



REFRIGERATOR PRICE FORECAST

ML Project

Prepared by:

Berrin Göçer

INTRODUCTION

PROBLEM

To make a price estimation according to product features for consumers who will buy refrigerators.

SOLUTION

Making the best estimation by scraping data from Hepsiburada website, which is one of the largest e-commerce sites in our country.

OBJECTIVE

Calculating the best R^2 score by establishing the best regression and making the best price estimation.



METHODOLOGY

DATA SOURCE



URL: 'https://www.hepsiburada.com/ara?q=no-frost+buzdolab%C4%B1&kategori=2147483637_235604&filtreler=fiyat:2500-max'

TOOLS



BAHARA ÖZEL FENOMEN İNDİRLİMLER
18-21 NİSAN

Reeder telefonlar

ayda 112 TL'den başlayan fiyatlarla

12 aya varan alışveriş kredisi

Acele et kaçırma

*Ekstra hediyeli ve 0 anlık faizli kampanya.

Siparişlerim

Süper Fiyat, Süper Teklif

Yurt Dışından

Kampanyalar

Girişimci Kadınlar

Çözüm Merkezi

Hepsiburada'da Satıcı Ol

hepsiburada

no-frost buzdolabı

ARA

Konum

Konum Seç

Giriş Yap

veya üye ol

Sepetim

Elektronik

Moda

Ev, Yaşam,
Kirtasiye, Ofis

Oto, Bahçe, Yapı
Market

Anne, Bebek,
Oyuncak

Spor,
Outdoor

Kozmetik,
Kişisel Bakım

Süpermarket,
Pet Shop

Kitap, Müzik,
Film, Hobi

Filtreleri temizle

Sıralama ▾

Yann Kapıda ürünlerini görmek için konumunu seç.

10

Konum: seçilmedi

Dondurucular

☐ Vestel

Güvenle Kapıda

★★★★☆ 379

★★★★★ 142

★★★★★ 84

ABOUT THE DATA

	Urun_Adi	Uretici	Fiyat	Degerlendirme	Hacim	Enerji_Sinifi	Yillik_Enerji_Tuketimi	Renk
0	Samsung RT46K6000WW/TR No-Frost Buzdolabi	Samsung	6848	855	468.0	F	324	Beyaz
1	Samsung RT46K6000S8/TR No-Frost Buzdolabi	Samsung	7798	381	468.0	F	298	Inox
2	Vestel No-Frost Kombi Buzdolabi NFK48001 X	Vestel	7695	143	428.0	F	331	Gri
3	Profilo BD2155WFNN 453 L No-Frost Çift Kapılı ...	Profilo	6324	84	453.0	F	336	Beyaz
4	Vestel NF45001 No-Frost Buzdolabi	Vestel	6509	185	403.0	F	310	Beyaz
5	Bosch KGN86AIF0N 682 lt No-Frost Buzdolabi	Bosch	16885	13	619.0	E	378	Inox
6	Profilo BD3086WFDN 682 Lt No Frost Buzdolabi	Profilo	11025	54	682.0	F	384	Beyaz
7	Regal Nf 45010 402 Lt No-Frost Buzdolabi	Vestel	5298	55	402.0	F	310	Beyaz
8	Bosch KGN86AID1N 631 Lt No-Frost Buzdolabi	Bosch	18524	34	631.0	D	245	Inox
9	Vestel No-Frost Kombi Buzdolabi NFK48001	Vestel	7199	152	428.0	F	331	Beyaz

**First version of our dataset.

RESULTS

```
new_dff2["Renk"].replace({"Açık Gri": "Gri"}, inplace=True)
new_dff2["Renk"].replace({"Bej": "Gri"}, inplace=True)
new_dff2["Renk"].replace({"Gri": "Gri"}, inplace=True)
new_dff2["Renk"].replace({"Gümüş": "Gri"}, inplace=True)
new_dff2["Renk"].replace({"Inox": "Gri"}, inplace=True)
new_dff2["Renk"].replace({"Koyu Gri": "Gri"}, inplace=True)
new_dff2["Renk"].replace({"Siyah - Gri": "Gri"}, inplace=True)
new_dff2["Renk"].replace({"Bordo": "Renkli"}, inplace=True)
new_dff2["Renk"].replace({"Koyu Mavi": "Renkli"}, inplace=True)
new_dff2["Renk"].replace({"Kırmızı": "Renkli"}, inplace=True)
new_dff2["Renk"].replace({"Mavi": "Renkli"}, inplace=True)
new_dff2["Renk"].replace({"Turuncu": "Renkli"}, inplace=True)
new_dff2["Renk"].replace({"Açık Siyah": "Siyah"}, inplace=True)
new_dff2["Renk"].replace({"Siyah": "Siyah"}, inplace=True)
new_dff2["Renk"].replace({"Beyaz": "Beyaz"}, inplace=True)
```

```
new_dff34["Uretici"].replace({"Vestel": "Yerli"}, inplace=True)
new_dff34["Uretici"].replace({"Profilo": "Yerli"}, inplace=True)
new_dff34["Uretici"].replace({"Arçelik": "Yerli"}, inplace=True)
new_dff34["Uretici"].replace({"Beko": "Yerli"}, inplace=True)
new_dff34["Uretici"].replace({"Regal": "Yerli"}, inplace=True)
new_dff34["Uretici"].replace({"Altus": "Yerli"}, inplace=True)
new_dff34["Uretici"].replace({"Uğur": "Yerli"}, inplace=True)
```

```
scale_mapper = {"A":1, "D": 2, "E":3, 'F':4}
new_dff55["Scale_Energy"] = new_dff55["Enerji_Sinifi"].replace(scale_mapper)
```

****We reorganized the values of some features on our dataset.**

RESULTS

Data columns (total 19 columns):

#	Column	Non-Null Count	Dtype
0	Yillik_Enerji_Tuketimi	356 non-null	int64
1	Degerlendirme	356 non-null	int64
2	Hacim	356 non-null	float64
3	Renk_Gri	356 non-null	uint8
4	Renk_Renkli	356 non-null	uint8
5	Renk_Siyah	356 non-null	uint8
6	Uretici_Electrolux	356 non-null	uint8
7	Uretici_Finlux	356 non-null	uint8
8	Uretici_Franke	356 non-null	uint8
9	Uretici_Hoover	356 non-null	uint8
10	Uretici_LG	356 non-null	uint8
11	Uretici_Liebherr	356 non-null	uint8
12	Uretici_Samsung	356 non-null	uint8
13	Uretici_Sharp	356 non-null	uint8
14	Uretici_Siemens	356 non-null	uint8
15	Uretici_Teka	356 non-null	uint8
16	Uretici_Yerli	356 non-null	uint8
17	Scale_Energy	356 non-null	int64
18	log_price	356 non-null	float64

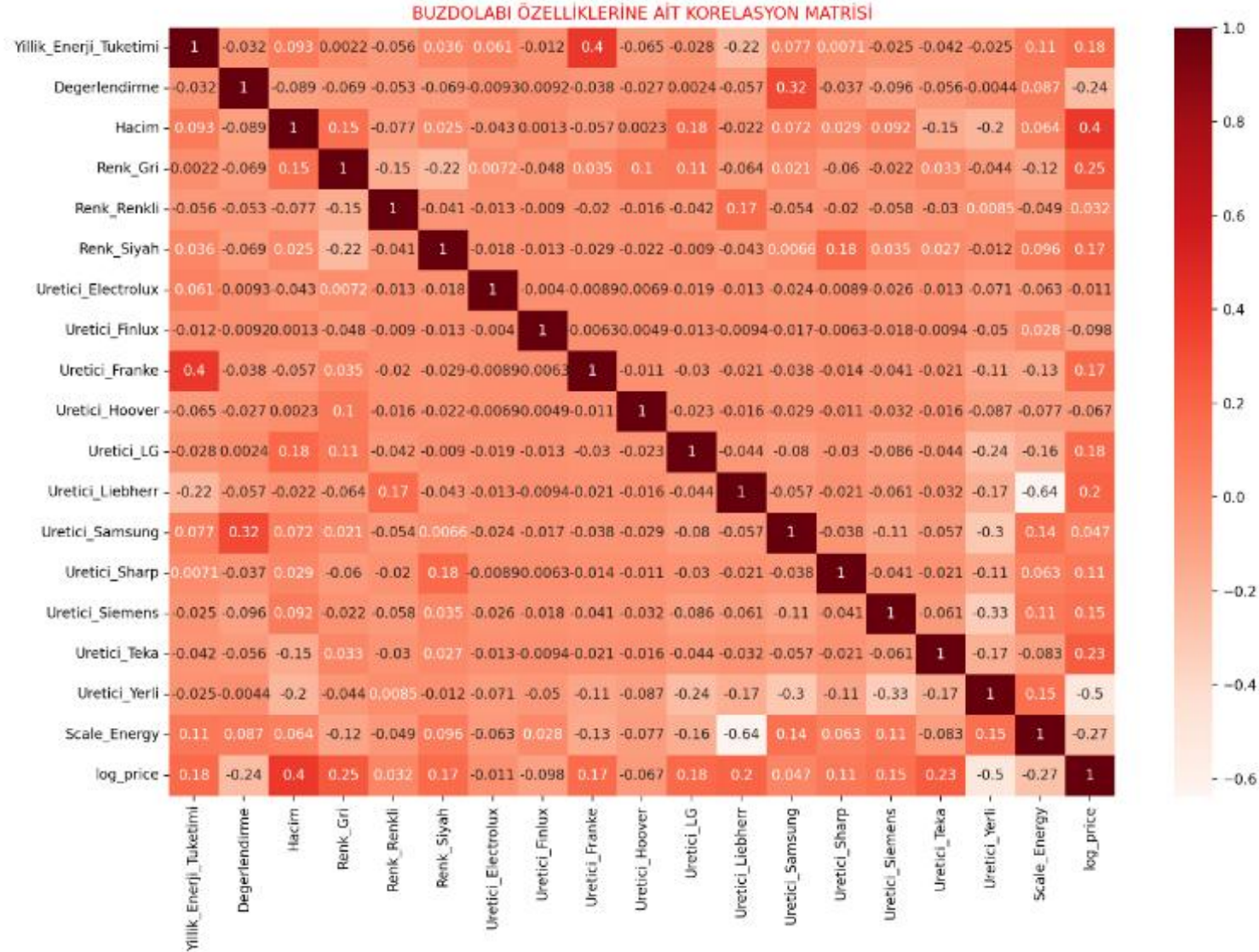
**We created dummies for Uretici and Renk feautures.

RESULTS

	Yillik_Enerji_Tuketimi	Degerlendirme	Hacim	Renk_Gri	Renk_Renkli	Renk_Siyah	Uretici_Electrolux	Uretici_Finlux	Uretici_Franke	Uretici_Hoover	Uretici_LG	Uretici_Liebherr	Uretici_Samsung	Uretici_Sharp	Uretici_Siemens	Uretici_Teka	Uretici_Yerli	Scale_Energy	log_price
Yillik_Enerji_Tuketimi	1.000000	-0.037940	0.273283	-0.035309	-0.059704	0.007863	0.068372	-0.161166	0.276188	-0.091408	-0.063476	-0.135202	0.005663	0.006055	-0.041747	-0.077055	0.107794	0.057422	0.045011
Degerlendirme	-0.037940	1.000000	-0.108961	-0.078711	-0.037432	-0.052893	-0.015017	-0.021517	-0.035111	-0.041662	0.011844	-0.040992	0.323527	-0.030476	-0.096069	-0.054944	-0.018738	0.063086	-0.257106
Hacim	0.273283	-0.108961	1.000000	0.194502	-0.056152	0.017200	-0.052939	-0.047863	-0.007461	0.002199	0.163532	-0.034642	0.059840	0.029386	0.128447	-0.208482	-0.125476	-0.063074	0.438830
Renk_Gri	-0.035309	-0.078711	0.194502	1.000000	-0.128742	-0.206228	0.055105	-0.090647	-0.021862	0.144031	0.043299	-0.058317	0.025340	0.055105	0.067686	0.003148	-0.112283	-0.078601	0.297834
Renk_Renkli	-0.059704	-0.037432	-0.056152	-0.128742	1.000000	-0.027461	-0.013957	-0.012070	-0.015627	-0.018543	-0.029320	0.452977	-0.039719	-0.013957	-0.047237	-0.024454	-0.044380	-0.205862	0.028640
Renk_Siyah	0.007863	-0.052893	0.017200	-0.206228	-0.027461	1.000000	-0.022358	-0.019335	-0.025032	-0.029703	0.084172	-0.029703	0.037043	-0.022358	-0.031866	0.115776	-0.043126	0.062562	0.197239
Uretici_Electrolux	0.068372	-0.015017	-0.052939	0.055105	-0.013957	-0.022358	1.000000	-0.009827	-0.012723	-0.015097	-0.023872	-0.015097	-0.032338	-0.011364	-0.038459	-0.019910	-0.107201	-0.052566	0.069377
Uretici_Finlux	-0.161166	-0.021517	-0.047863	-0.090647	-0.012070	-0.019335	-0.009827	1.000000	-0.011003	-0.013056	-0.020644	-0.013056	-0.027966	-0.009827	-0.033259	-0.017218	-0.092707	0.054029	-0.157913
Uretici_Franke	0.276188	-0.035111	-0.007461	-0.021862	-0.015627	-0.025032	-0.012723	-0.011003	1.000000	-0.016903	-0.026727	-0.016903	-0.036206	-0.012723	-0.043059	-0.022292	-0.120025	-0.136136	0.163018
Uretici_Hoover	-0.091408	-0.041662	0.002199	0.144031	-0.018543	-0.029703	-0.015097	-0.013056	-0.016903	1.000000	-0.031715	-0.020057	-0.042962	-0.015097	-0.051094	-0.026451	-0.142422	-0.120783	0.057597
Uretici_LG	-0.063476	0.011844	0.163532	0.043299	-0.029320	0.084172	-0.023872	-0.020644	-0.026727	-0.031715	1.000000	-0.031715	-0.067932	-0.023872	-0.080791	-0.041825	-0.225198	-0.153073	0.215561
Uretici_Liebherr	-0.135202	-0.040992	-0.034642	-0.058317	0.452977	-0.029703	-0.015097	-0.013056	-0.016903	-0.020057	-0.031715	1.000000	-0.042962	-0.015097	-0.051094	-0.026451	-0.142422	-0.528352	0.098784
Uretici_Samsung	0.005663	0.323527	0.059840	0.025340	-0.039719	0.037043	-0.032338	-0.027966	-0.036206	-0.042962	-0.067932	-0.042962	1.000000	-0.032338	-0.109443	-0.056658	-0.305065	0.075938	0.043277
Uretici_Sharp	0.006055	-0.030476	0.029386	0.055105	-0.013957	-0.022358	-0.011364	-0.009827	-0.012723	-0.015097	-0.023872	-0.015097	-0.032338	1.000000	-0.038459	-0.019910	-0.107201	0.062476	0.078020
Uretici_Siemens	-0.041747	-0.096069	0.128447	0.067686	-0.047237	-0.031866	-0.038459	-0.033259	-0.043059	-0.051094	-0.080791	-0.051094	-0.109443	-0.038459	1.000000	-0.067383	-0.362808	0.135472	0.206514
Uretici_Teka	-0.077055	-0.054944	-0.208482	0.003148	-0.024454	0.115776	-0.019910	-0.017218	-0.022292	-0.026451	-0.041825	-0.026451	-0.056658	-0.019910	-0.067383	1.000000	-0.187824	-0.114495	0.219555
Uretici_Yerli	0.107794	-0.018738	-0.125476	-0.112283	-0.044380	-0.043126	-0.107201	-0.092707	-0.120025	-0.142422	-0.225198	-0.142422	-0.305065	-0.107201	-0.362808	-0.187824	1.000000	0.160929	-0.470615
Scale_Energy	0.057422	0.063086	-0.063074	-0.078601	-0.205862	0.062562	-0.052566	0.054029	-0.136136	-0.120783	-0.153073	-0.528352	0.075938	0.062476	0.135472	-0.114495	0.160929	1.000000	-0.230208
log_price	0.045011	-0.257106	0.438830	0.297834	0.028640	0.197239	0.069377	-0.157913	0.163018	0.057597	0.215561	0.098784	0.043277	0.078020	0.206514	0.219555	-0.470615	-0.230208	1.000000

**We calculated the correlation values for our features.

BUZDOLABI ÖZELLİKLERİNE AİT KORELASYON MATRİSİ



CONCLUSION

```
from sklearn.linear_model import Ridge
from sklearn.datasets import make_blobs
model = Ridge(alpha=0.05, normalize=True)
model.fit(X, y)
new_input = [[256,105,524.0,1,0,0,0,0,0,1,0,0,0,0,0,0,4]]
new_output = model.predict(new_input)
print(new_input, new_output)

[[256, 105, 524.0, 1, 0, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0, 0, 4]] [9.10725854]
```

Modeller ve Skor Değerleri:

LinearRegression_model_test: 47.66

LinearRegression2_model_test 50.36

ridgeReg_test 49.34

lassoReg_test -9.46

****The 3 features that are most correlated with log_price are 'Uretici_Yerli', 'Hacim', 'Renk_Gri'**

IF WE HAD MORE TIME

We could have analyzed all data in the refrigerator category, and not only no-frost refrigerators.

We could have analyzed other e-commerce websites with more products, and increased the number of our data's.

The number of features can be increased on a per product basis.

**THANK YOU FOR
LISTENING**