

Computer Monitor Pricing

Xiaorui Yuan





Design

Client: Computer monitor customers



Objective: Explore monitor pricing

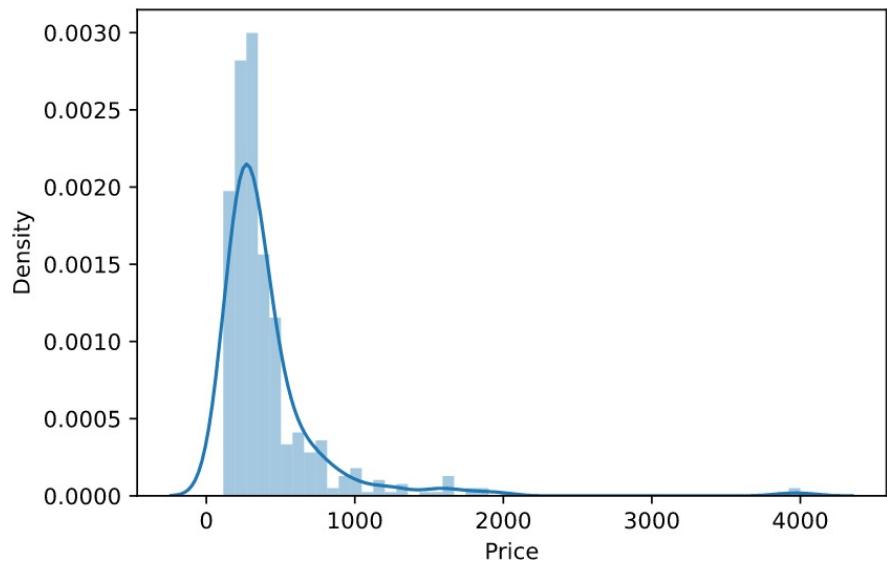
Data

- ▶ Monitor data scraped from Bestbuy.com
- ▶ Target:
- ▶ Feature:

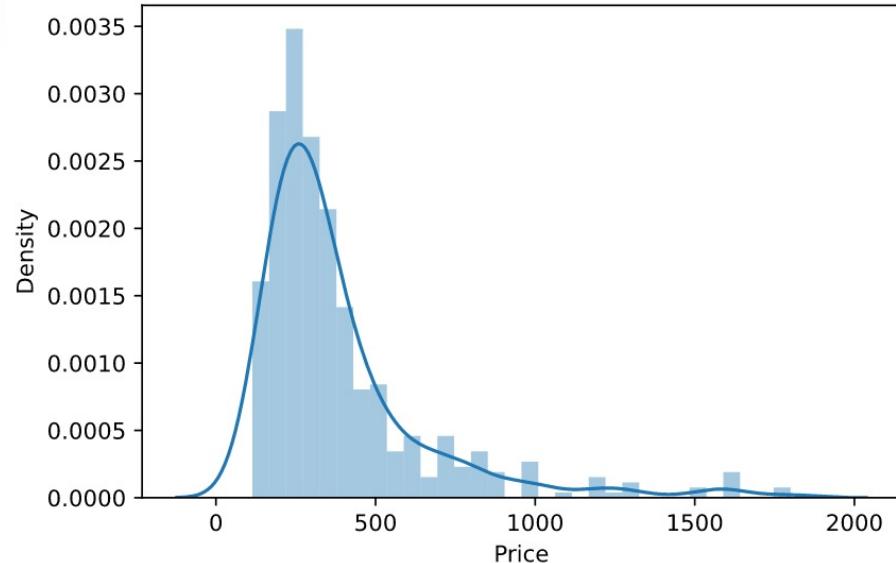


A Glimpse of Data

Distribution of Price



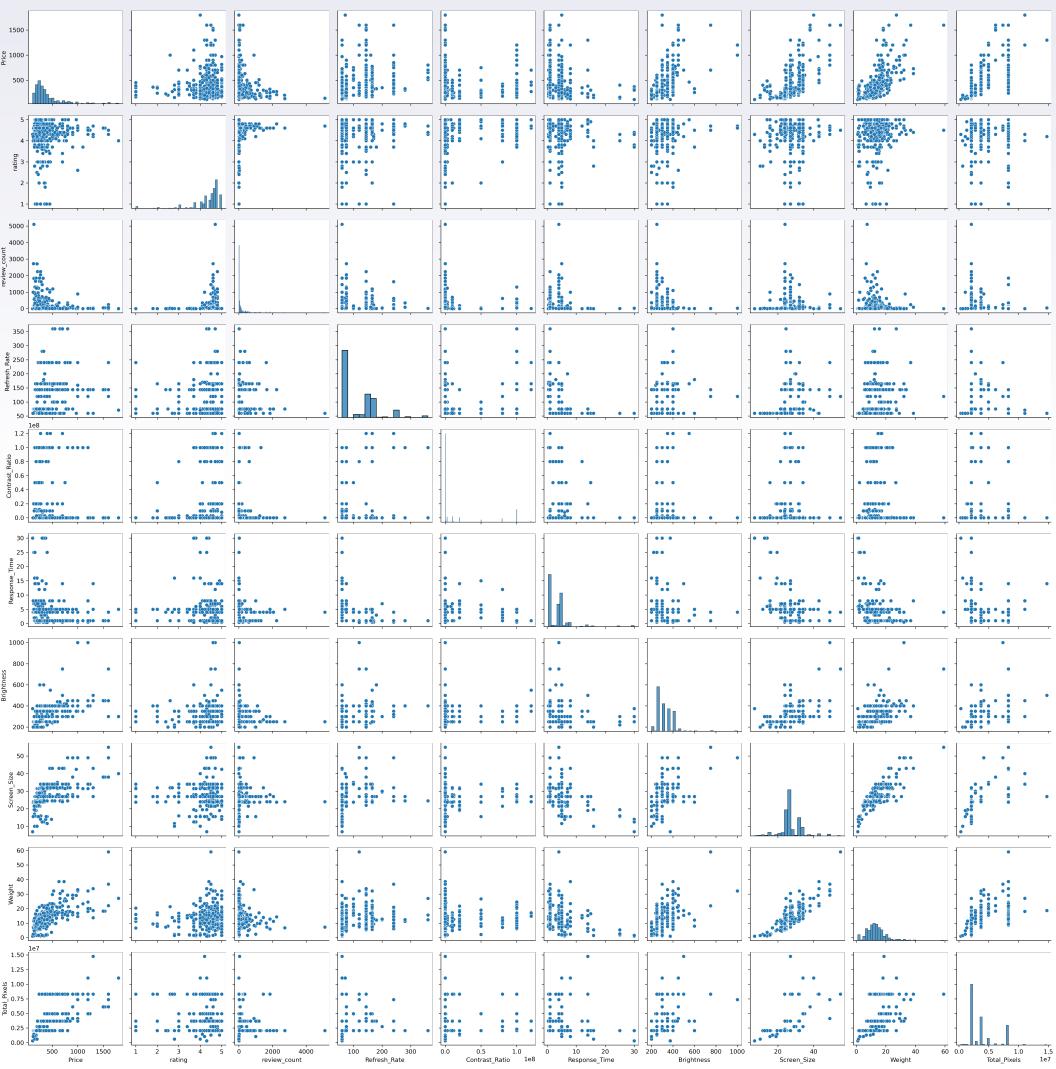
Drop Significant Outliers



Relationship Viz(1)



Relationship Viz (2)



Baseline OLS

```
train_val_test(x,y)
```

```
train r score: 0.594
validation r score: 0.629
test r score: 0.658
```

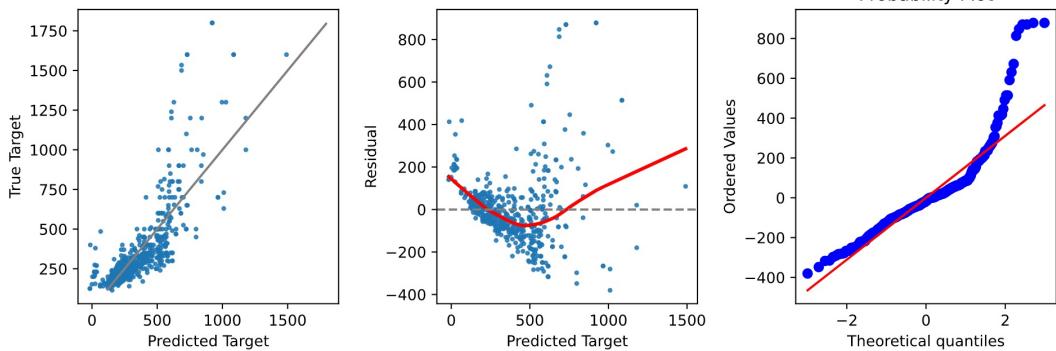
```
KFold3_cross_validation(x,y)
```

```
Simple regression scores: [ 0.54588404  0.59138039  0.5834882 ]
Simple mean cv r^2:  0.574 +- 0.02
```

```
KFold5_cross_validation(x,y)
```

```
Simple regression scores: [ 0.52381485  0.607549   0.59280324  0.01615653  0.63758722]
Simple mean cv r^2:  0.476 +- 0.233
```

Diagnostic Plots



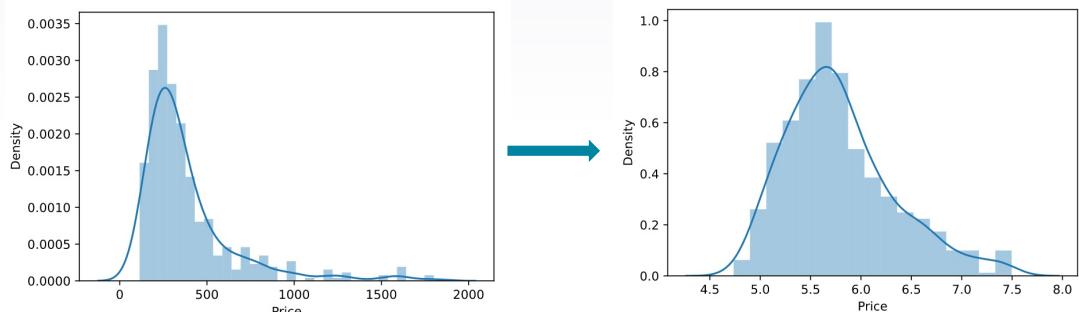
Dep. Variable:	Price	R-squared:	0.616
Model:	OLS	Adj. R-squared:	0.609
Method:	Least Squares	F-statistic:	86.49
Date:	Wed, 15 Jun 2022	Prob (F-statistic):	4.55e-95
Time:	00:30:41	Log-Likelihood:	-3249.7
No. Observations:	496	AIC:	6519.
Df Residuals:	486	BIC:	6562.
Df Model:	9		
Covariance Type:	nonrobust		

	coef	std err	t	P> t	[0.025	0.975]
const	-414.2909	76.457	-5.419	0.000	-564.518	-264.064
rating	3.4965	11.775	0.297	0.767	-19.640	26.633
review_count	-0.0163	0.016	-1.041	0.299	-0.047	0.014
Refresh_Rate	1.0760	0.166	6.479	0.000	0.750	1.402
Contrast_Ratio	-2.833e-07	2.38e-07	-1.189	0.235	-7.51e-07	1.85e-07
Response_Time	9.3568	2.292	4.083	0.000	4.854	13.860
Brightness	0.3492	0.113	3.091	0.002	0.127	0.571
Screen_Size	7.5140	2.419	3.106	0.002	2.761	12.267
Weight	11.6788	2.214	5.276	0.000	7.329	16.028
Total_Pixels	4.313e-05	4.22e-06	10.215	0.000	3.48e-05	5.14e-05
Omnibus:	247.326	Durbin-Watson:			1.903	
Prob(Omnibus):	0.000	Jarque-Bera (JB):			1674.416	
Skew:	2.088	Prob(JB):			0.00	
Kurtosis:	10.974	Cond. No.			3.70e+08	

Feature Engineering

log transformation

Add polynomial terms & interaction terms



```

print(train_val_test(x,y))

print(KFold3_cross_validation(x,y))

print(KFold5_cross_validation(x,y))

train r score: 0.723
validation r score: 0.752
test r score: 0.657
None
Simple regression scores: [0.67227442 0.68416461 0.72515236]
Simple mean cv r^2: 0.694 +- 0.023
None
Simple regression scores: [0.65571332 0.68596706 0.68863738 0.56249618 0.78244167]
Simple mean cv r^2: 0.675 +- 0.071
None

```

Dep. Variable:	Log_Price	R-squared:	0.728			
Model:	OLS	Adj. R-squared:	0.724			
Method:	Least Squares	F-statistic:	163.3			
Date:	Wed, 15 Jun 2022	Prob (F-statistic):	1.34e-132			
Time:	00:32:22	Log-Likelihood:	-75.277			
No. Observations:	496	AIC:	168.6			
Df Residuals:	487	BIC:	206.4			
Df Model:	8					
Covariance Type:	nonrobust					
	coef	std err	t	P> t	[0.025	0.975]
const	4.7329	0.183	25.831	0.000	4.373	5.093
Refresh_Rate	0.0022	0.000	8.461	0.000	0.002	0.003
Brightness	0.0035	0.001	5.795	0.000	0.002	0.005
Screen_Size	-0.0626	0.013	-4.887	0.000	-0.088	-0.037
Weight	0.0178	0.004	4.641	0.000	0.010	0.025
Total_Pixels	1.611e-07	4.3e-08	3.747	0.000	7.66e-08	2.46e-07
Screen_Size^2	0.0015	0.000	5.182	0.000	0.001	0.002
Brightness^2	-3.15e-06	6.2e-07	-5.078	0.000	-4.37e-06	-1.93e-06
Screen_Size*Pixel	-2.141e-09	1.46e-09	-1.471	0.142	-5e-09	7.18e-10
Omnibus:	16.772	Durbin-Watson:	1.958			
Prob(Omnibus):	0.000	Jarque-Bera (JB):	17.659			
Skew:	0.426	Prob(JB):	0.000146			
Kurtosis:	3.359	Cond. No.	2.00e+09			

Feature Engineering

Add Dummies

Dep. Variable:	Log_Price	R-squared:	0.836
Model:	OLS	Adj. R-squared:	0.815
Method:	Least Squares	F-statistic:	40.73
Date:	Wed, 15 Jun 2022	Prob (F-statistic):	5.71e-140
Time:	01:44:11	Log-Likelihood:	49.543
No. Observations:	496	AIC:	12.91
Df Residuals:	440	BIC:	248.5
Df Model:	55		
Covariance Type:	nonrobust		

```

print(train_val_test(x,y))

print(KFold3_cross_validation(x,y))

print(KFold5_cross_validation(x,y))

train r score: 0.851
validation r score: 0.791
test r score: 0.724
None
Simple regression scores: [ 0.7516161   0.72604438  0.72892018]
Simple mean cv r^2:  0.736 +- 0.011
None
Simple regression scores: [ 0.78822478  0.67068485  0.82284472  0.66866058  0.74858826]
Simple mean cv r^2:  0.74 +- 0.062
None

```

	coef	std err	t	P> t	[0.025	0.975]
const	4.6081	0.216	21.321	0.000	4.183	5.033
Refresh_Rate	0.0026	0.000	8.756	0.000	0.002	0.003
Brightness	0.0021	0.001	3.403	0.001	0.001	0.003
Screen_Size	-0.0388	0.014	-2.727	0.007	-0.067	-0.011
Weight	0.0136	0.004	3.754	0.000	0.006	0.021
Total_Pixels	1.485e-07	3.81e-08	3.900	0.000	7.37e-08	2.23e-07
Screen_Size*2	0.0011	0.000	3.988	0.000	0.001	0.002
Brightness*2	-1.89e-06	6.02e-07	-3.141	0.002	-3.07e-06	-7.08e-07
Screen_Size*Pixel	1.814e-09	1.29e-09	-1.409	0.160	-4.34e-09	7.16e-10
brand_AOC	-0.0142	0.076	-0.184	0.852	-0.164	0.136
brand_APEN	-0.5466	0.241	-2.267	0.024	-1.020	-0.073
brand_ASUS	-0.0337	0.056	-0.599	0.549	-0.144	0.077
brand_Acer	-0.0013	0.062	-0.021	0.983	-0.123	0.121
brand_Alienware	0.0172	0.116	1.007	0.314	-0.112	0.346
brand_Asus	-0.0768	0.148	-0.520	0.604	-0.368	0.214
brand_BenQ	0.0338	0.069	0.493	0.622	-0.101	0.168
brand_CORSAIR	0.2168	0.181	1.196	0.232	-0.139	0.573
brand_Dell	0.1042	0.065	1.613	0.107	-0.023	0.231
brand_DoubleSight	-0.1649	0.213	-0.777	0.440	-0.585	0.255
brand_Element	-0.1474	0.142	-1.039	0.299	-0.426	0.131
brand_GIGABYTE	-0.0423	0.074	-0.572	0.568	-0.188	0.103
brand_Geek	0.1410	0.240	0.584	0.558	-0.331	0.613
brand_HP	0.1949	0.070	2.788	0.006	0.057	0.332
brand_LG	0.1402	0.051	2.741	0.006	0.040	0.241
brand_Lenovo	0.1035	0.064	1.616	0.107	-0.022	0.229
brand_MSI	0.0414	0.091	0.455	0.650	-0.137	0.220
brand_NHT	0.5028	0.254	1.978	0.049	0.003	1.002
brand_Philips	-0.0052	0.095	-0.055	0.956	-0.192	0.182
brand_Razer	0.3868	0.163	2.371	0.018	0.066	0.707
brand_SideTrak	0.4274	0.140	3.061	0.002	0.153	0.702
brand_VIOTEK	0.0436	0.241	0.181	0.856	-0.429	0.516
brand_ViewSonic	0.0087	0.068	0.127	0.899	-0.126	0.143
brand_Visusonic	0.1078	0.261	0.417	0.680	-0.406	0.622
brand_Viotek	-0.1676	0.117	-1.430	0.152	-0.397	0.062
Synchronization_Technology_FreeSync	-0.0619	0.031	-2.014	0.045	-0.122	-0.001
Synchronization_Technology_Freesync&SYNC	0.0329	0.054	0.603	0.547	-0.074	0.140
Synchronization_Technology_G_SYNC	0.1071	0.060	1.779	0.076	-0.011	0.225
Synchronization_Technology_G-SYNC&VSync	0.4593	0.179	2.560	0.011	0.107	0.812
Synchronization_Technology_VSync	0.0150	0.093	0.161	0.872	-0.168	0.198
Panel_Type_IPS	0.1582	0.045	3.500	0.001	0.070	0.247
Panel_Type_MVA	0.0556	0.087	0.639	0.523	-0.115	0.226
Panel_Type_PLS	-0.2104	0.242	-0.868	0.386	-0.687	0.266
Panel_Type_TFT	0.2052	0.113	1.819	0.070	-0.017	0.427
Panel_Type_TN	-0.1001	0.065	-1.543	0.124	-0.227	0.027
Panel_Type_VA	-0.1086	0.051	-2.122	0.034	-0.209	-0.008
Curved_Screen_Yes	0.2777	0.040	6.868	0.000	0.198	0.357
HDR_Yes	0.0621	0.032	1.925	0.055	-0.001	0.125
Smart_Display_Yes	-0.1060	0.115	-0.924	0.356	-0.331	0.119
Touch_Screen_Yes	0.3544	0.131	2.699	0.007	0.096	0.612
Quantum_Dot_Technology_Yes	0.1825	0.080	2.277	0.023	0.025	0.340
Headphone_Jack_Yes	-0.1139	0.029	-3.887	0.000	-0.172	-0.056
Voice_Assistant_Yes	0.0918	0.098	0.941	0.347	-0.100	0.283
Wall_Mountable_Yes	-0.0546	0.035	-1.579	0.115	-0.123	0.013
Anti_Glare_Yes	-0.0731	0.036	-2.024	0.043	-0.144	-0.002
Speaker_Yes	0.0949	0.029	3.268	0.001	0.038	0.152
Webcam_Yes	0.1127	0.065	1.730	0.084	-0.015	0.241

Regularization

Lasso regression Wins

LASSO_train R-squared: 0.813
LASSO_test R-squared: 0.811

