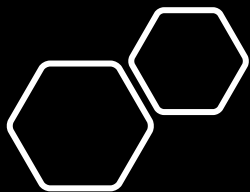


# EMPLOYEE CHURN ANALYSIS

- KNN
- RANDOM FOREST
- XGBOOST
- ANN
- MODEL DEPLOYMENT

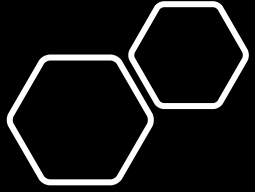
GROUP – 2 CAPSTONE PROJECT - 2





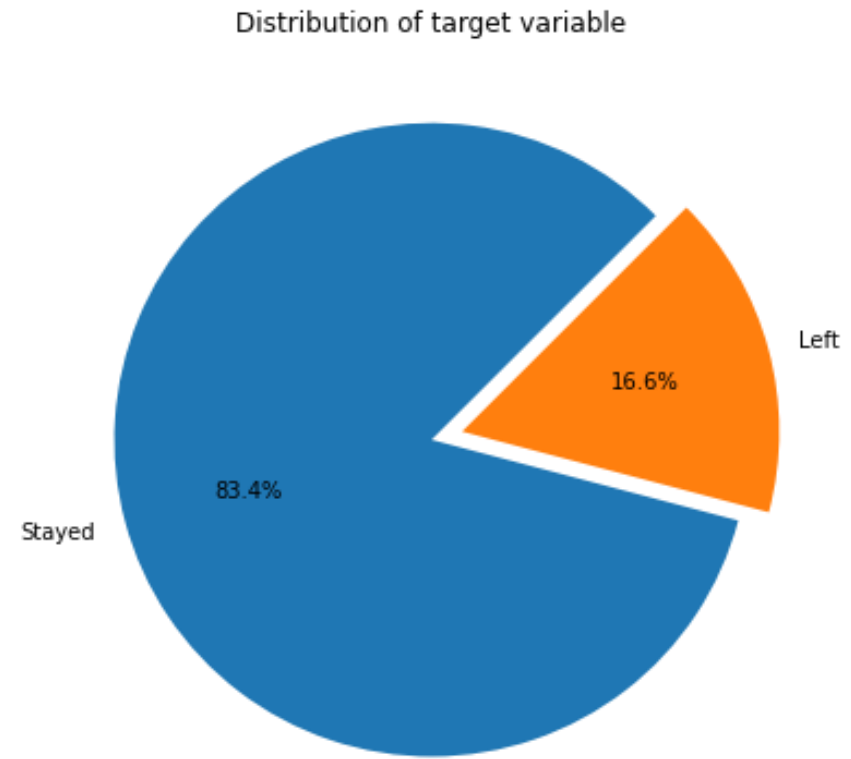
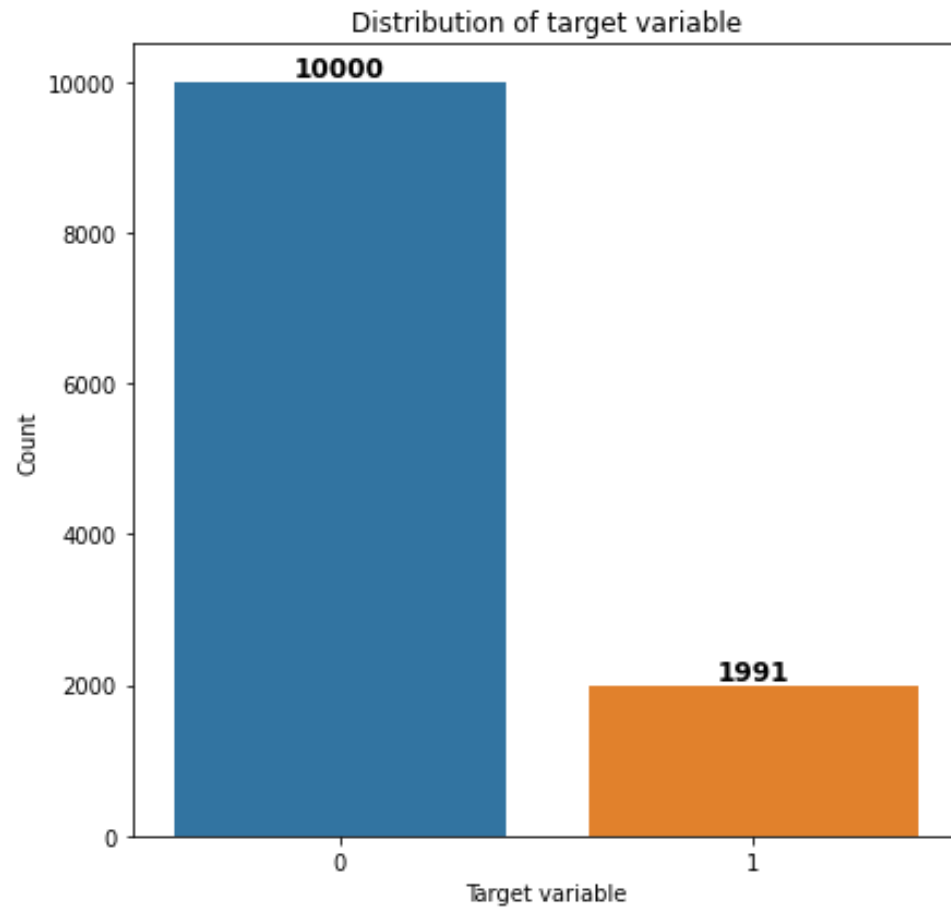
# contents

- Group Members
- Data Analysis
- EDA
- KNN
- RF
- XGBOOST
- ANN



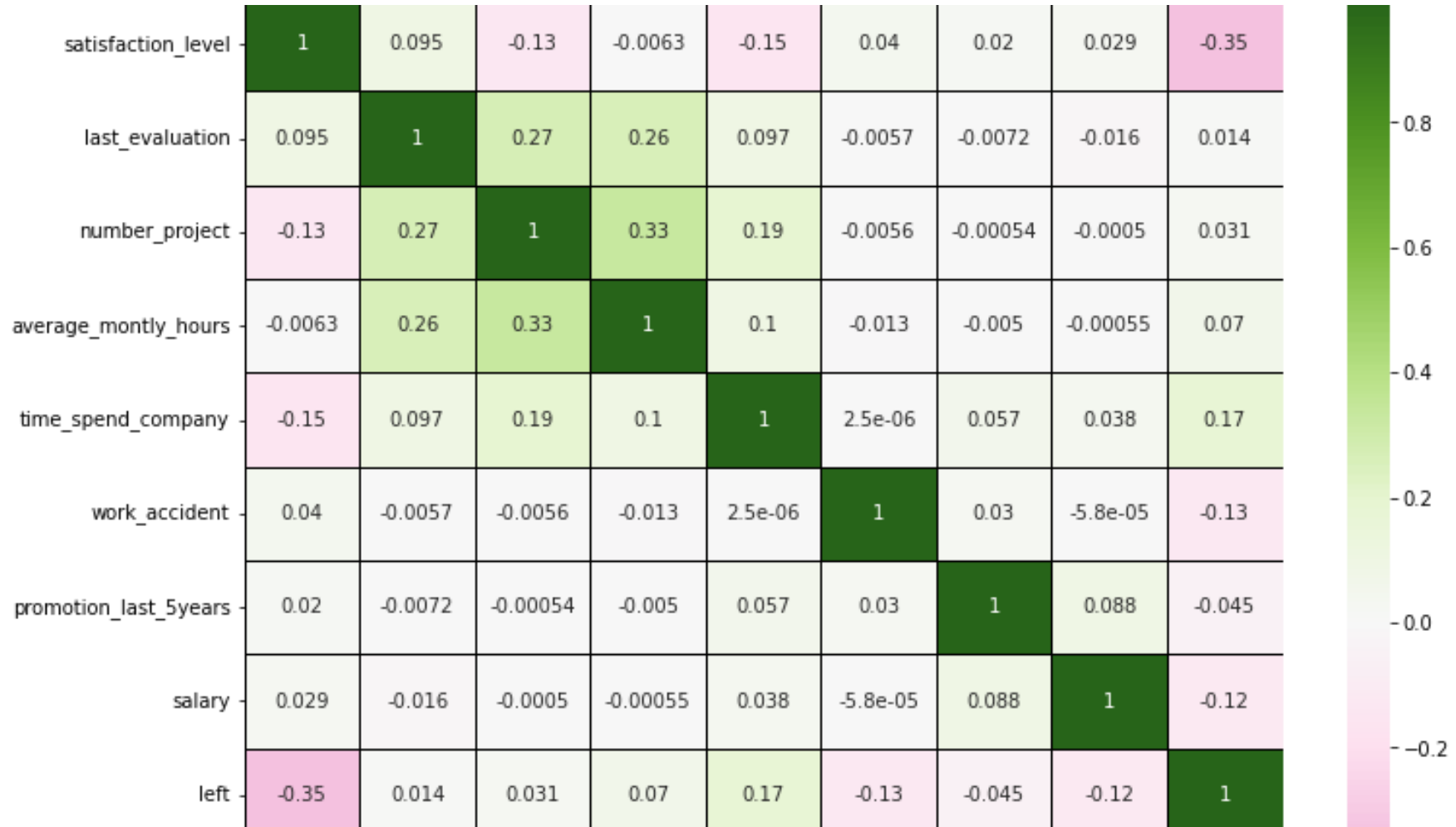
# Groups Members

- F3662-Muhsin Ayaz
- F3634-İbrahim Şimşek

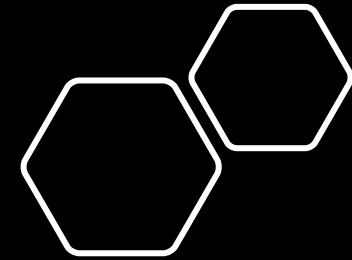


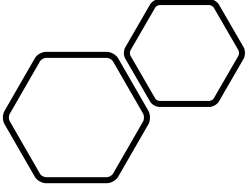
CHURN RATE

# Feature Corr

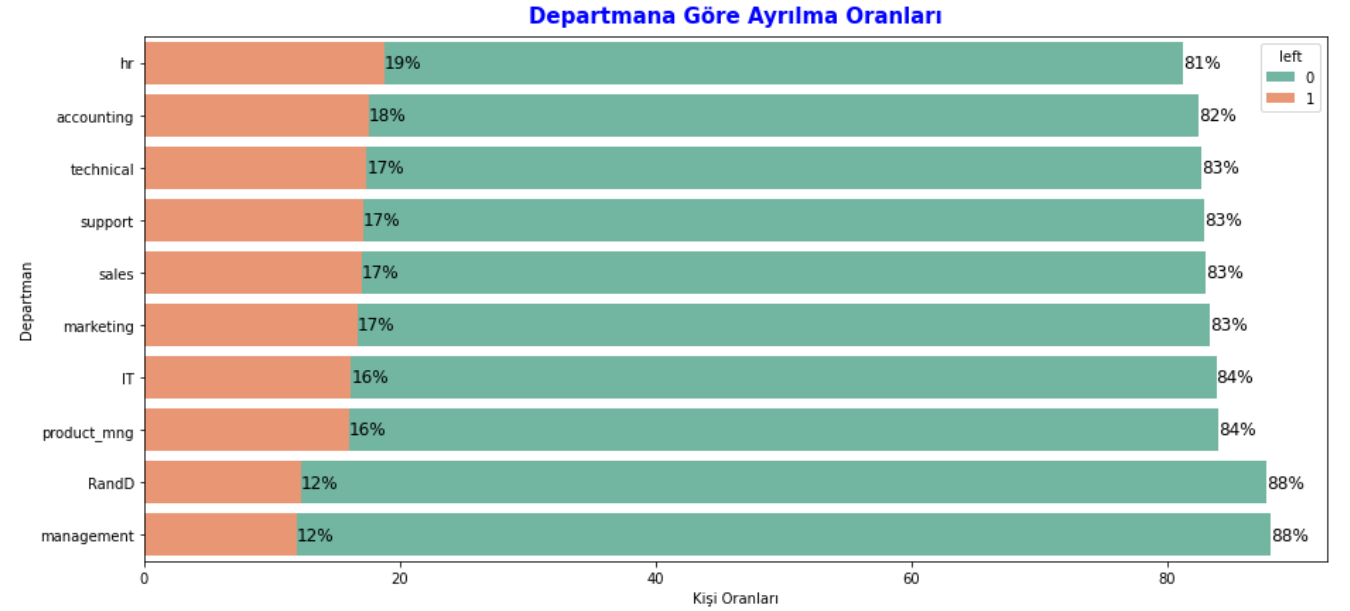
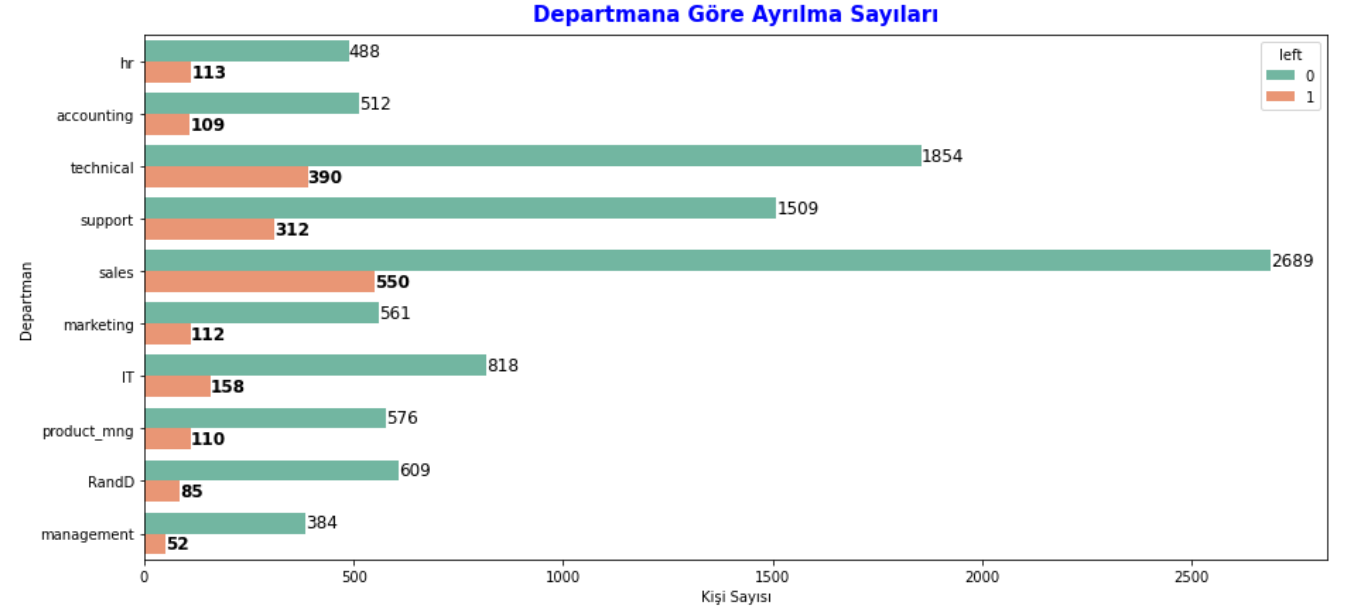


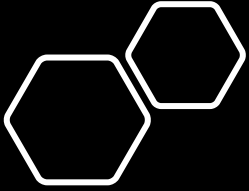
left	0	1
satisfaction_level	0.667365	0.440271
last_evaluation	0.715667	0.721783
number_project	3.786800	3.883476
average_monthly_hours	198.942700	208.162230
time_spend_company	3.262000	3.881467
work_accident	0.174500	0.052737
promotion_last_5years	0.019500	0.004018
salary	0.637600	0.434455



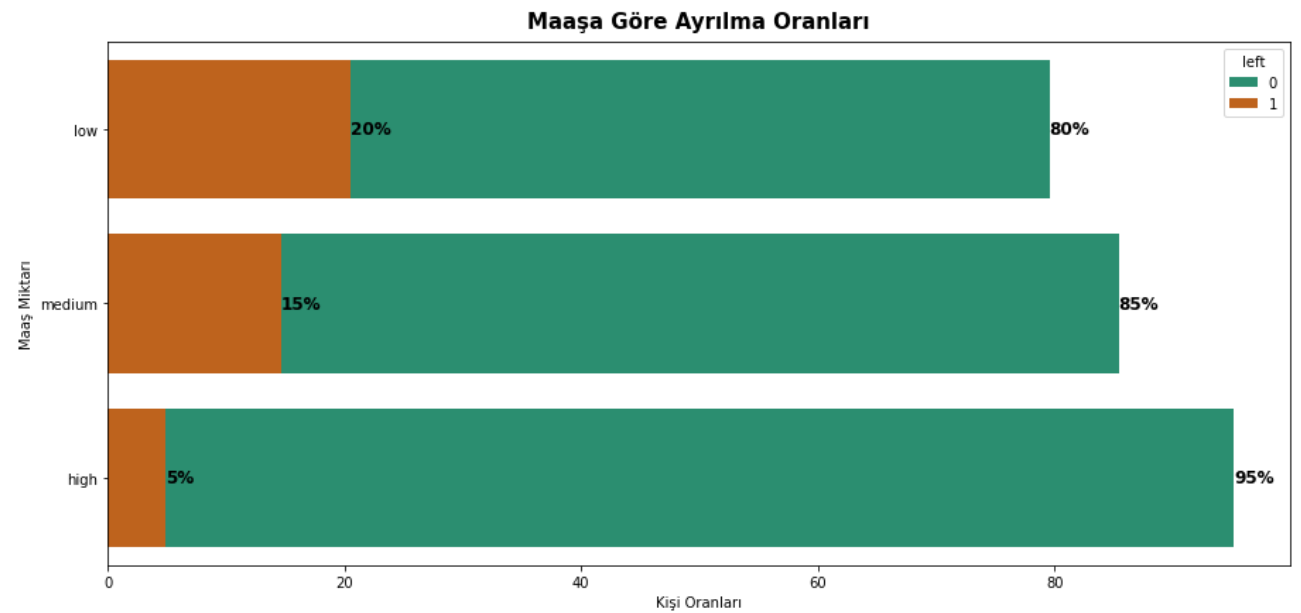
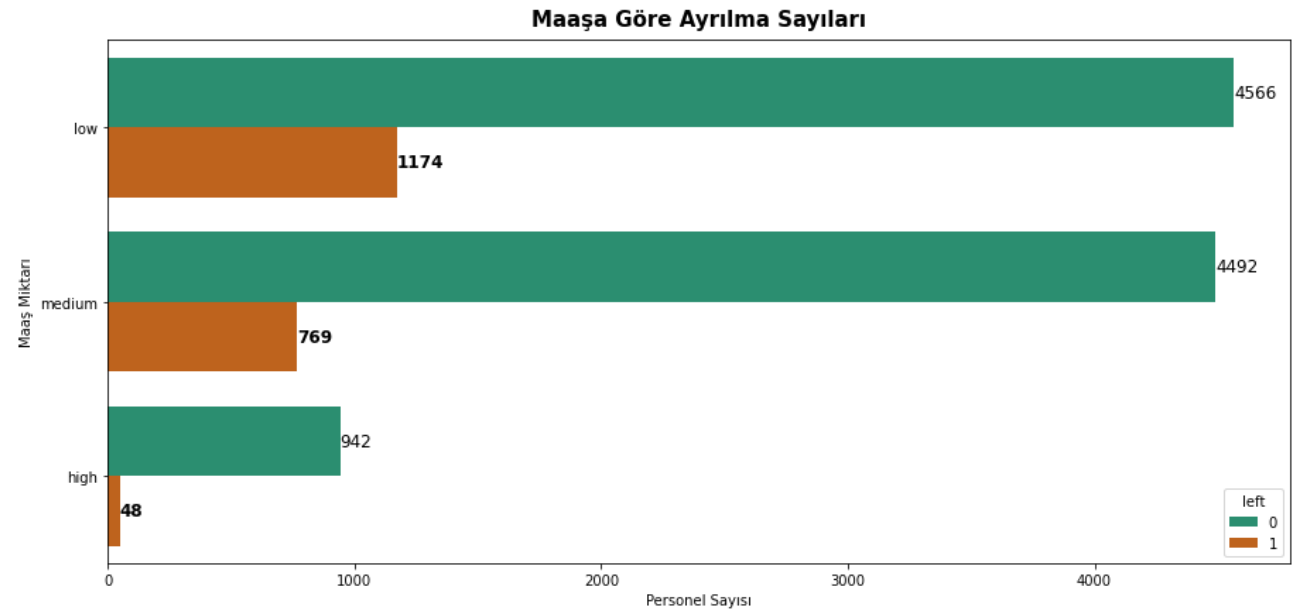


- DEPARTMENT CHURN

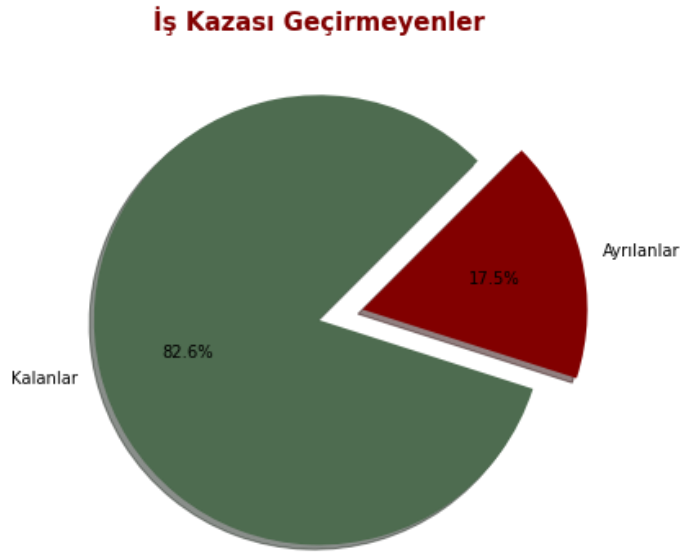
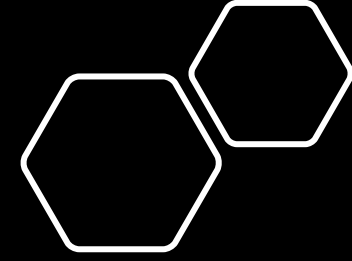
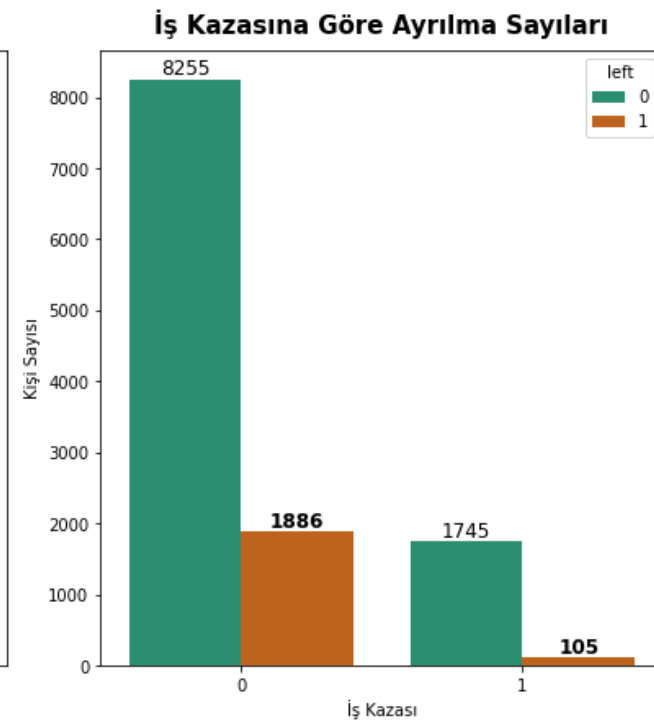
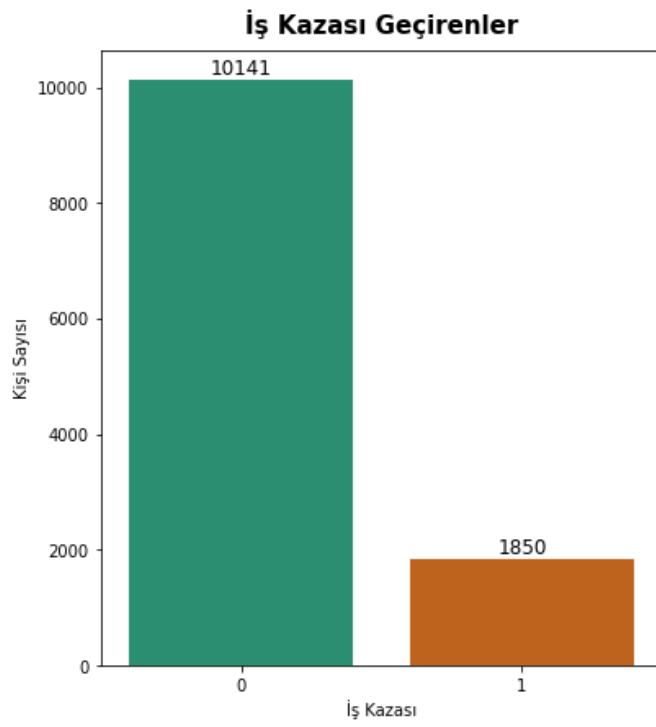




- CHURN / SALARY

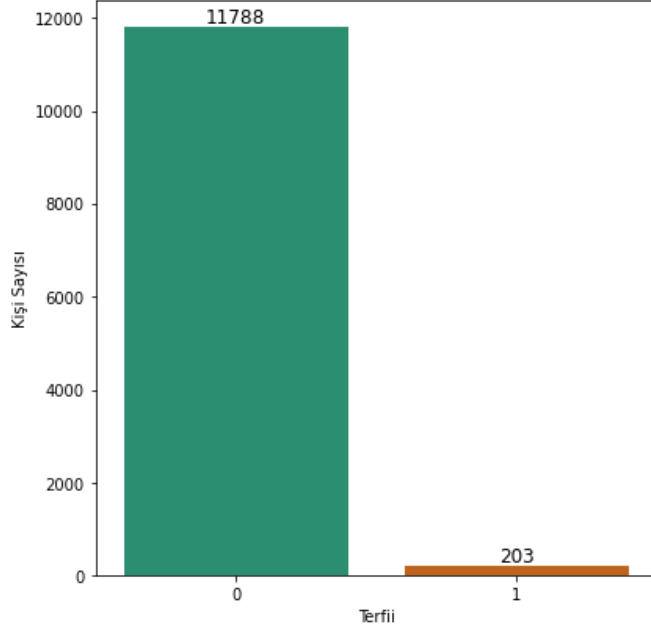




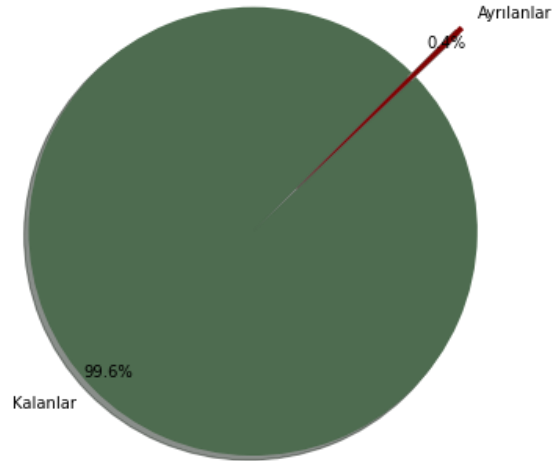


## Son 5 Yılda Terfii Alanlar ve Almayanların Karşılaştırılması

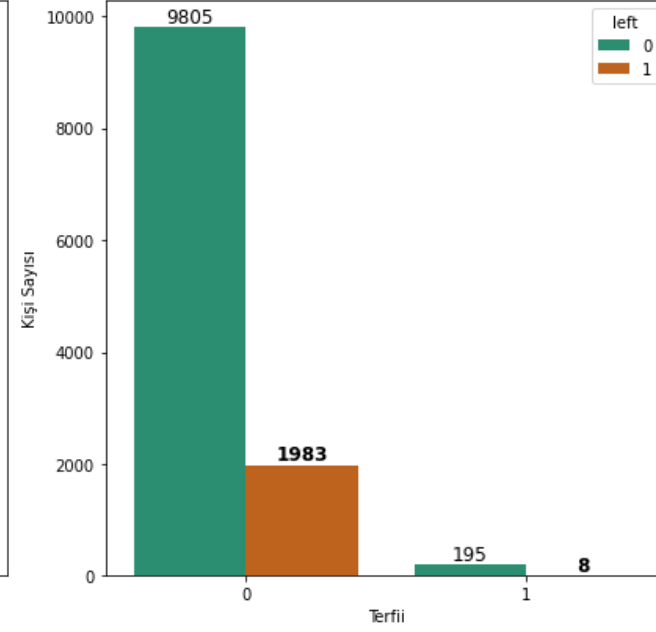
### Terfii Durumu



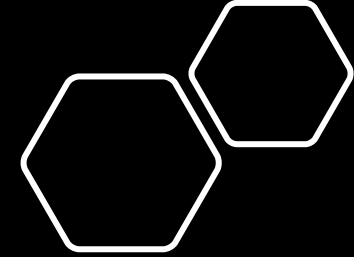
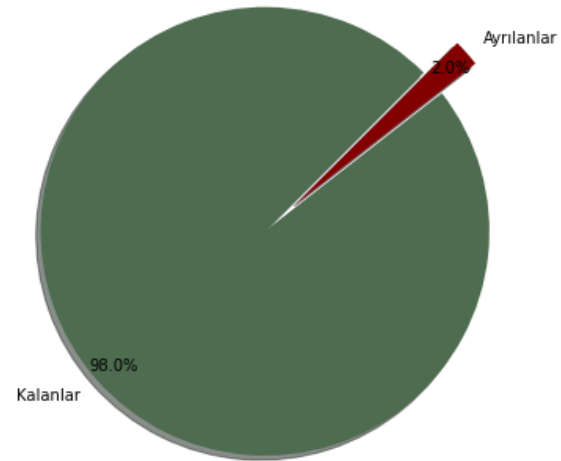
### Terfii Alanlar



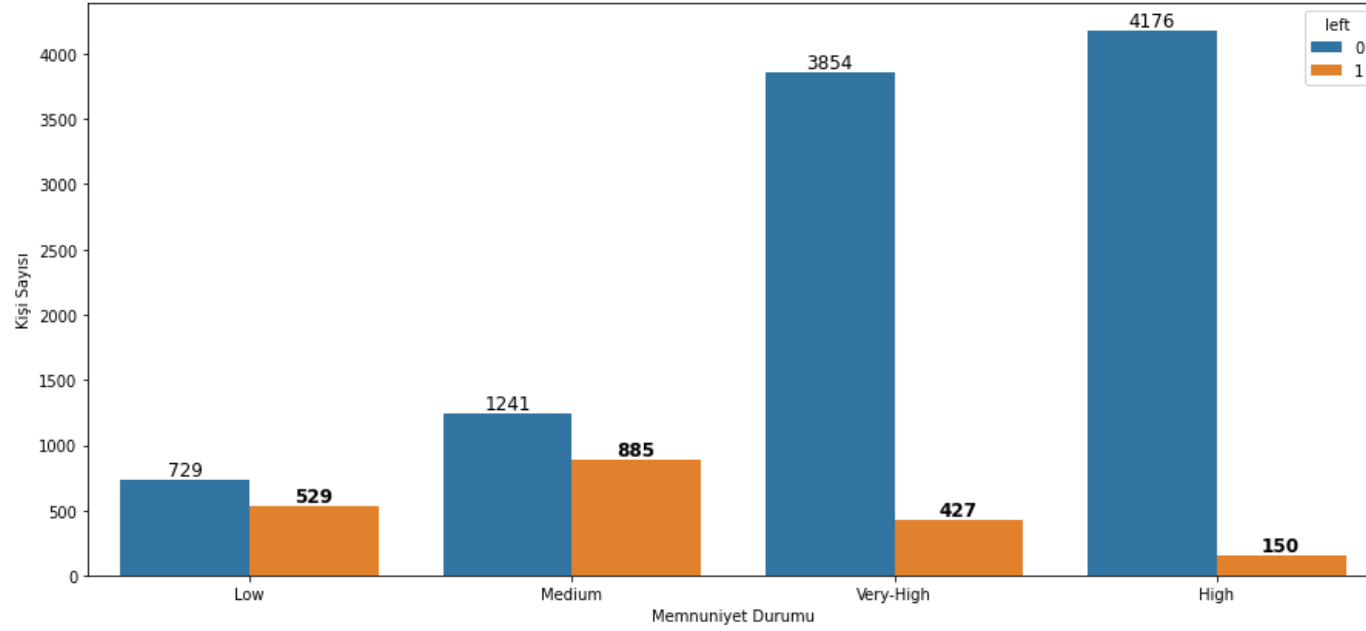
### Terfiye Göre Ayrılma Sayıları



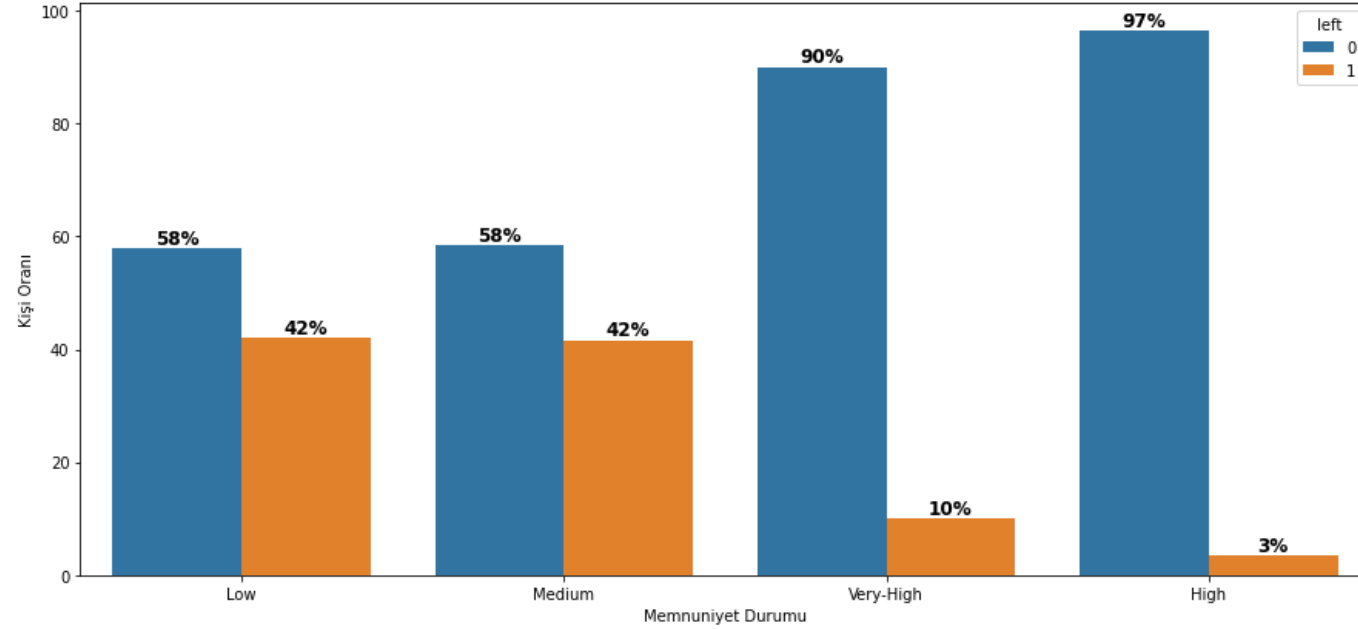
### Terfii Almayanlar



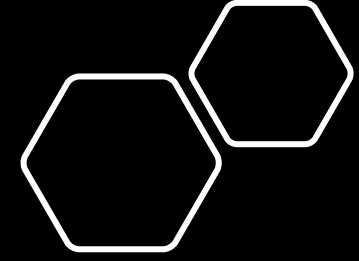
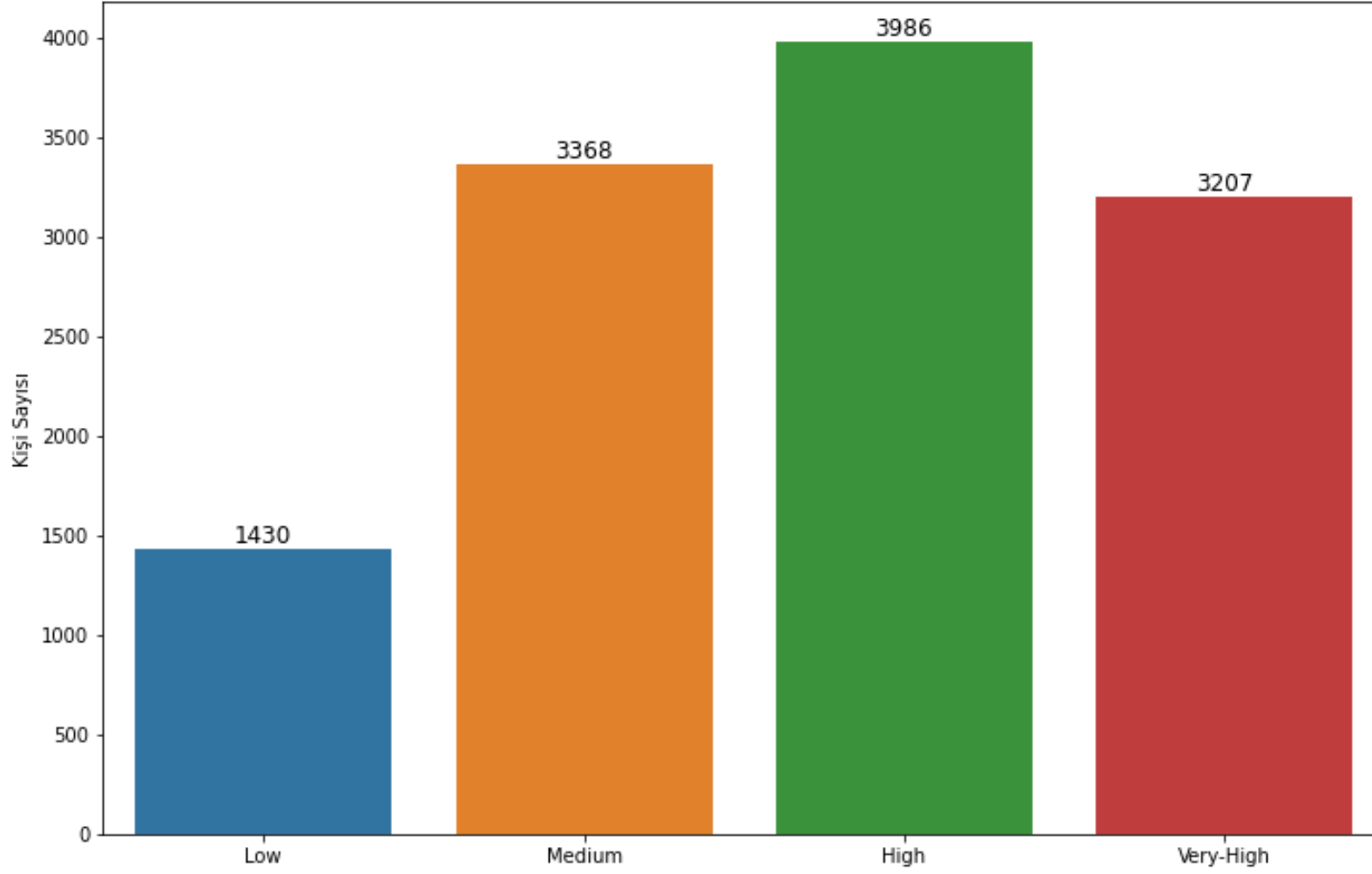
İş Tatmini/Memnuniyete Göre Ayrılma Sayıları



İş Tatmini/Memnuniyete Göre Ayrılma Oranları

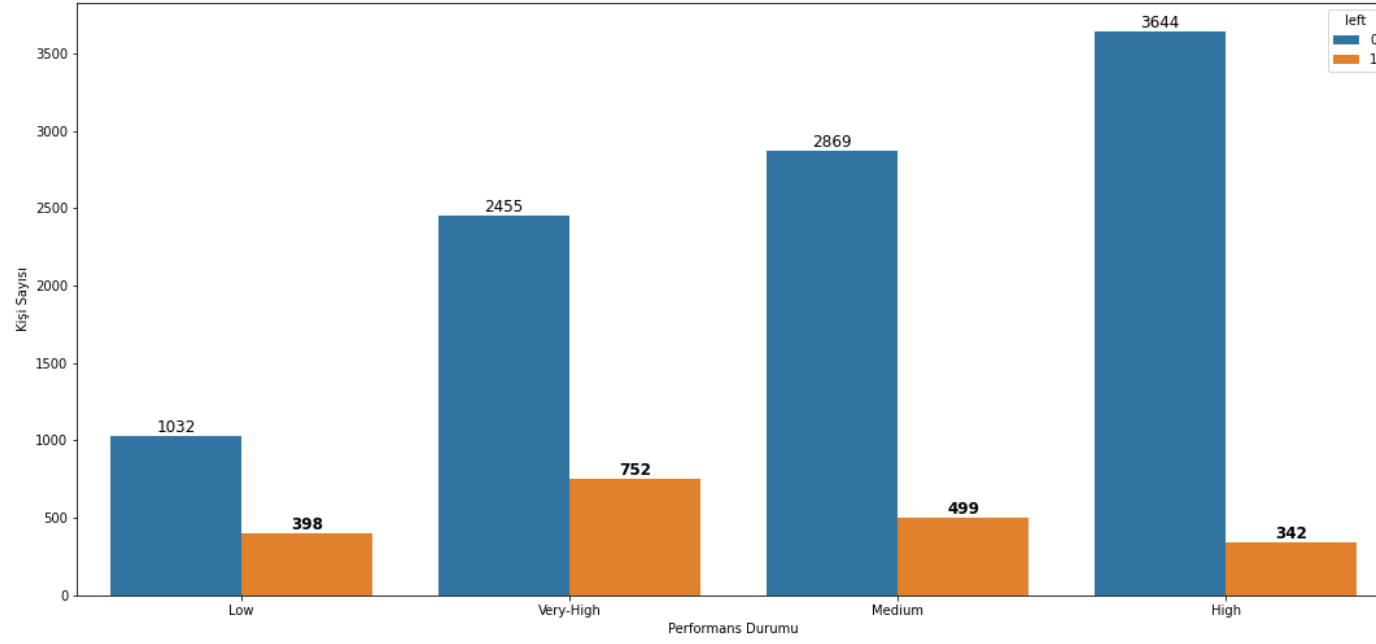


## Performansa Durumu

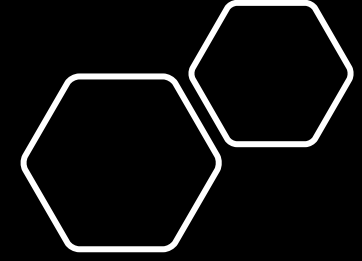
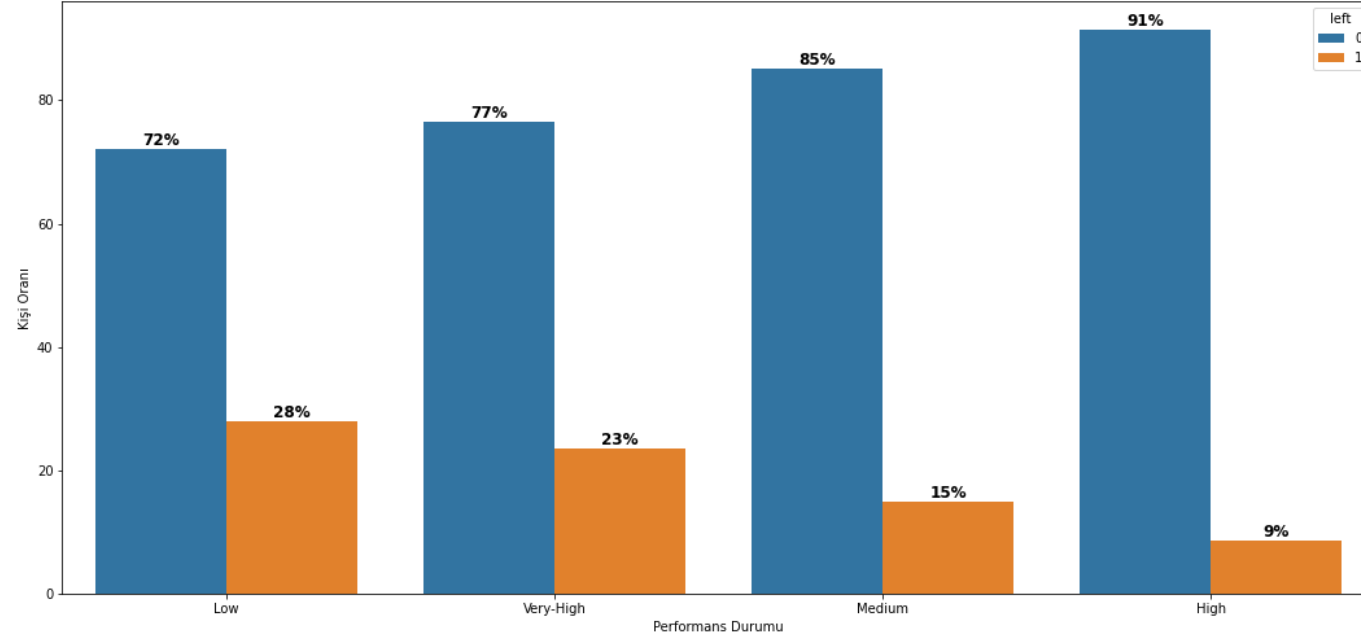


## İş Veren Performans Değerlendirmesine Göre Ayrılma Durumları

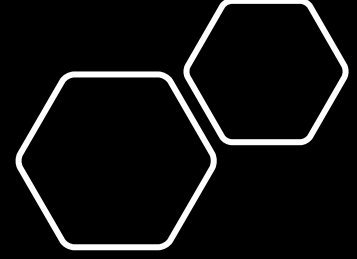
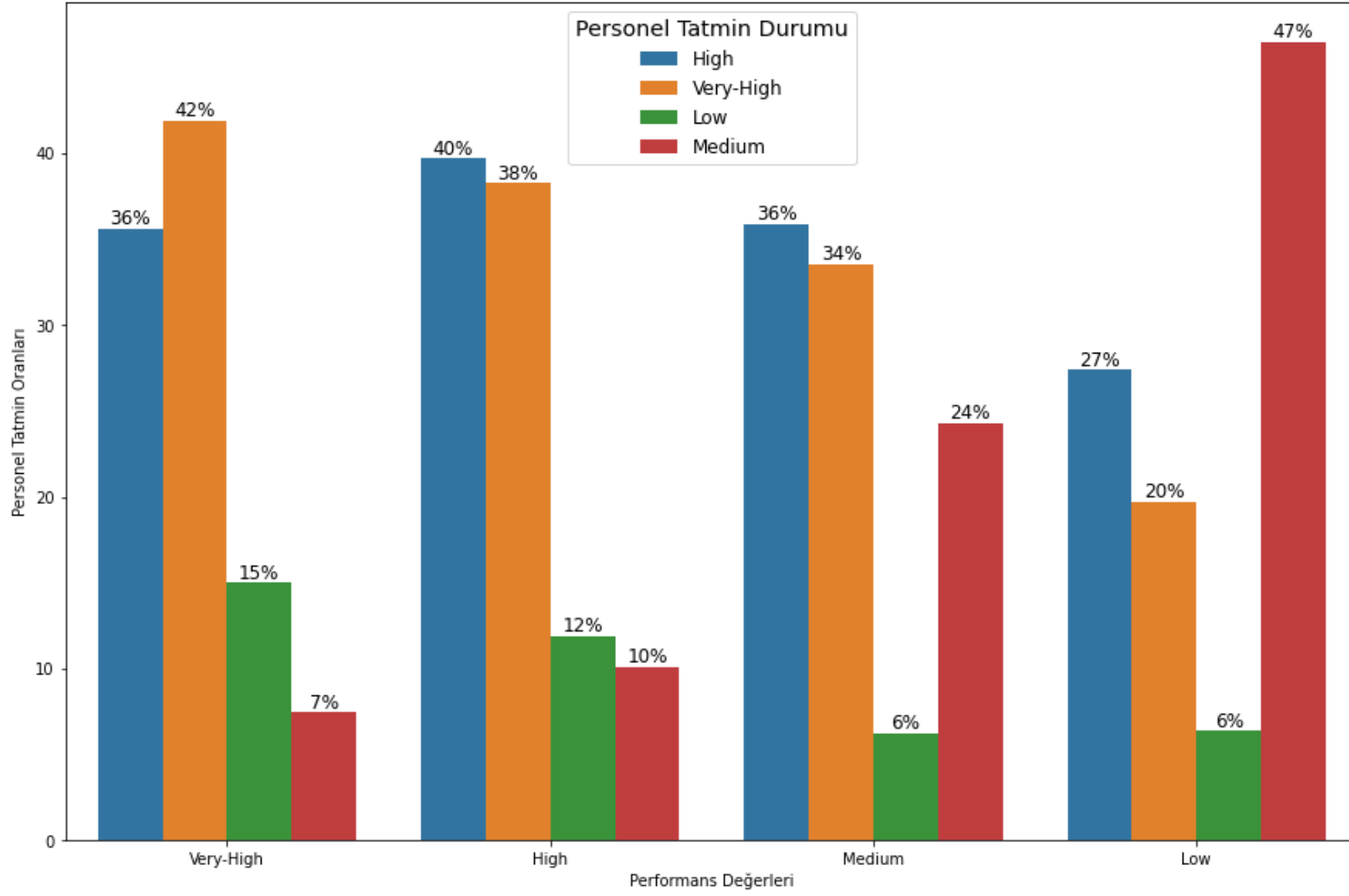
### Performansa Göre Ayrılma Sayıları



### Performansa Göre Ayrılma Oranları

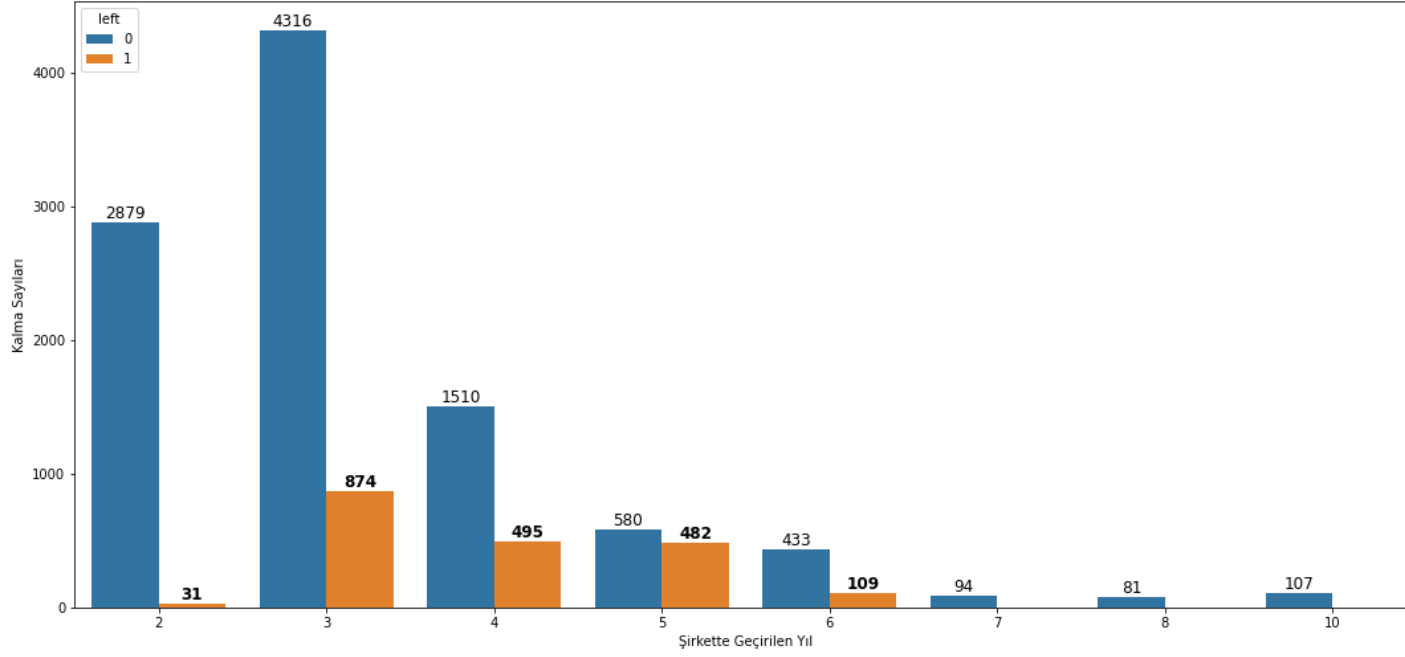


### Performans-Memnuniyet Karşılaştırması

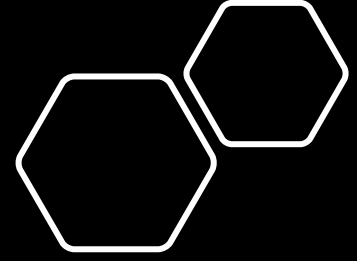
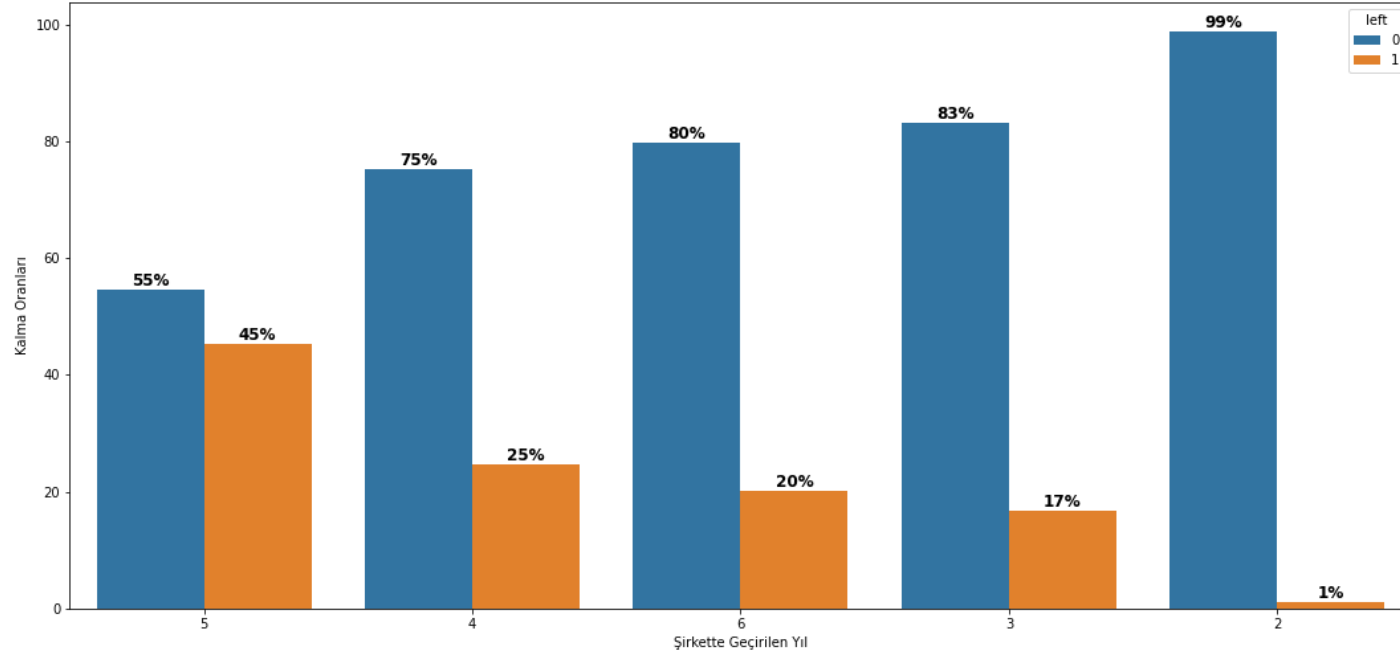


## Deneyime Göre Ayrılma Durumlarının Karşılaştırılması

### Deneyime Göre Ayrılma Sayıları

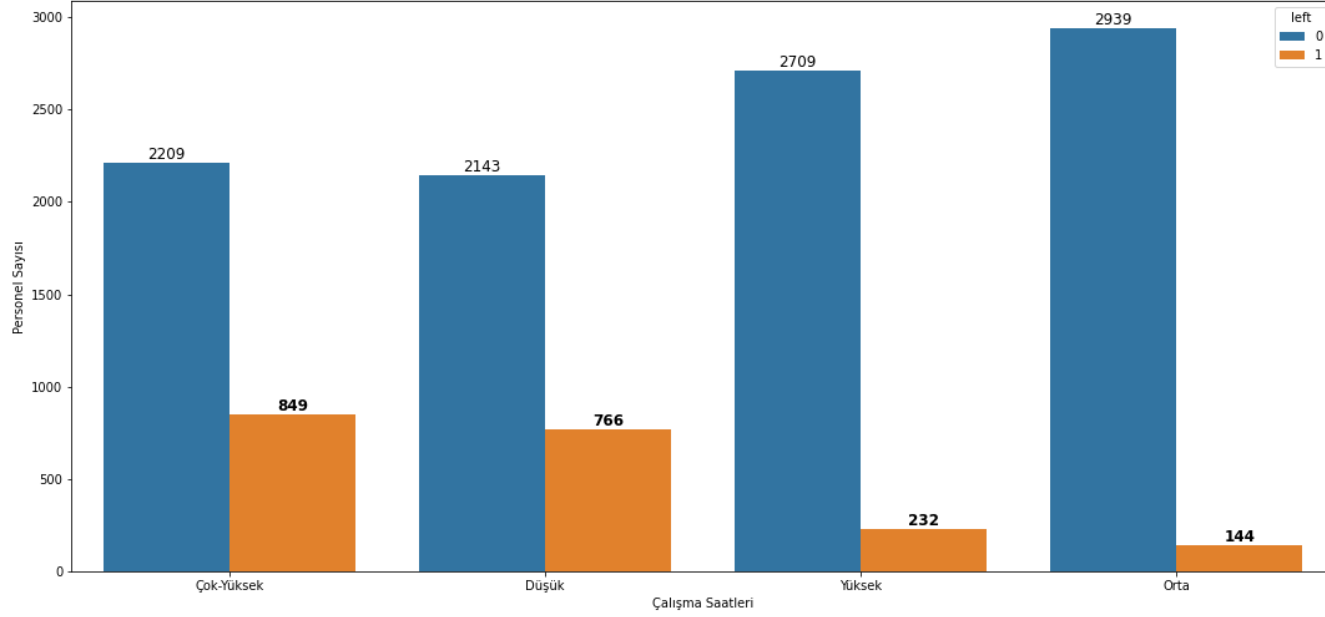


### Deneyime Göre Ayrılma Oranları

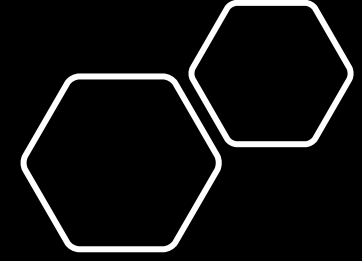
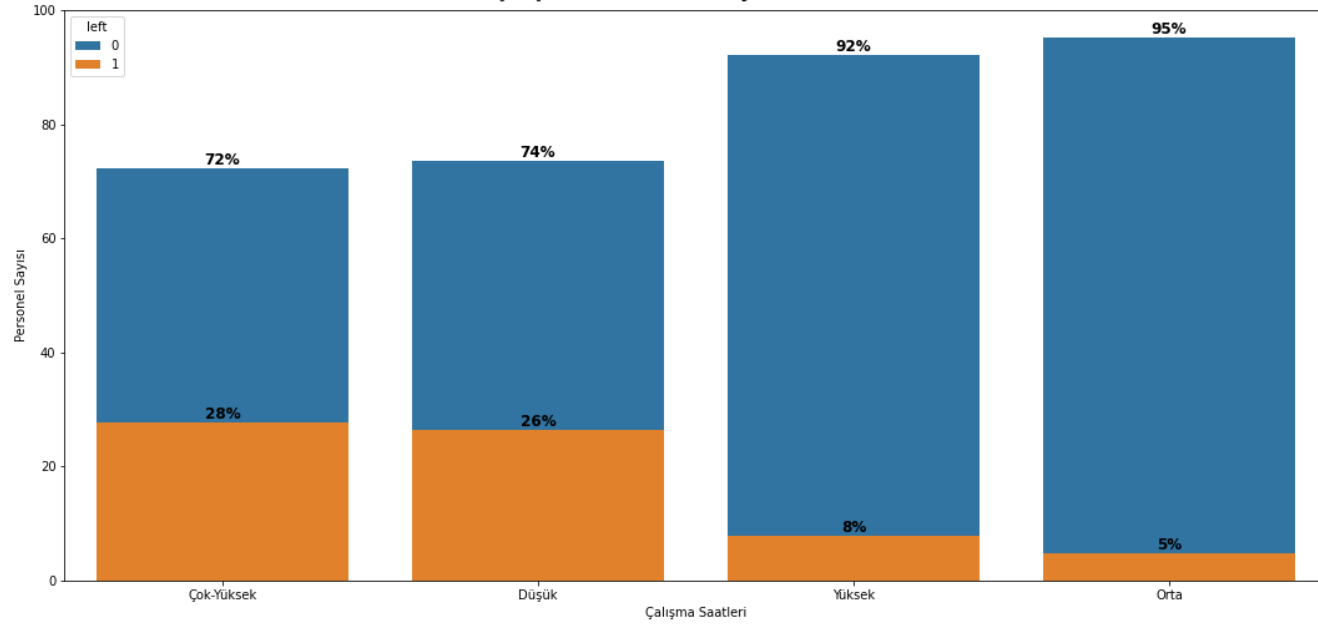


### Çalışma Saatlerine Göre Ayrılma Durumlarının Karşılaştırılması

#### Çalışma Saatine Göre Ayrılma Sayıları

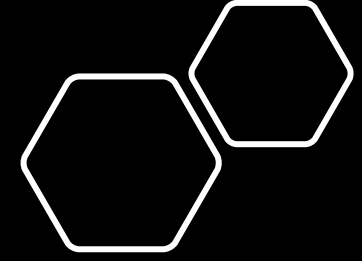
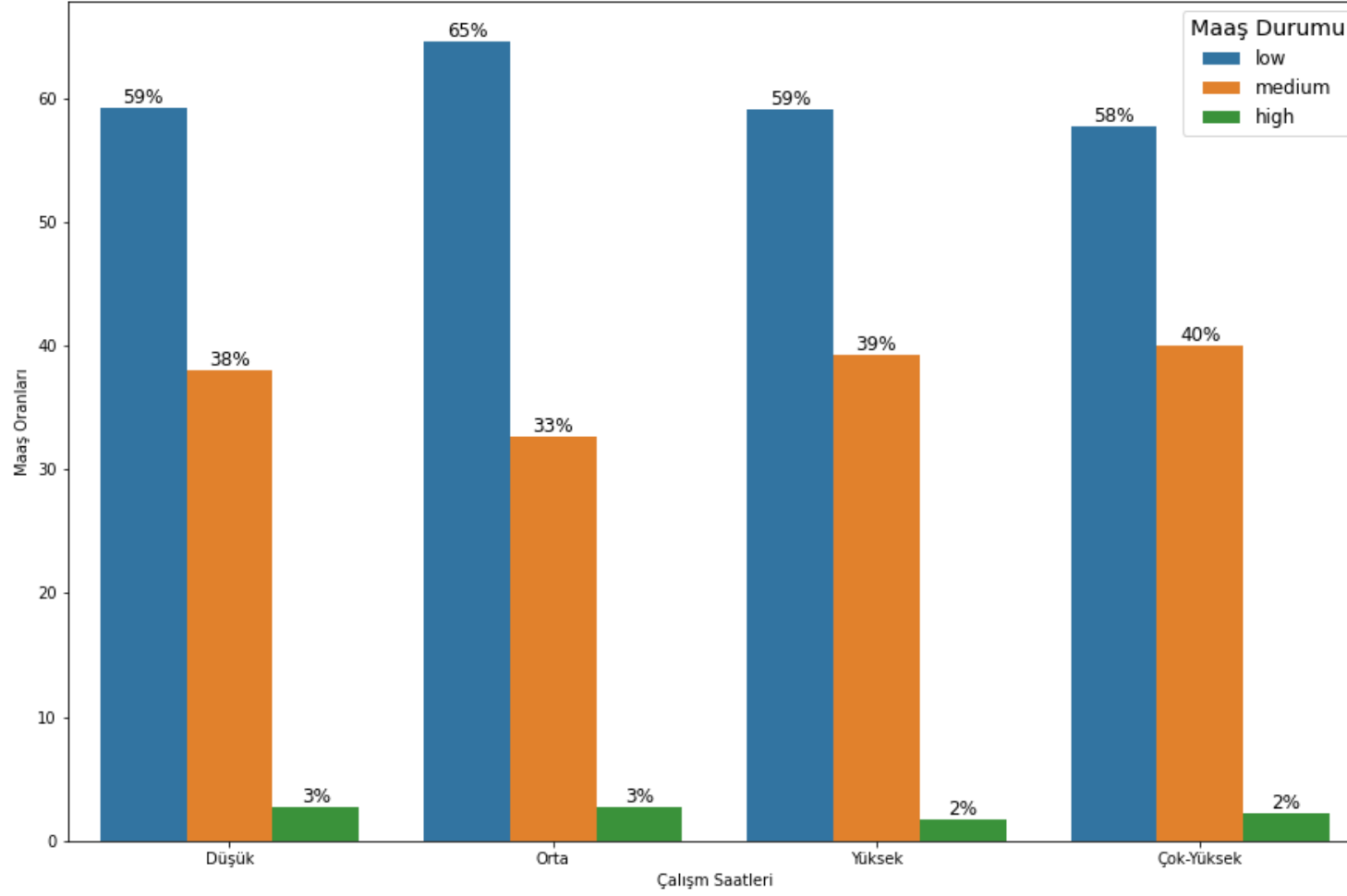


#### Çalışma Saatine Göre Ayrılma Oranları

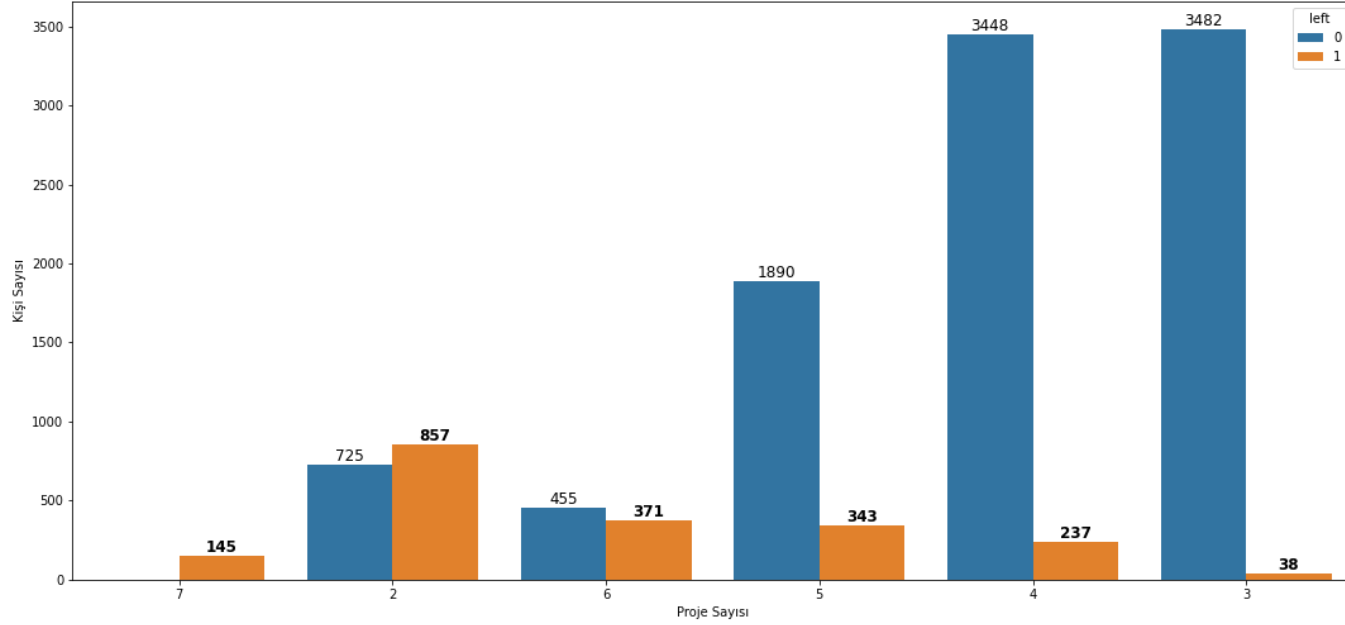




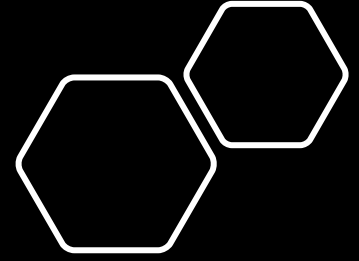
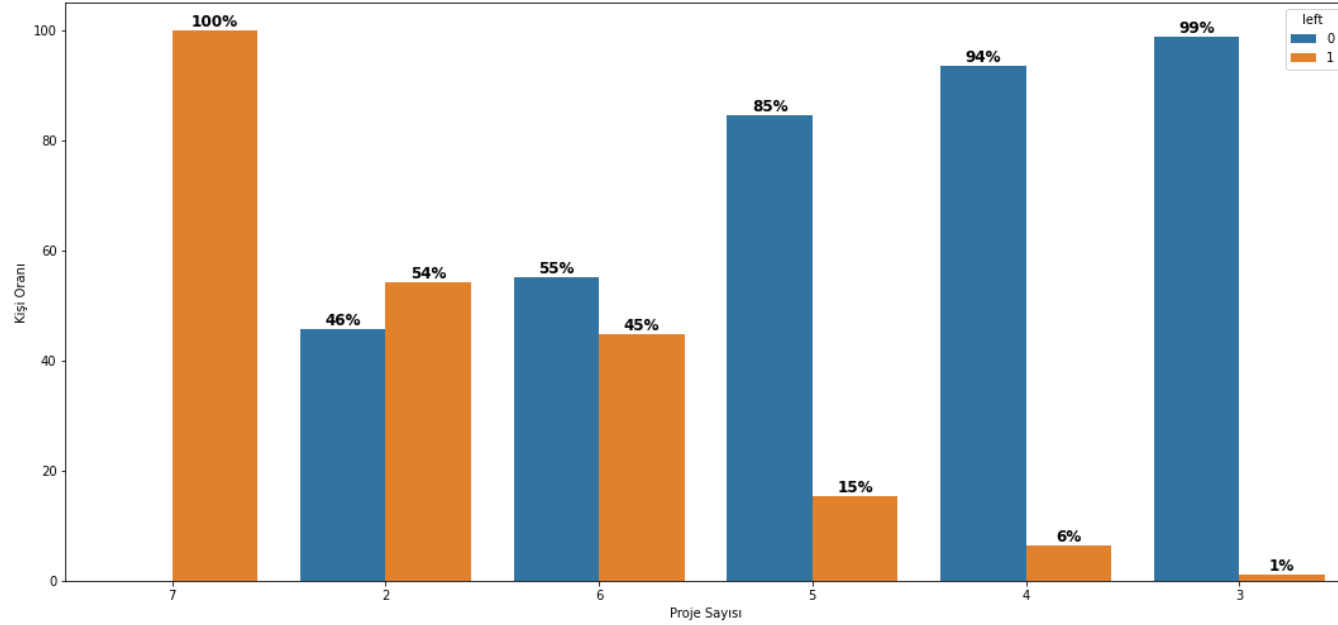
Çalışma Saati-Maaş Karşılaştırması

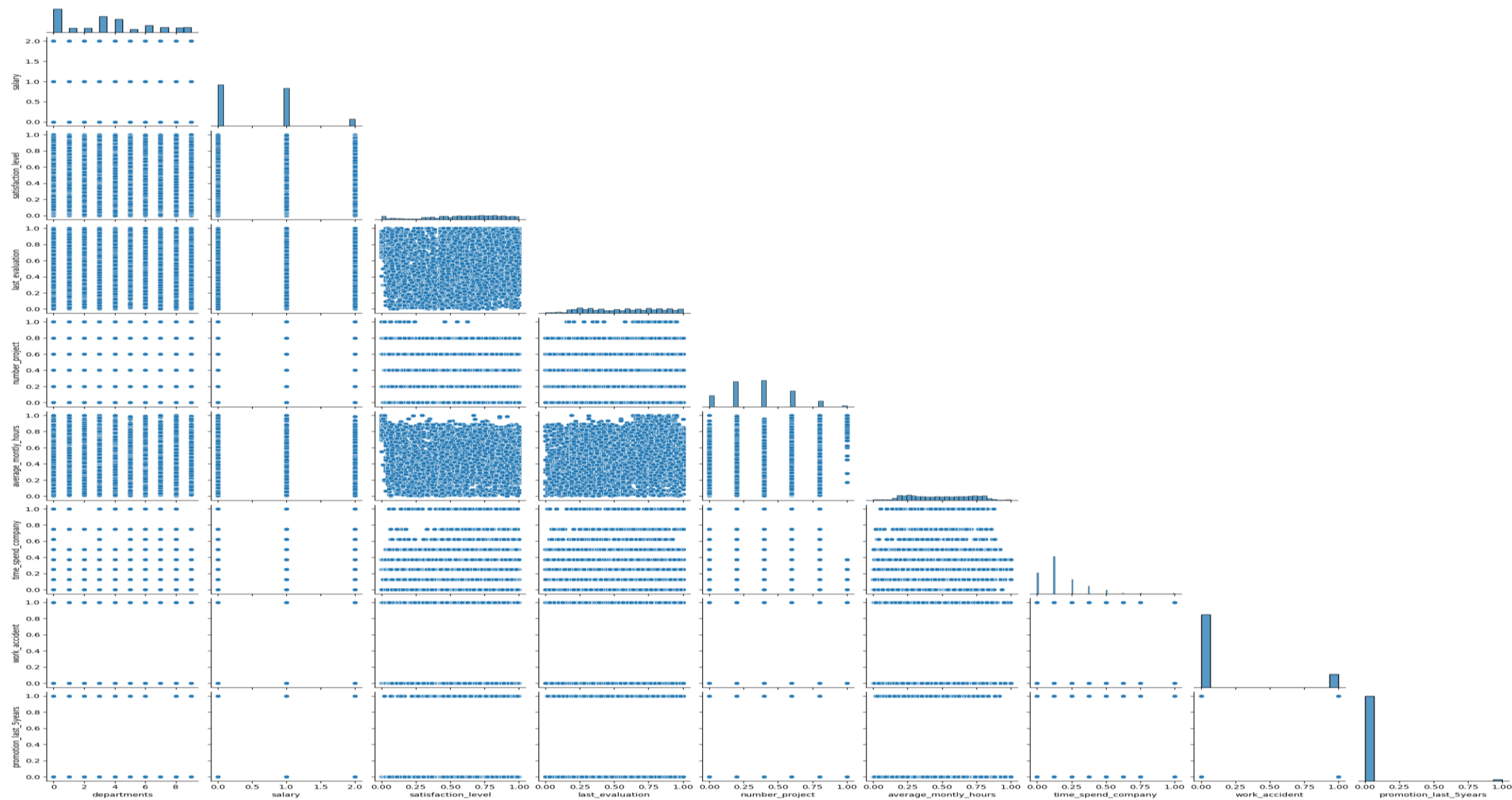


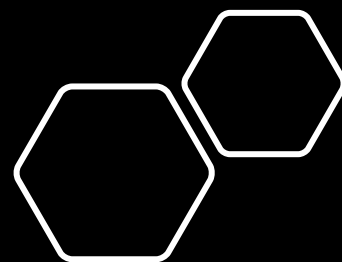
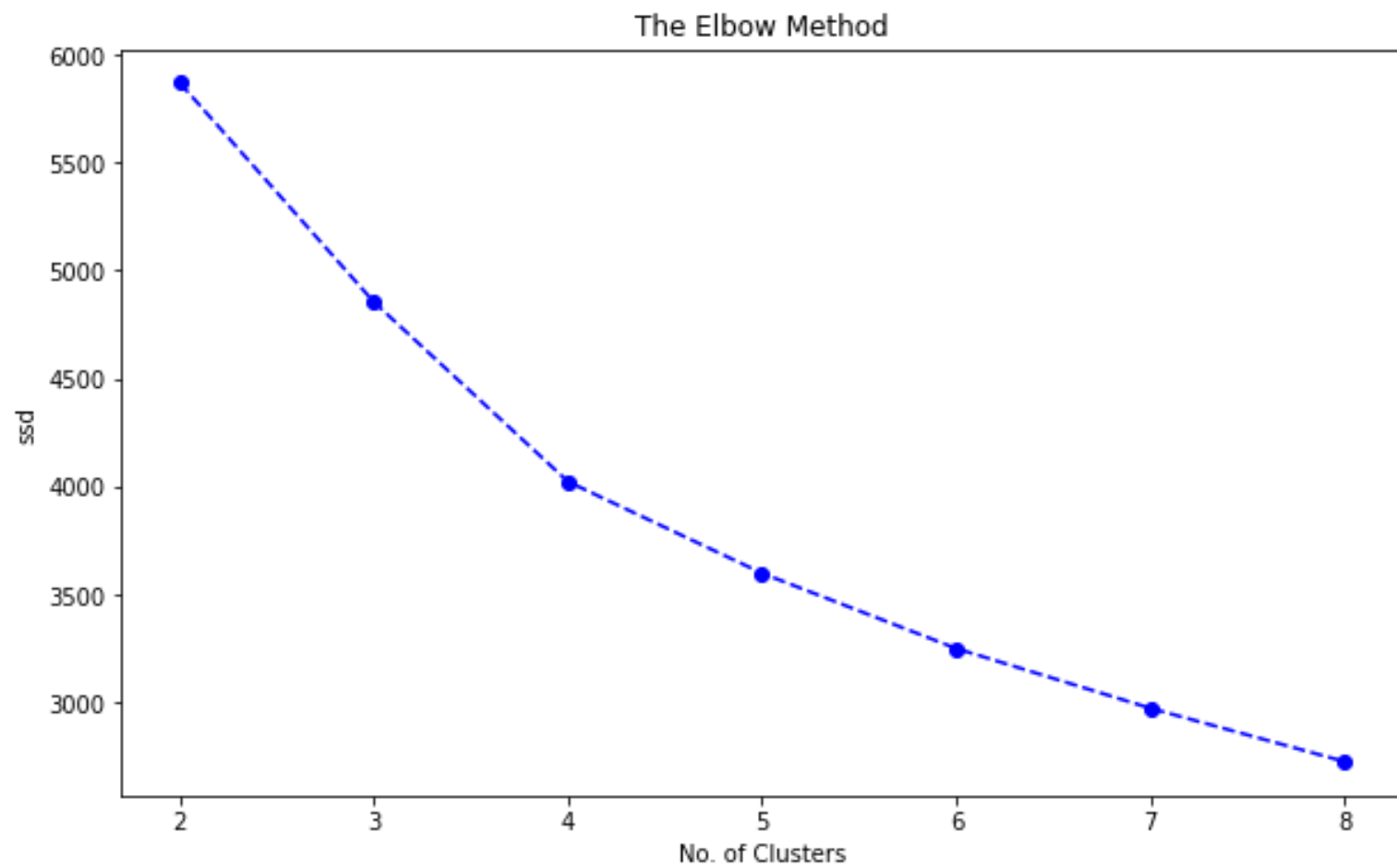
**İş Yüğü/Atanan Projeye Göre Ayrılma Durumları**  
**Atanan Projeye Göre Ayrılma Sayıları**

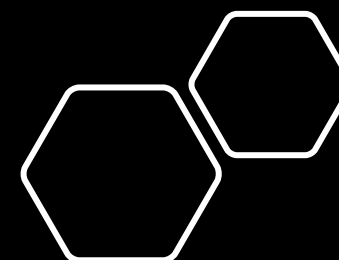
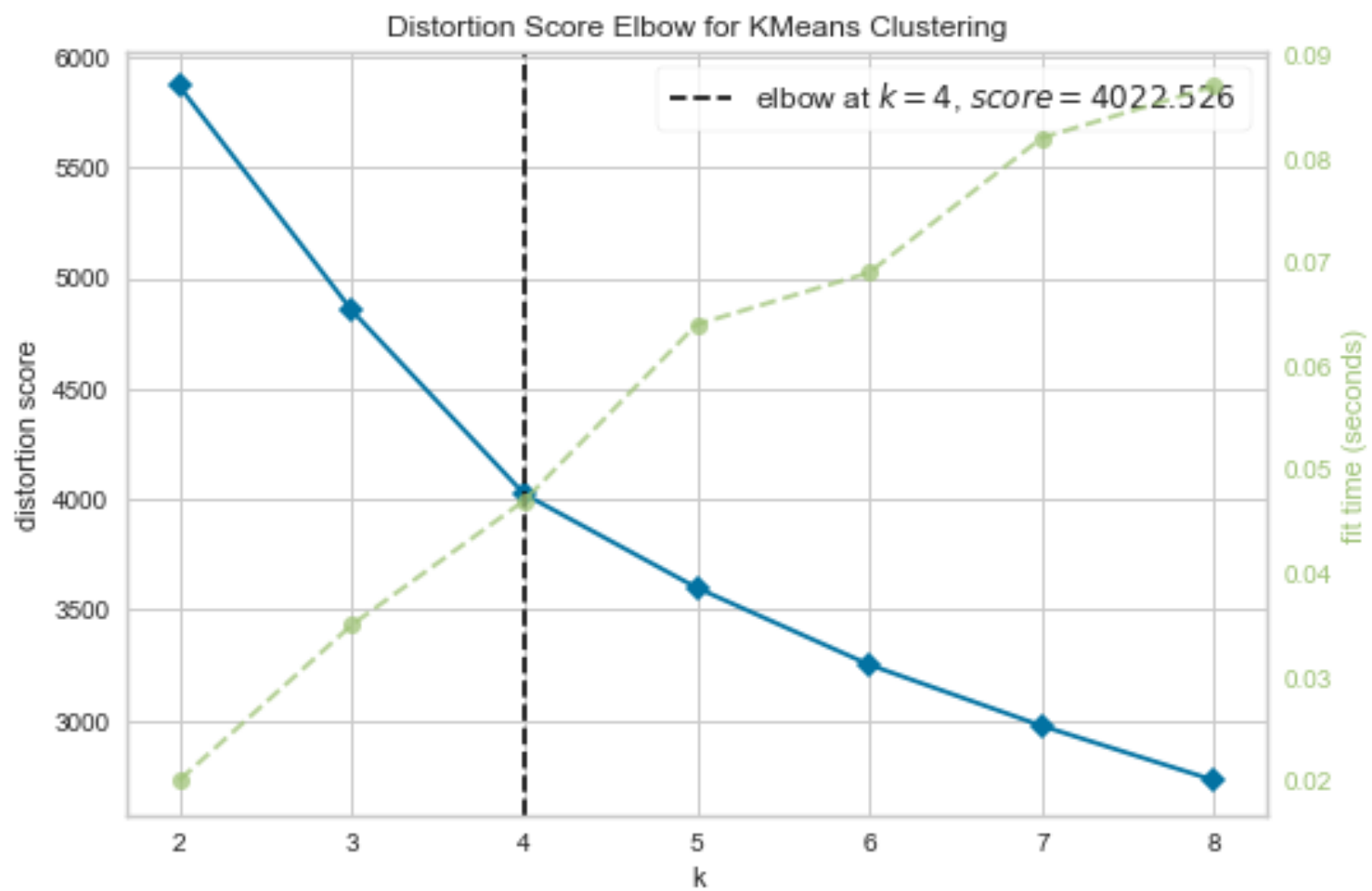


**Atanan Projeye Göre Ayrılma Oranları**







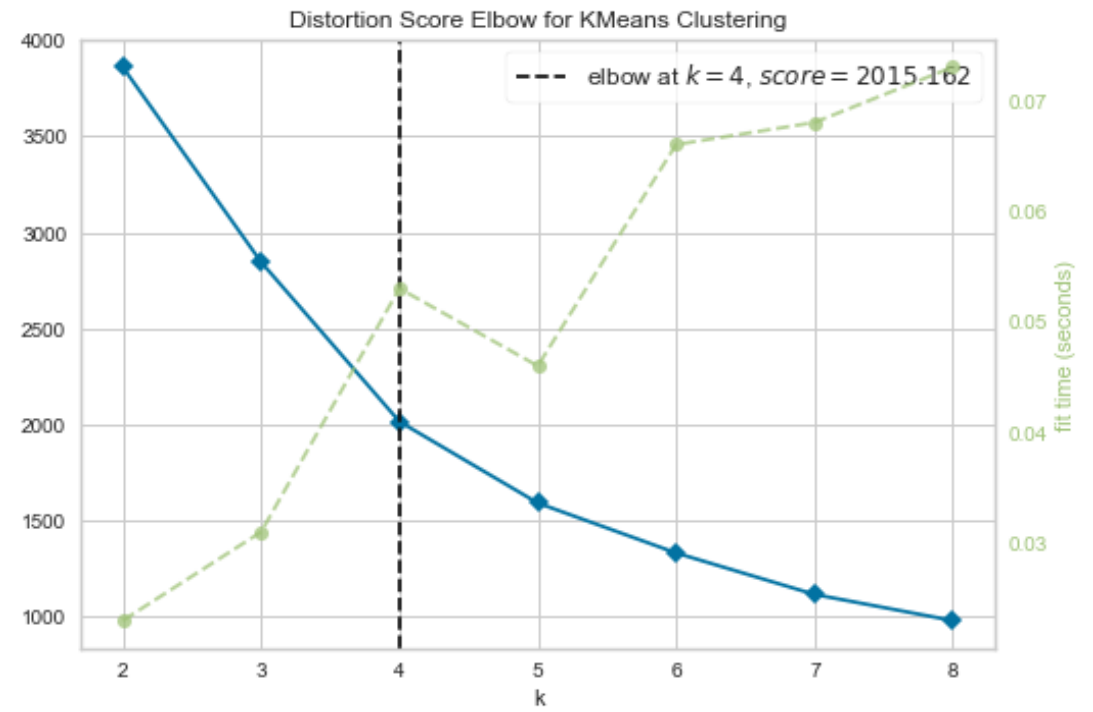
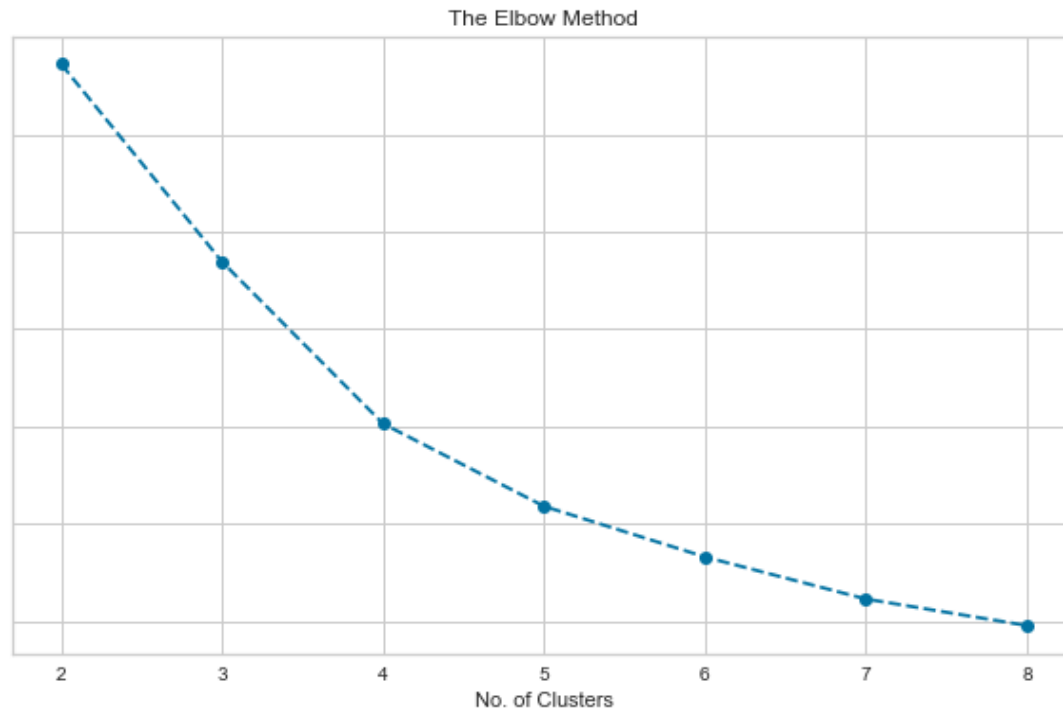




# Kmeans k=4 ve Bütün Featurelar için Cluster Ayrımı

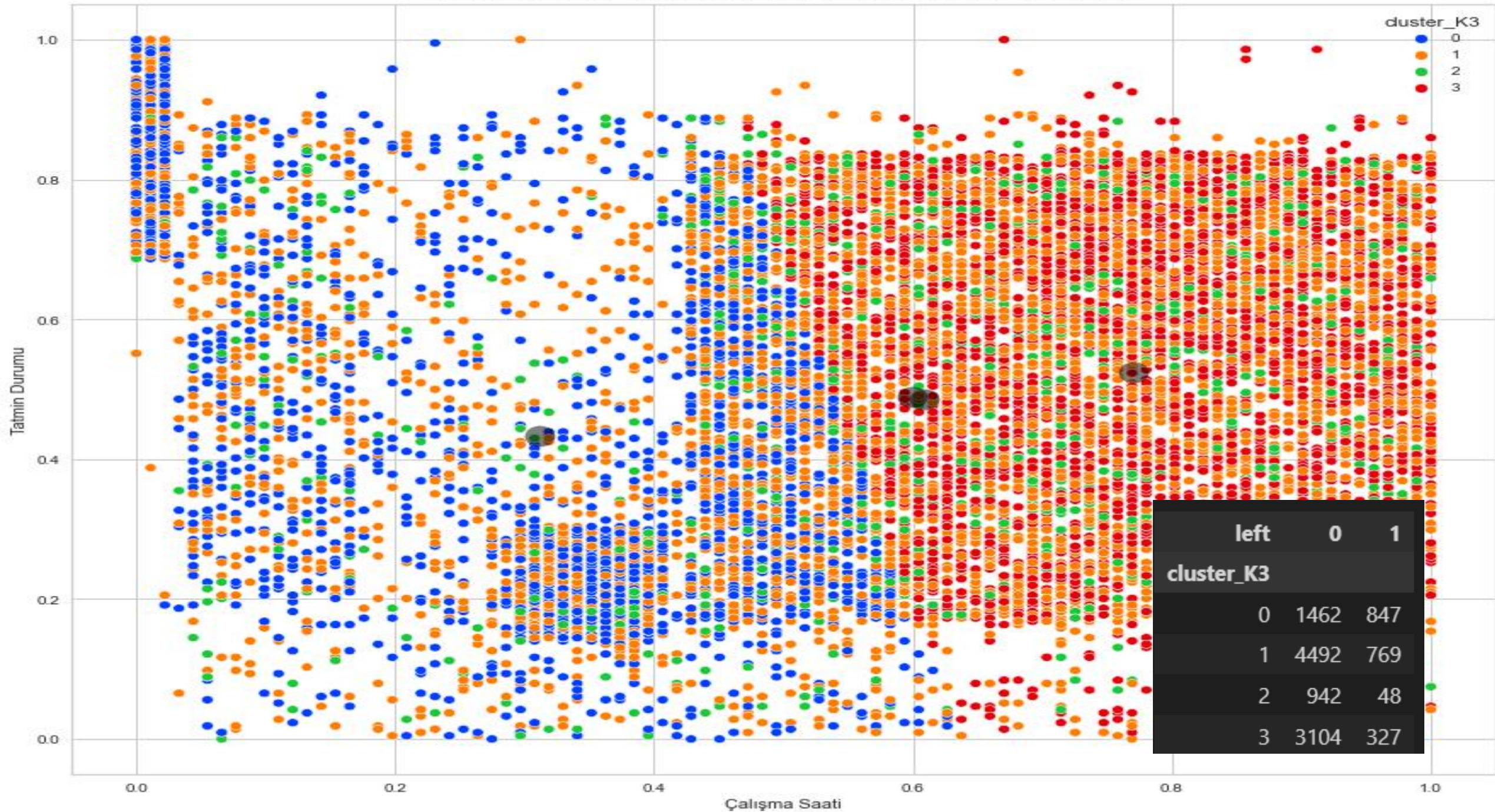


# KNN CLUSTERS



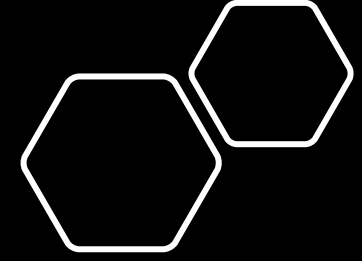
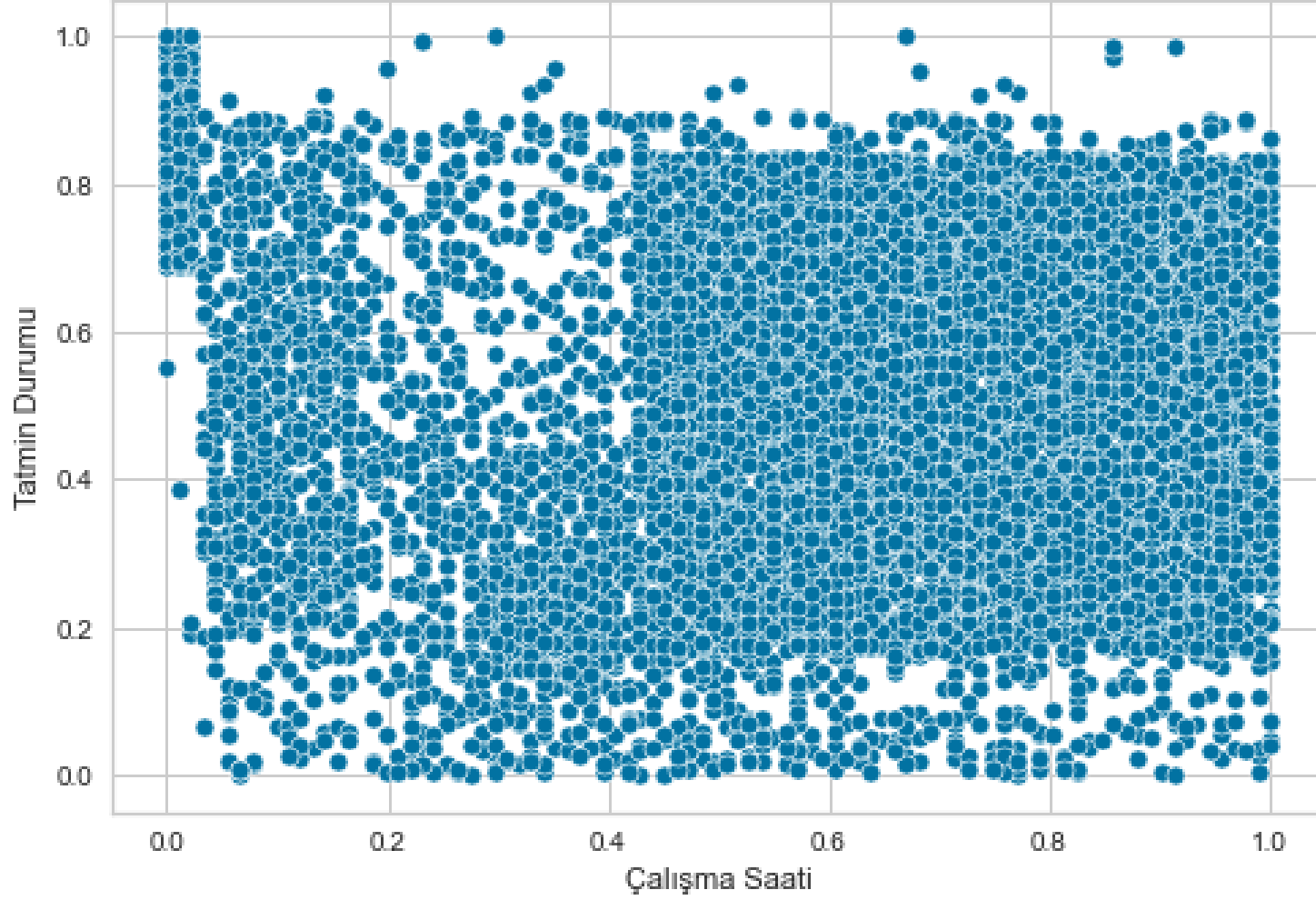


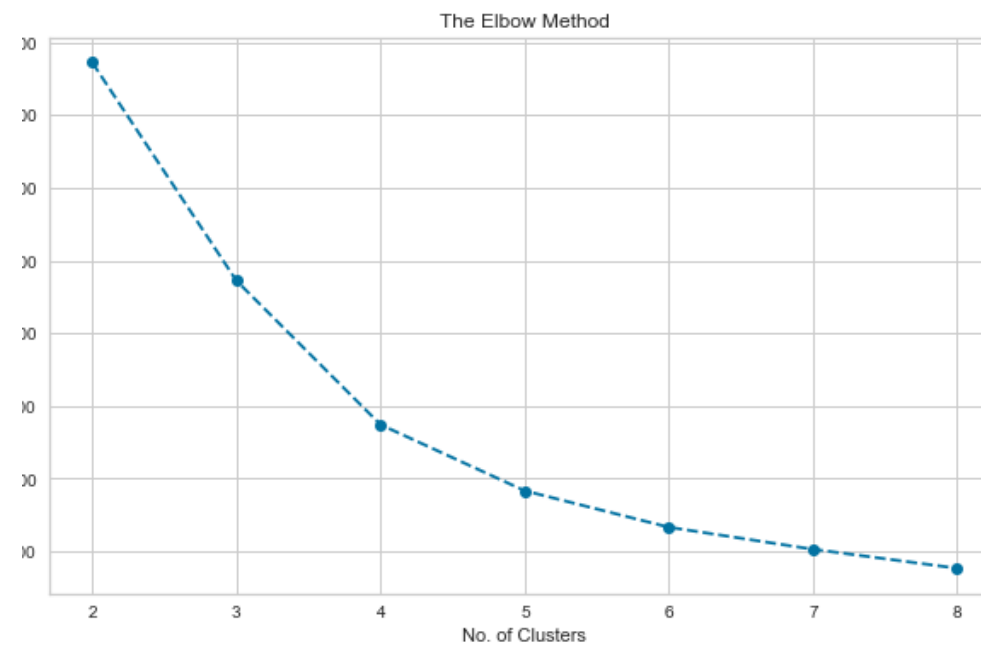
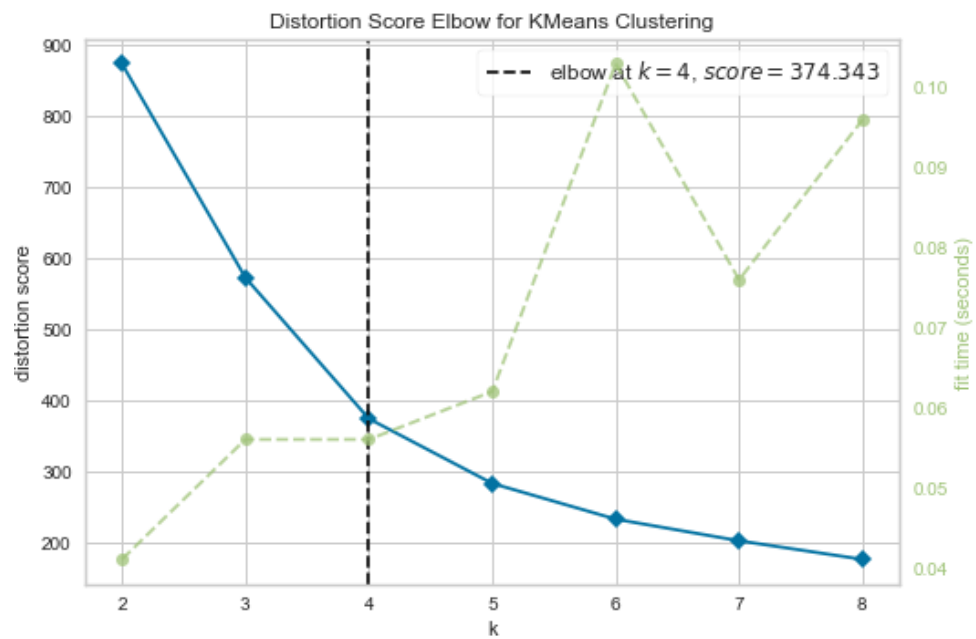
Kmeans k=4 ve "Tatmin", "Çalışma-Saati", "Maaş" Özellikleri



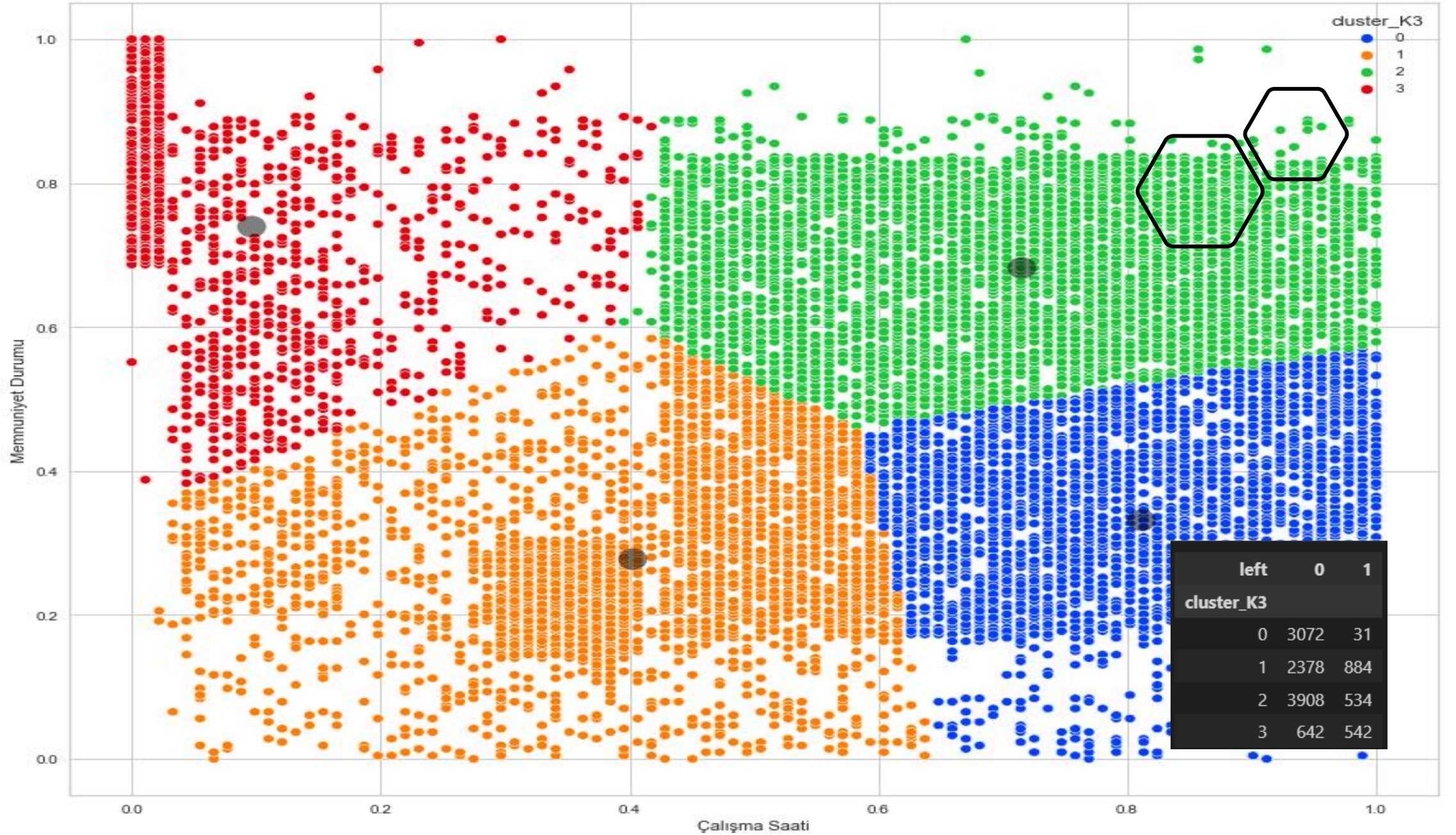


## Personel Tatmin Durumu ve Çalışma Saatleri Dağılımı





Kmeans k=4 ve "Personel Memnuniyet", "Çalışma-Saati" Featurları



# KNN

```
[ 96 302]]
```

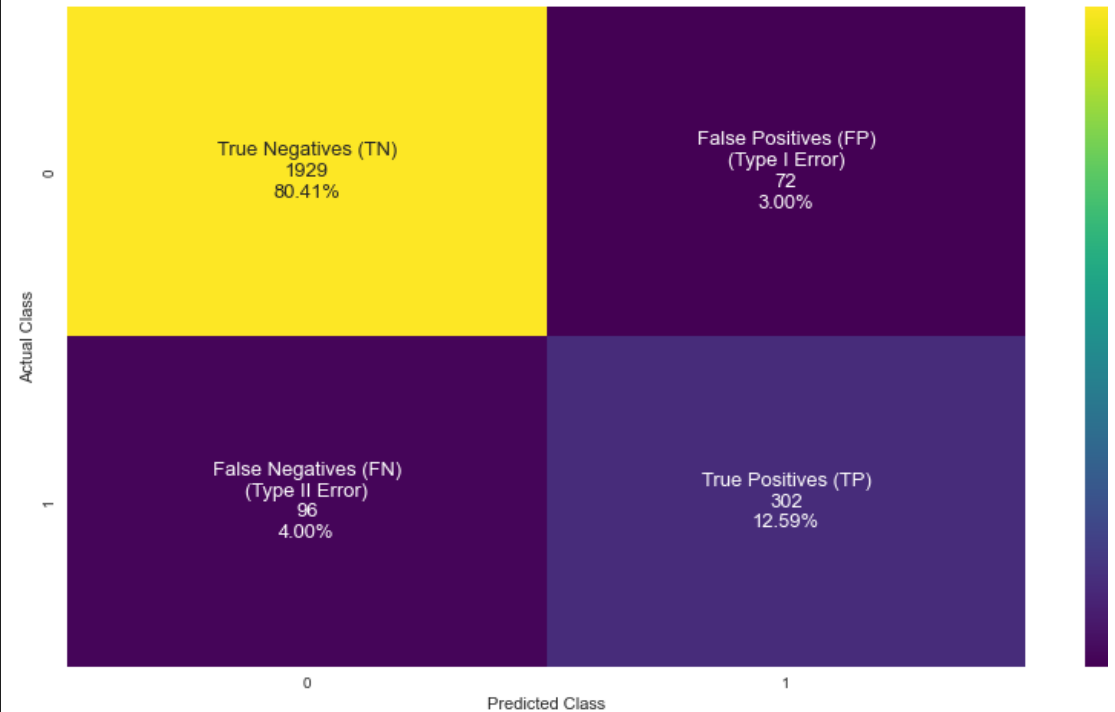
	precision	recall	f1-score	support
0	0.95	0.96	0.96	2001
1	0.81	0.76	0.78	398
accuracy			0.93	2399
macro avg	0.88	0.86	0.87	2399
weighted avg	0.93	0.93	0.93	2399

```
Train_Set
```

```
[[7838 161]
```

```
[ 404 1189]]
```

	precision	recall	f1-score	support
0	0.95	0.98	0.97	7999
1	0.88	0.75	0.81	1593



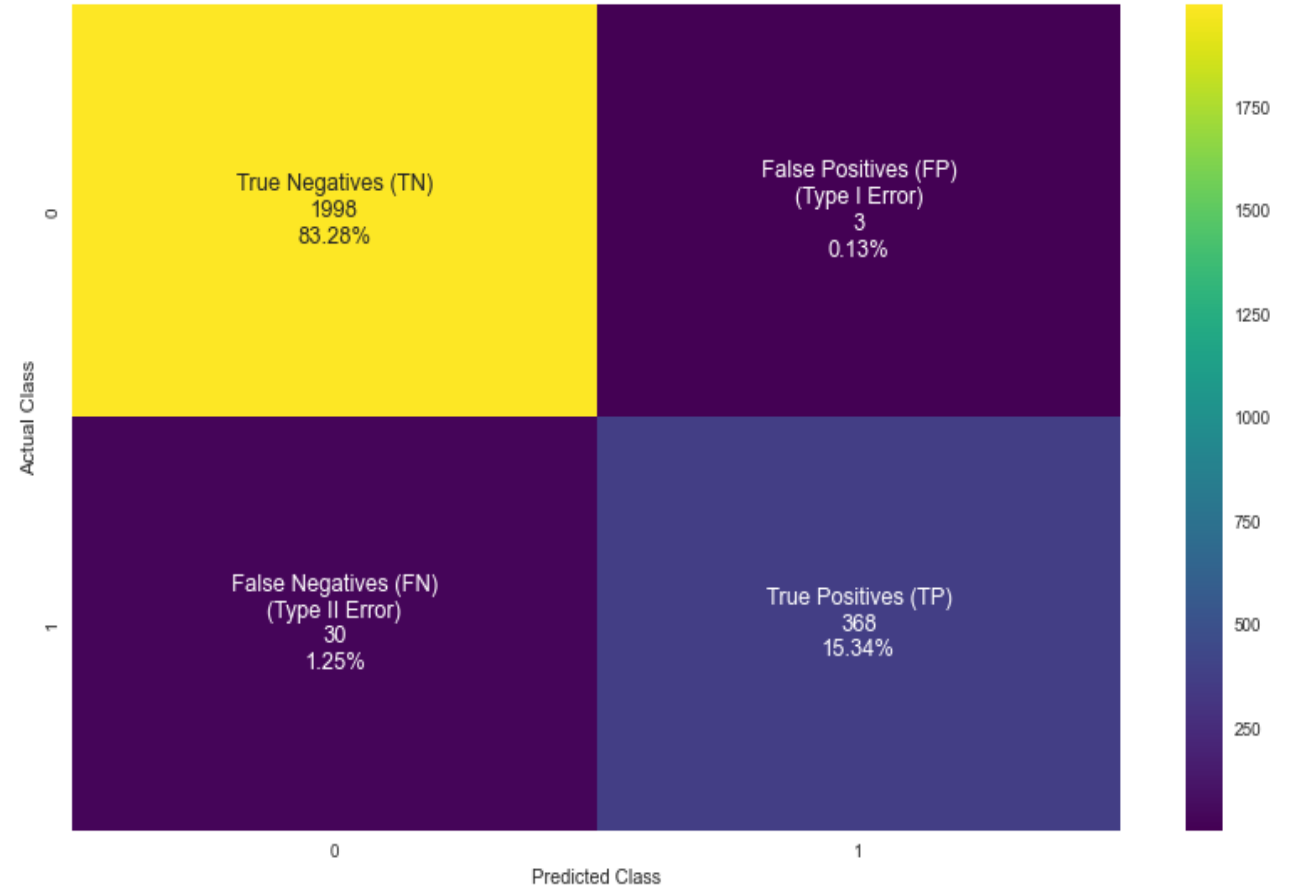
# Random Forest

```
Test_Set  
[[1998   3]  
 [ 30 368]]
```

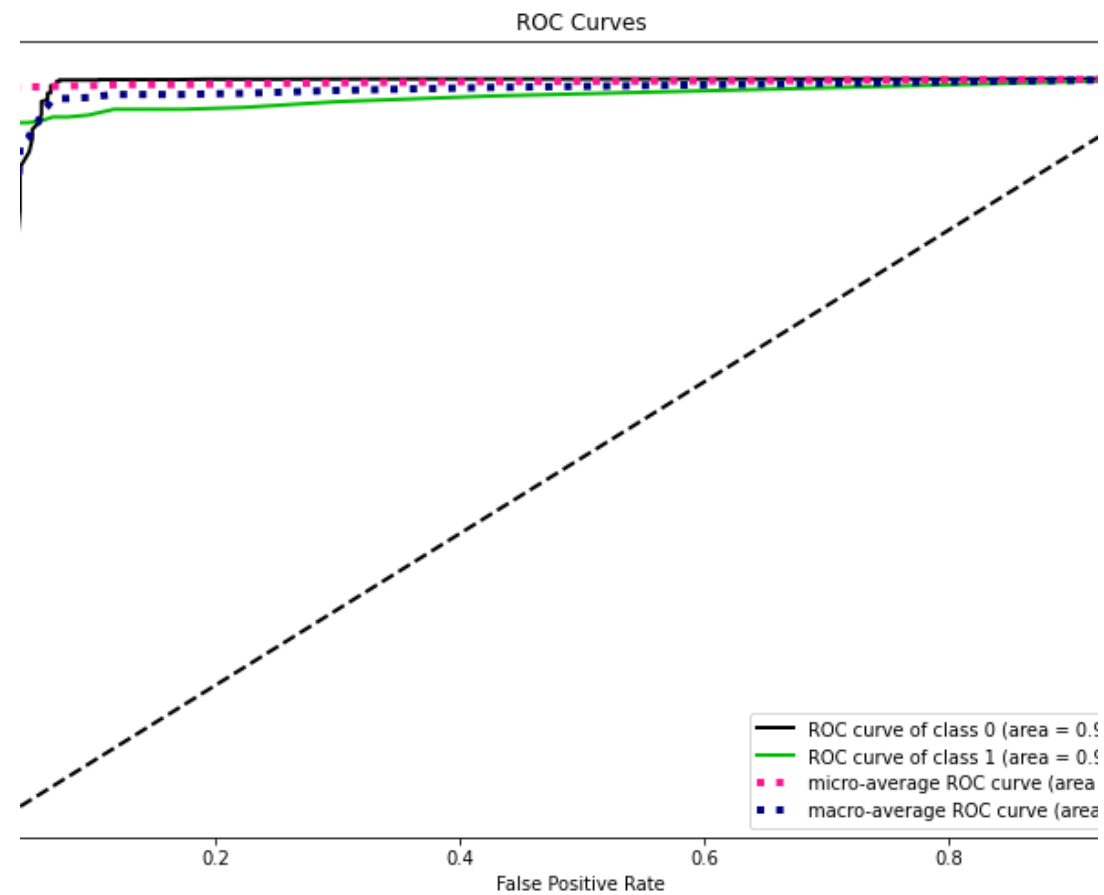
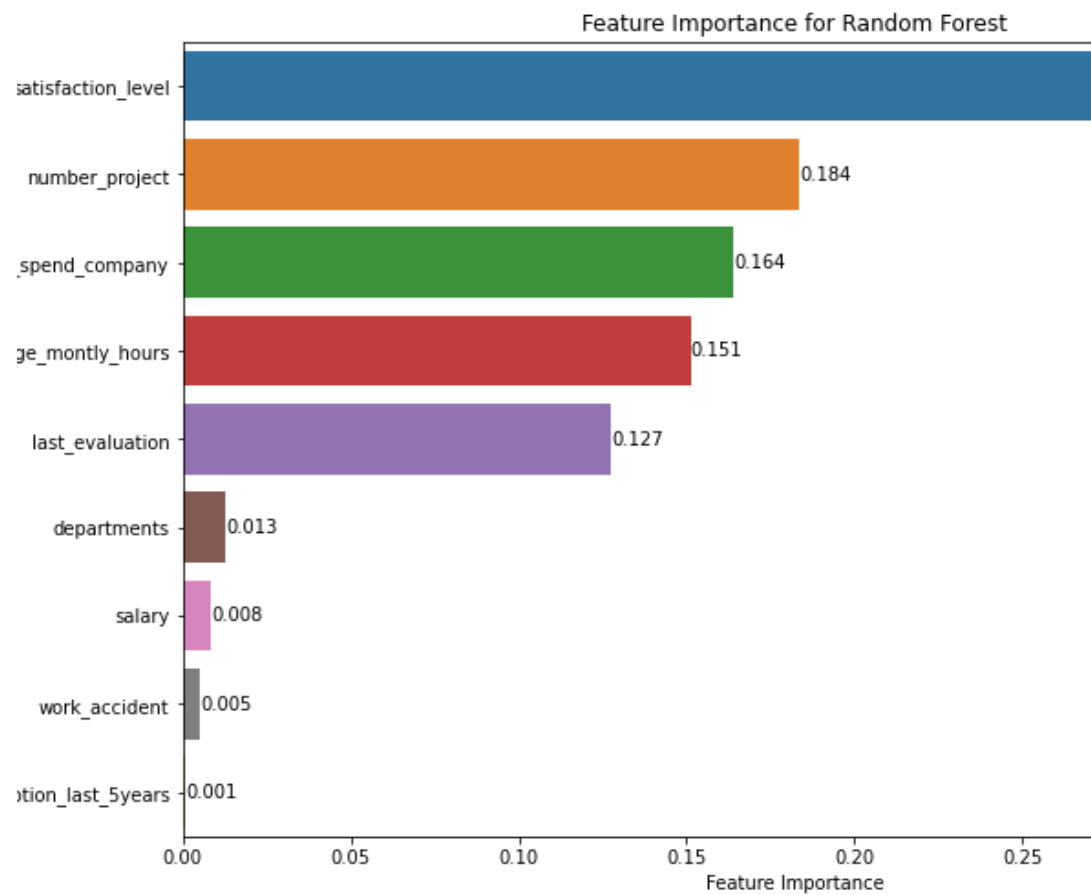
	precision	recall	f1-score	support
0	0.99	1.00	0.99	2001
1	0.99	0.92	0.96	398
accuracy			0.99	2399
macro avg	0.99	0.96	0.97	2399
weighted avg	0.99	0.99	0.99	2399

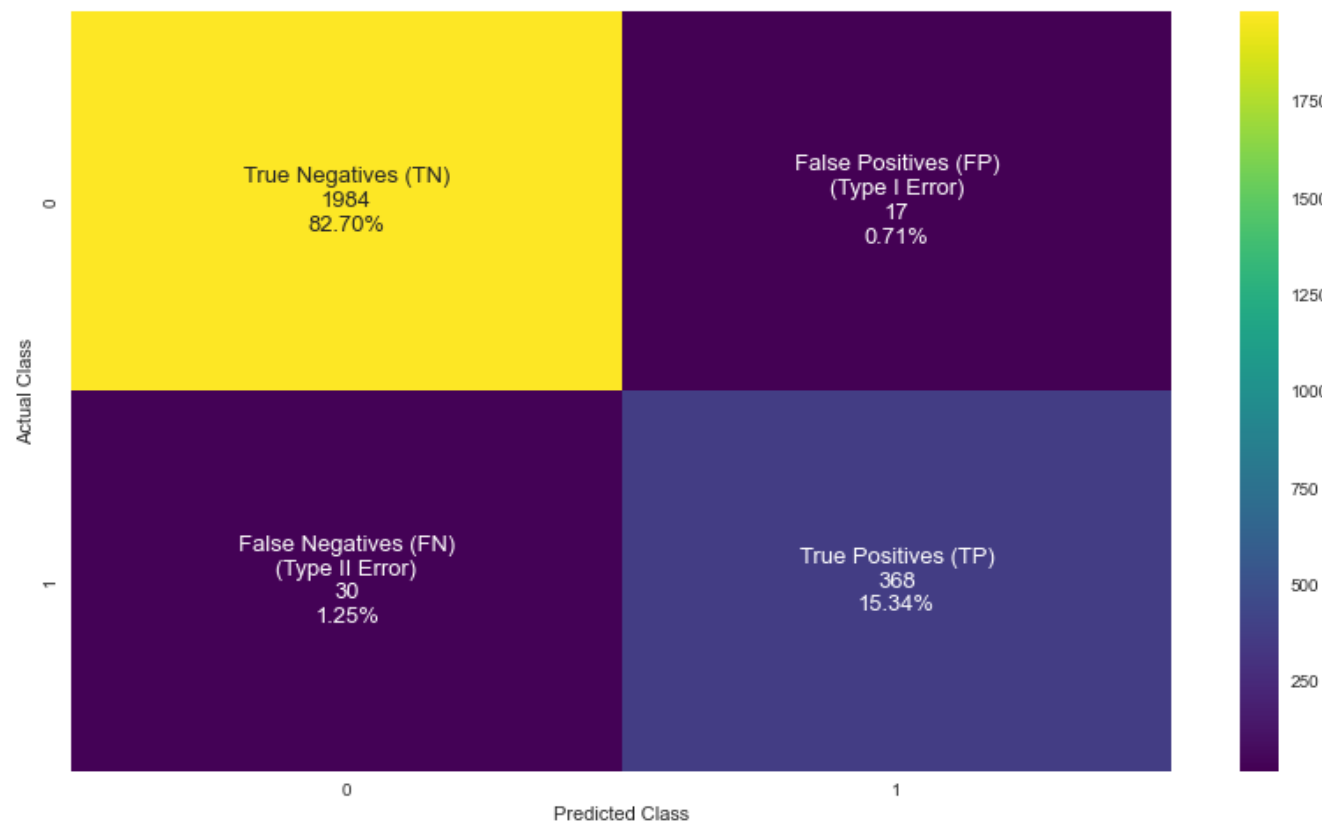
```
Train_Set  
[[7999   0]  
 [  0 1593]]
```

	precision	recall	f1-score	support
0	1.00	1.00	1.00	7999
1	1.00	1.00	1.00	1593
accuracy			1.00	9592
macro avg	1.00	1.00	1.00	9592
weighted avg	1.00	1.00	1.00	9592









Test_Set				
[[1984 17]				
[ 30 368]]				
	precision	recall	f1-score	support
0	0.99	0.99	0.99	2001
1	0.96	0.92	0.94	398
accuracy			0.98	2399
macro avg	0.97	0.96	0.96	2399
weighted avg	0.98	0.98	0.98	2399
Train_Set				
[[7993 6]				
[ 35 1558]]				
	precision	recall	f1-score	support
0	1.00	1.00	1.00	7999
1	1.00	0.98	0.99	1593
accuracy			1.00	9592
macro avg	1.00	0.99	0.99	9592
weighted avg	1.00	1.00	1.00	9592

# Xgboosting

# ANN

75/75 [=====] - 0s 1ms/step

[[1977 24]

[ 42 356]]

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

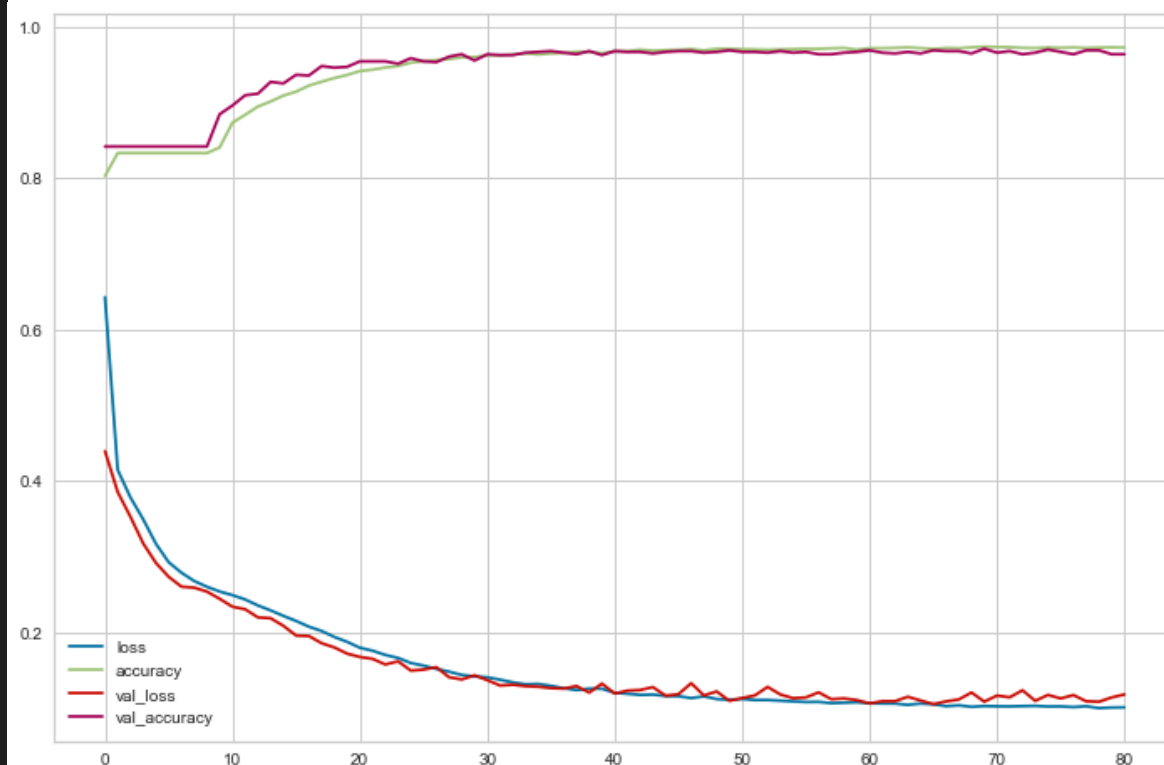
0	0.98	0.99	0.98	2001
---	------	------	------	------

1	0.94	0.89	0.92	398
---	------	------	------	-----

accuracy			0.97	2399
----------	--	--	------	------

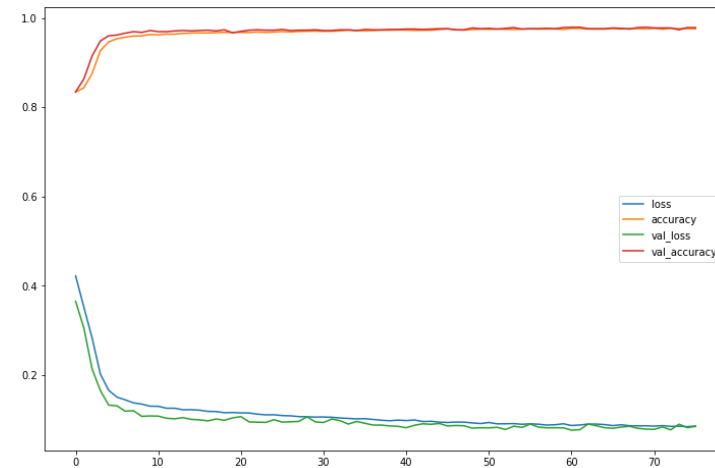
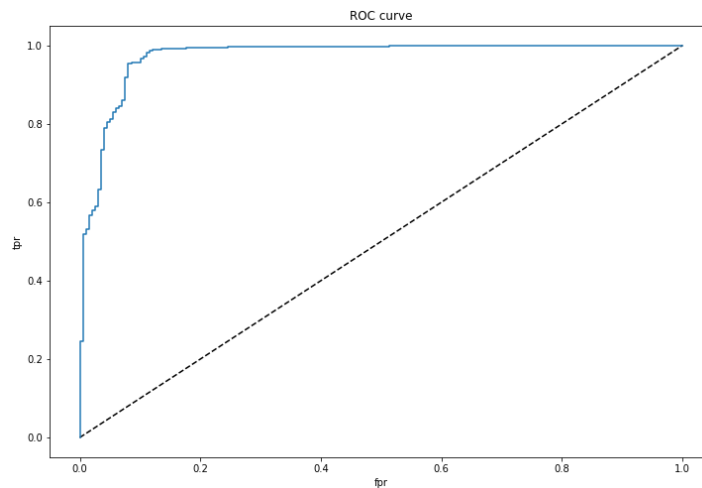
macro avg	0.96	0.94	0.95	2399
-----------	------	------	------	------

weighted avg	0.97	0.97	0.97	2399
--------------	------	------	------	------





# Optimize Model



```
38/38 [=====] - 0s 2ms/step
[[993  8]
 [ 17 182]]
```

	precision	recall	f1-score	support
0	0.98	0.99	0.99	1001
1	0.96	0.91	0.94	199
accuracy			0.98	1200
macro avg	0.97	0.95	0.96	1200
weighted avg	0.98	0.98	0.98	1200

0.09 1.00

Evaluation Score

0.50

0.36 1.00

Number of Projects

7

Avg. Monthly Working Hours

300 - +

Years in the Company

10

☐ Employee had a work accident

☐ The employee received a promotion in the last 5 years

Department

Marketing

Salary Level

☒ Low

☐ Medium

☐ High

## Choose Your Model

Pick one model and get your prediction

Random Forest

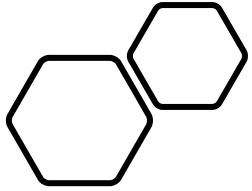
Predict

Random Forest Prediction

It looks like s/he is leaving.



Deploy And Tested



- MODEL DEPLOYMENT

Enter Specs to Predict Whether Your Employee Will Stay

0.50

1.00

0.81

1.00

ts

Working Hours

Company

had a work accident

Employee received a promotion in the last 3 years

### Your Selected

	Satisfaction Level	Evaluation Score	# of Projects	Monthly Hours	Years in Company	Work Accident	Resigned
0	0.5000	0.8100	7	300	4	No	No

### Choose Your Model

Pick one model and get your prediction

K-Nearest Neighbors

Predict

KNN Prediction

Relax, s/he is still yours.

THANKS

