Wisconsin Breast Cancer Dataset

by Rajshri Ganesh Iyer

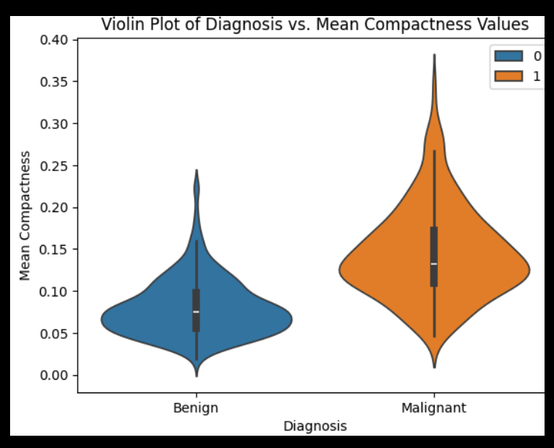
Dataset from : UCI Machine Learning Repo

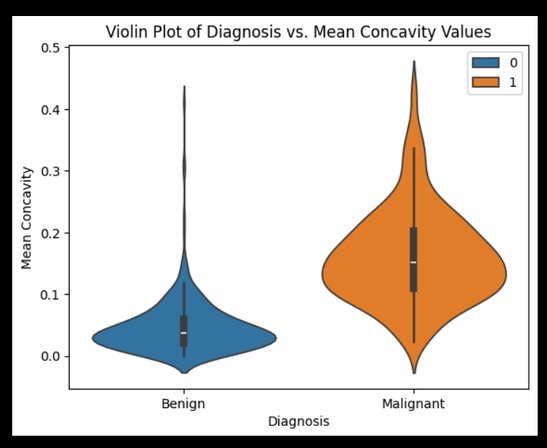
Link to Kaggle Dataset:

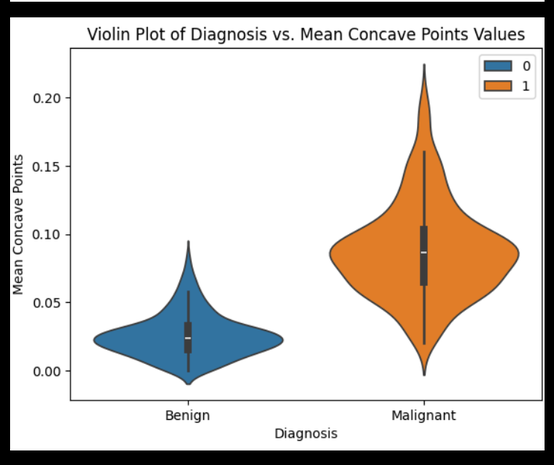
https://www.kaggle.com/datasets/uciml/breast-cancer-wisconsin-data/data

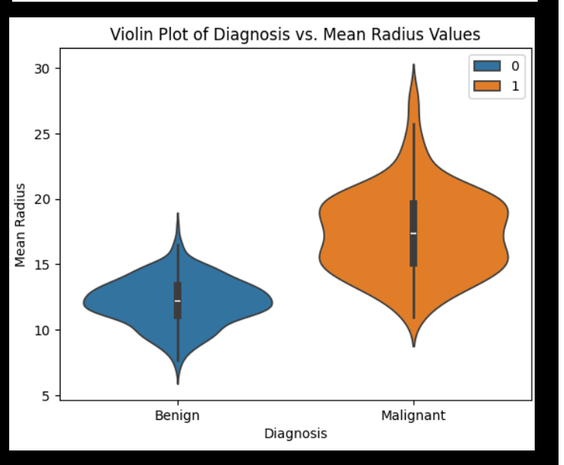
OBJECTIVE: To identify the features that have highest correlation with breast cancer diagnosis and to fit a Linear Regression model to the data for breast cancer diagnosis prediction.

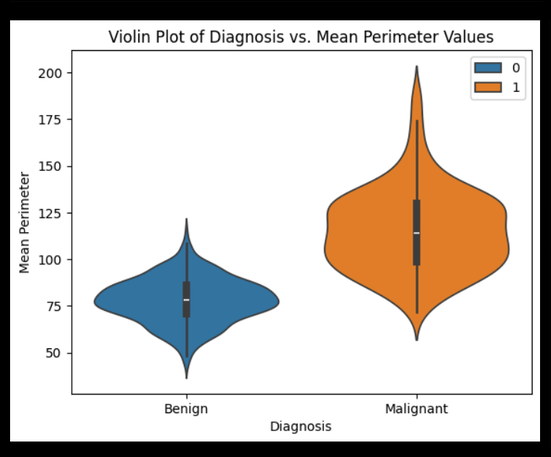
	id	diagnosis	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	concave points_mean	symmetry_mean	fractal_dimension_mean
count	5.690000e+02	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000
mean	3.037183e+07	0.372583	14.127292	19.289649	91.969033	654.889104	0.096360	0.104341	0.088799	0.048919	0.181162	0.062798
std	1.250206e+08	0.483918	3.524049	4.301036	24.298981	351.914129	0.014064	0.052813	0.079720	0.038803	0.027414	0.007060
min	8.670000e+03	0.000000	6.981000	9.710000	43.790000	143.500000	0.052630	0.019380	0.000000	0.000000	0.106000	0.049960
25%	8.692180e+05	0.000000	11.700000	16.170000	75.170000	420.300000	0.086370	0.064920	0.029560	0.020310	0.161900	0.057700
50%	9.060240e+05	0.000000	13.370000	18.840000	86.240000	551.100000	0.095870	0.092630	0.061540	0.033500	0.179200	0.061540
75%	8.813129e+06	1.000000	15.780000	21.800000	104.100000	782.700000	0.105300	0.130400	0.130700	0.074000	0.195700	0.066120
max	9.113205e+08	1.000000	28.110000	39.280000	188.500000	2501.000000	0.163400	0.345400	0.426800	0.201200	0.304000	0.097440

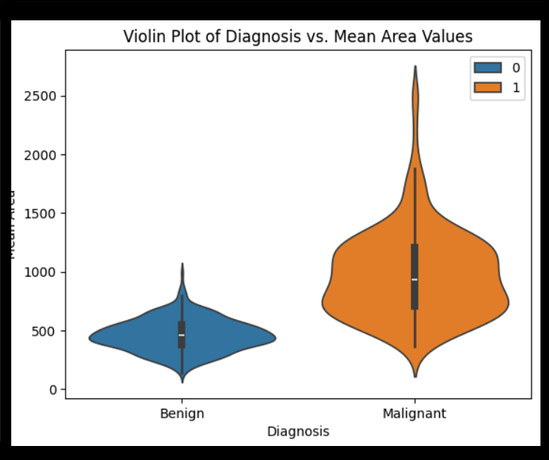


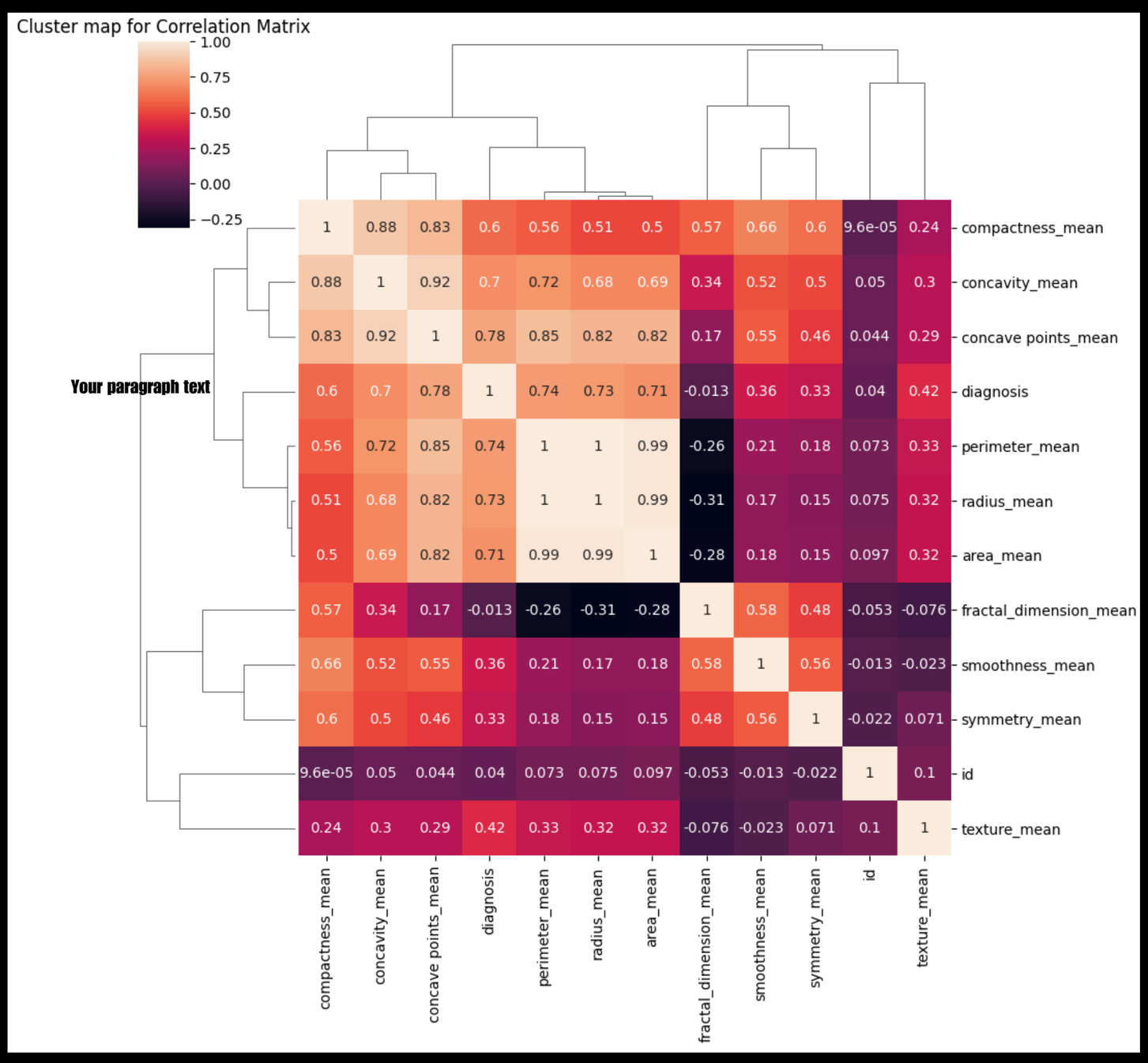












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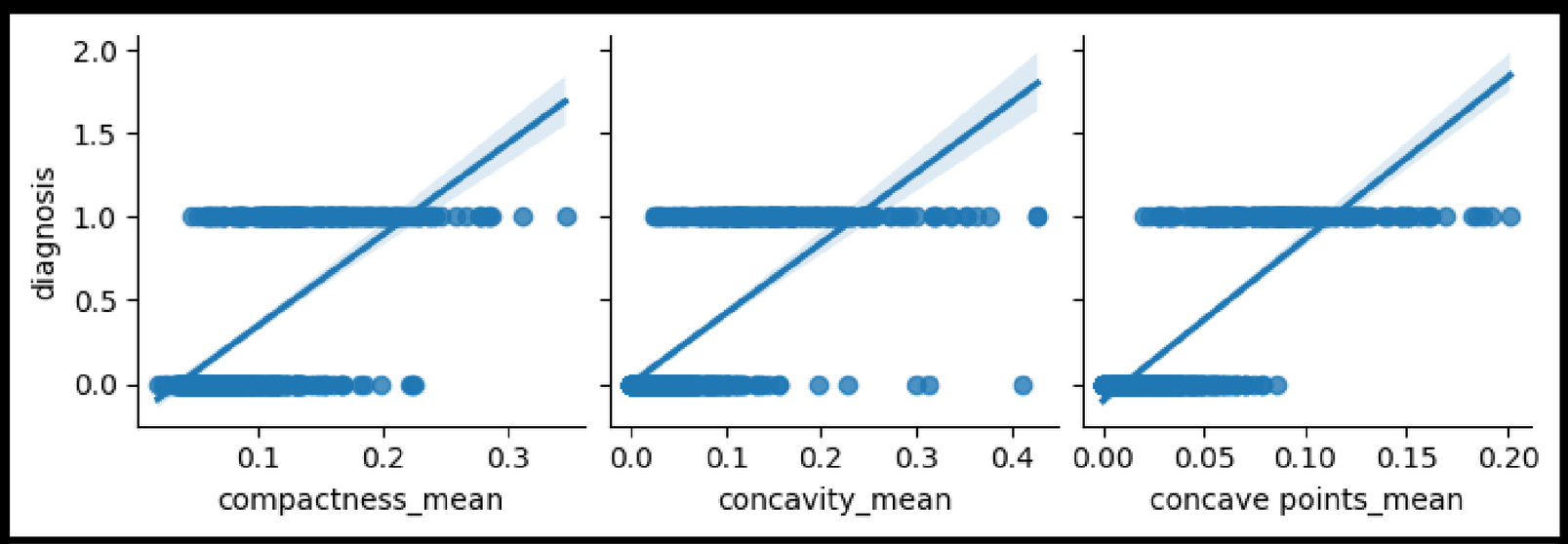
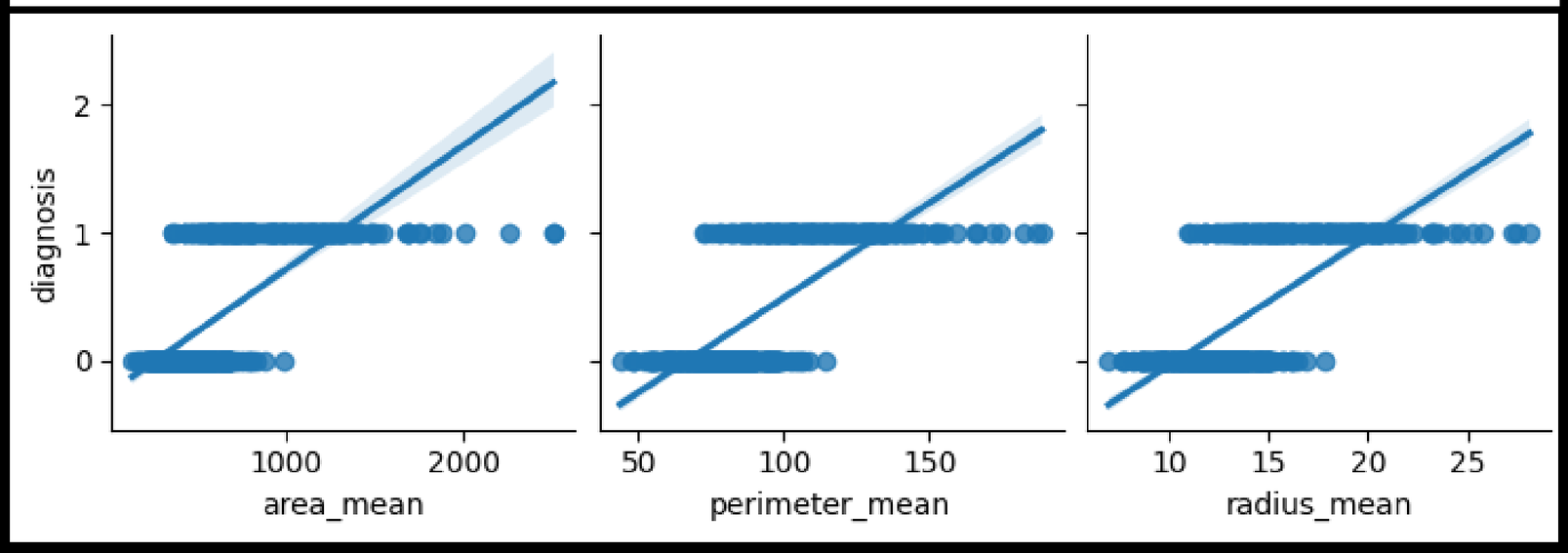


Steps

1. Extract the features to be used for fitting
2. Split data into training and testing
3. Fit a Linear Regression model
4. Extract the model parameters for R2, MSE, intercept and coefficients & evaluate the model



5. Plot the Linear Regression data

MODEL PARAMETERS

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Mean squared error: 0.08494739844208647
R-squared: 0.6383962036838009
b0 (model intercept)          = -1.3346645166241813
b1 (coeff for compactness)    = 0.4225071269807399
b2 (coeff for concavity)      = 0.6485696045302635
b3 (coeff for concave points)= 8.470875669627944
b4 (coeff for perimeter)      = -0.05294643956330038
b5 (coeff for radius)         = 0.4769109453062004
b6 (coeff for area)           = -0.0010274395335266862
```

CONCLUSION: Based on Correlation Matrix, only 6 out of 10 features have high correlation with breast cancer diagnosis. Linear Regression model has a low R2 value, hence a better model needs to be used for fitting.