAGNOSTICS

Dependent: Exited
Independent: CreditScore, Geography, Gender, Age, Balance, IsActiveMember

Multicollinearity:

	GVIF	Df	GVIF^(1/(2*Df))	
Cal				
glr				Age + git"),
CreditScore	1.001354	1	1.000677	
Geography	1.196809	2	1.045939	
Gender	1.003773	1	1.001885	
Dev				
Age	1.091707	1	1.044848	
-2				
Balance	1.195835	1	1.093543	
IsActiveMember	1.086432	1	1.042321	

Coefficients:

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-3.717e+00	2.417e-01	-15.379	< 2e-16 ***
CreditScore	-5.973e-04	3.134e-04	-1.906	0.0567 .
GeographyGermany	7.333e-01	7.548e-02	9.716	< 2e-16 ***
GeographySpain	8.375e-03	7.861e-02	0.107	0.9152
GenderMale	-5.780e-01	6.100e-02	-9.476	< 2e-16 ***
Age	7.545e-02	2.899e-03	26.022	< 2e-16 ***
Balance	2.999e-06	5.521e-07	5.431	5.61e-08 ***
IsActiveMember	-1.147e+00	6.502e-02	-17.637	< 2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 8135.0 on 7999 degrees of freedom
Residual deviance: 6832.4 on 7992 degrees of freedom
AIC: 6848.4

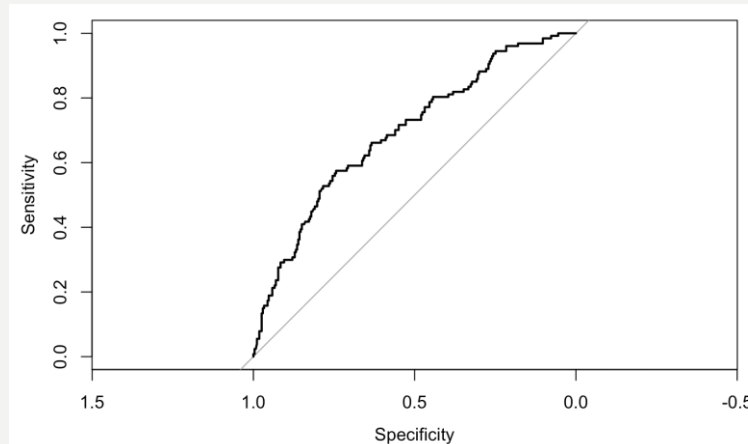
Number of Fisher Scoring iterations: 5

(Intercept)	0.02430666	CreditScore	0.99940291	GeographyGermany	2.08199990	GeographySpain	1.00841011
IsActiveMember	0.31765101						
GenderMale	0.56099703	Age	1.07836574	Balance	1.00000300		

Hosmer and Lemeshow goodness of fit (GOF) test

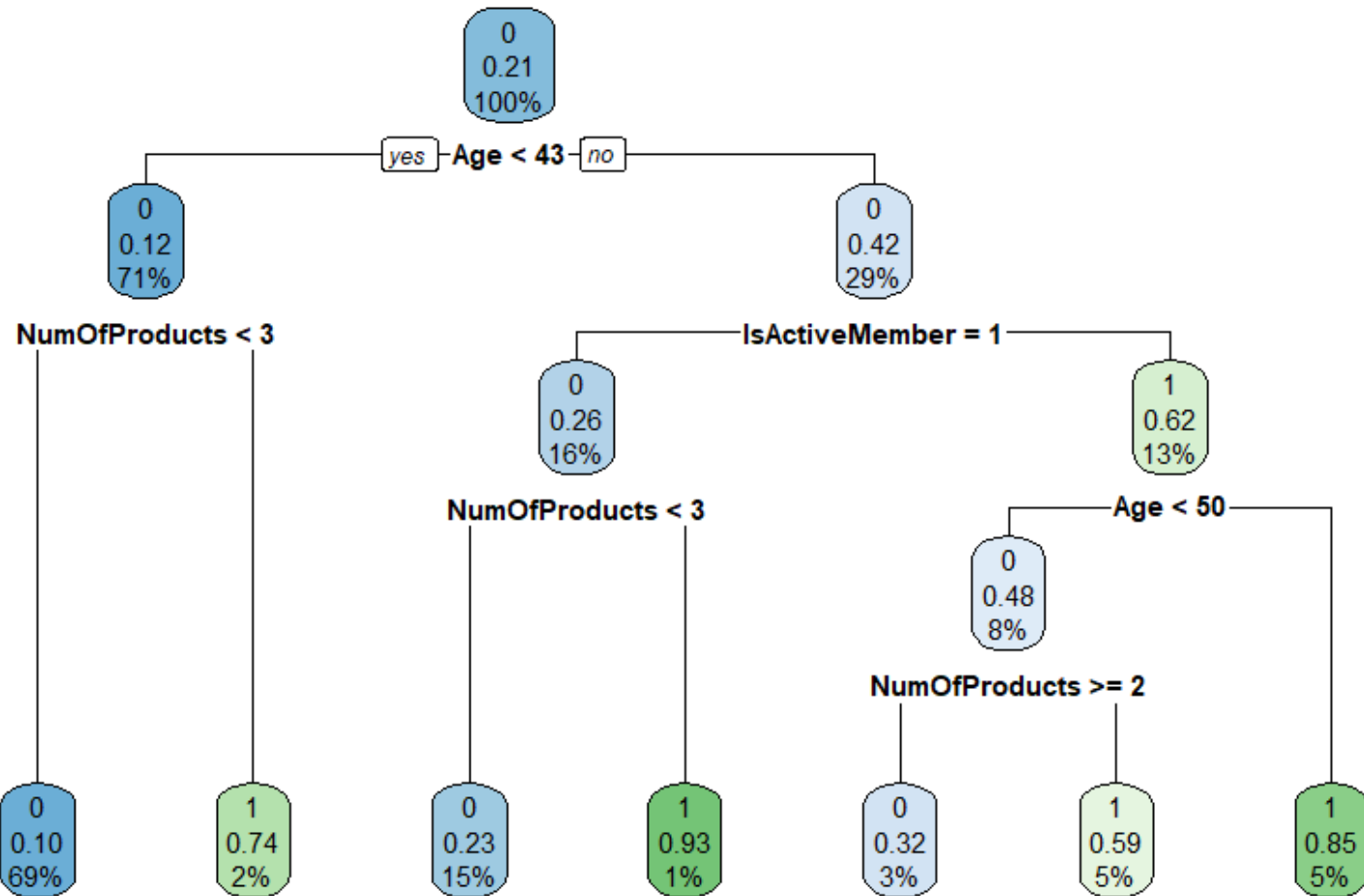
data: train\$Exited, fitted(bank_log)
X-squared = 13.407, df = 8, p-value = 0.0986

Hit rate : 0.809



AUC : 0.7418554

DECISION TREE



bank_model	0	1
0	6192	957
1	161	690

"Real error rate is: 13.975%"

Hit rate : 0.805

CONCLUSION/SOLUTION

- 1, The bank should hold promotional activities to the old, particularly age is older than 43.
- 2, Create more useful products and enable customers to have more accounts, better than 3.
- 3, Focus on German and Female, compared to France, Spain and Male.
- 4, Establish a good membership system to make more active members.

Team Bravo

A series of five horizontal bars of varying lengths, colored in shades of orange and yellow, stacked vertically.A collection of circles in various sizes and shades of orange and yellow scattered across the slide. A large yellow circle with a double outline is the central focus.

Thank you

A large orange circle containing the names Junchi Tian and Bixuan Huang in white text.

Junchi Tian
Bixuan Huang