AC2a

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Predição de Câncer

Informações do atributo:

a) ID Número de identificação
b) Diagnóstico (M = maligno, B = benigno) (a variável para predefinir)

Lista de exercícios:

1- Ler o dataset “Cancer_diagnostic.csv” e segui os seguintes passos.

```
file_path = 'Cancer_diagnostic.csv'
data = pd.read_csv(file_path)
```

2- Qual é o tamanho do dataset?

```
print(f"Tamanho do dataset: {data.shape}")
✓ 0.0s
Tamanho do dataset: (569, 33)
```

3- Verifique colunas e tipos de dados

```
data.info()
```

✓ 0.0s

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 569 entries, 0 to 568
Data columns (total 33 columns):
 #   Column                  Non-Null Count  Dtype
---  ------                  --------------  -----
 0   id                      569 non-null    int64
 1   diagnosis               569 non-null    object
 2   radius_mean             569 non-null    float64
 3   texture_mean            569 non-null    float64
 4   perimeter_mean          569 non-null    float64
 5   area_mean               569 non-null    float64
 6   smoothness_mean         569 non-null    float64
 7   compactness_mean        569 non-null    float64
 8   concavity_mean          569 non-null    float64
 9   concave points_mean     569 non-null    float64
 10  symmetry_mean           569 non-null    float64
 11  fractal_dimension_mean  569 non-null    float64
 12  radius_se               569 non-null    float64
 13  texture_se              569 non-null    float64
 14  perimeter_se            569 non-null    float64
 15  area_se                 569 non-null    float64
 16  smoothness_se           569 non-null    float64
 17  compactness_se          569 non-null    float64
 18  concavity_se            569 non-null    float64
 19  concave points_se       569 non-null    float64
...
 31  fractal_dimension_worst 569 non-null    float64
 32  Unnamed: 32             0 non-null      float64
dtypes: float64(31), int64(1), object(1)
```

4- Mostra o resumo estatístico do dataset

```
data.describe()
```

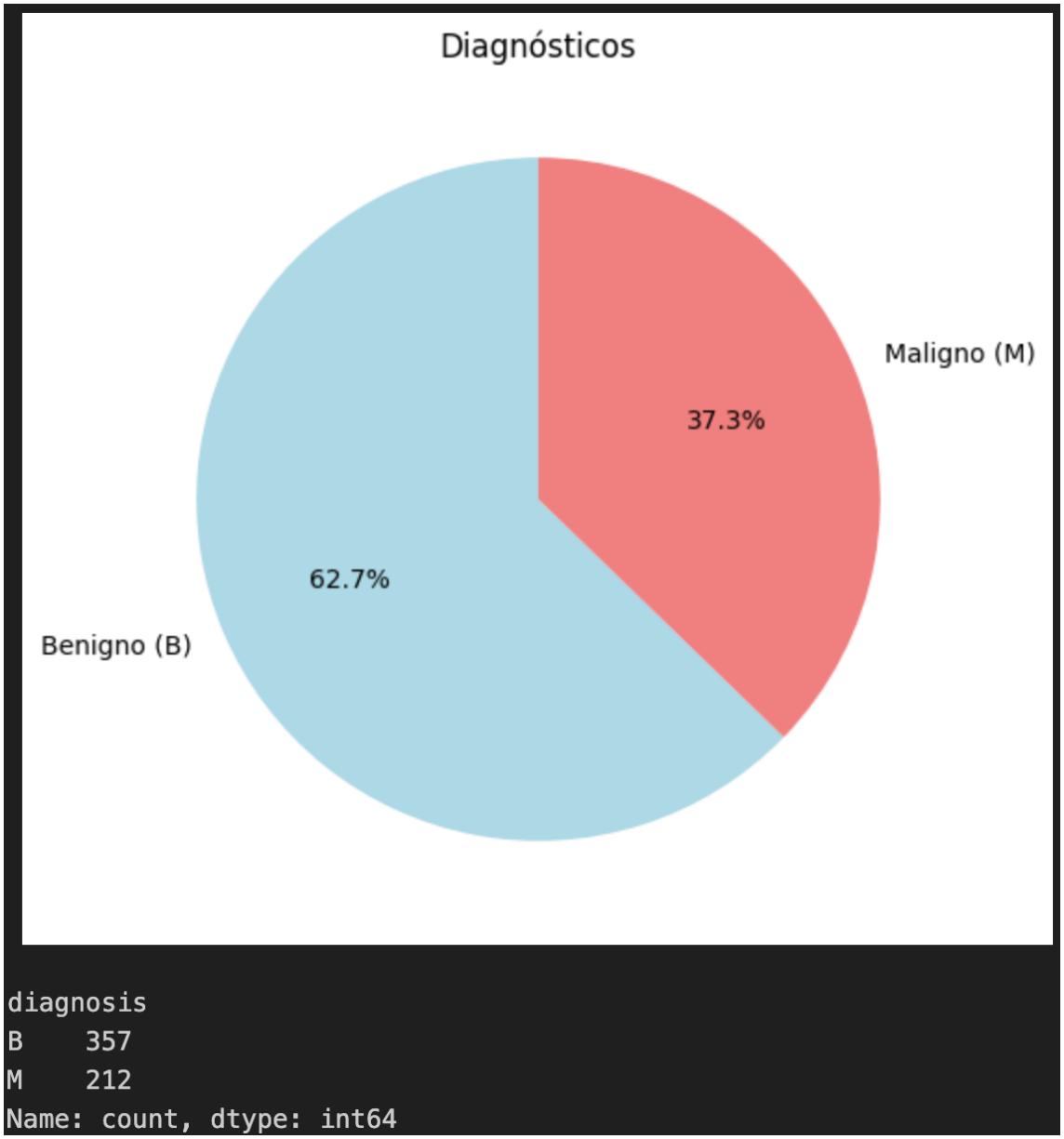
	id	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	concave points_mean	symmetry_mean	...	texture_worst	perimeter_worst	area_worst	smoothness_worst	compactness_worst	concavity_worst	concave points_worst	symmetry_worst	fractal_dimension_worst	Unnamed: 32
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	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000	569.000000	0.0
mean	3.037183e+07	14.127292	19.289649	91.969033	654.889104	0.096360	0.104341	0.088799	0.048919	0.181162	...	25.677223	107.261213	880.583128	0.132369	0.254265	0.272188	0.114606	0.290076	0.083946	NaN
std	1.250206e+08	3.524049	4.301036	24.298981	351.914129	0.014064	0.052813	0.079720	0.038803	0.027414	...	6.146258	33.602542	569.356993	0.022832	0.157336	0.208624	0.065732	0.061867	0.018061	NaN
min	8.670000e+03	6.981000	9.710000	43.790000	143.500000	0.052630	0.019380	0.000000	0.000000	0.106000	...	12.020000	50.410000	185.200000	0.071170	0.027290	0.000000	0.000000	0.156500	0.055040	NaN
25%	8.692180e+05	11.700000	16.170000	75.170000	420.300000	0.086370	0.064920	0.029560	0.020310	0.161900	...	21.080000	84.110000	515.300000	0.116600	0.147200	0.114500	0.064930	0.250400	0.071460	NaN
50%	9.060240e+05	13.370000	18.840000	86.240000	551.100000	0.095870	0.092630	0.061540	0.033500	0.179200	...	25.410000	97.660000	686.500000	0.131300	0.211900	0.226700	0.099930	0.282200	0.080040	NaN
75%	8.813129e+06	15.780000	21.800000	104.100000	782.700000	0.105300	0.130400	0.130700	0.074000	0.195700	...	29.720000	125.400000	1084.000000	0.146000	0.339100	0.382900	0.161400	0.317900	0.092080	NaN
max	9.113205e+08	28.110000	39.280000	188.500000	2501.000000	0.163400	0.345400	0.426800	0.201200	0.304000	...	49.540000	251.200000	4254.000000	0.222600	1.058000	1.252000	0.291000	0.663800	0.207500	NaN

8 rows × 32 columns

5- O dataset está balanceado?

O dataset não está balanceado.

6- Mostrar um gráfico de pizza do dataset

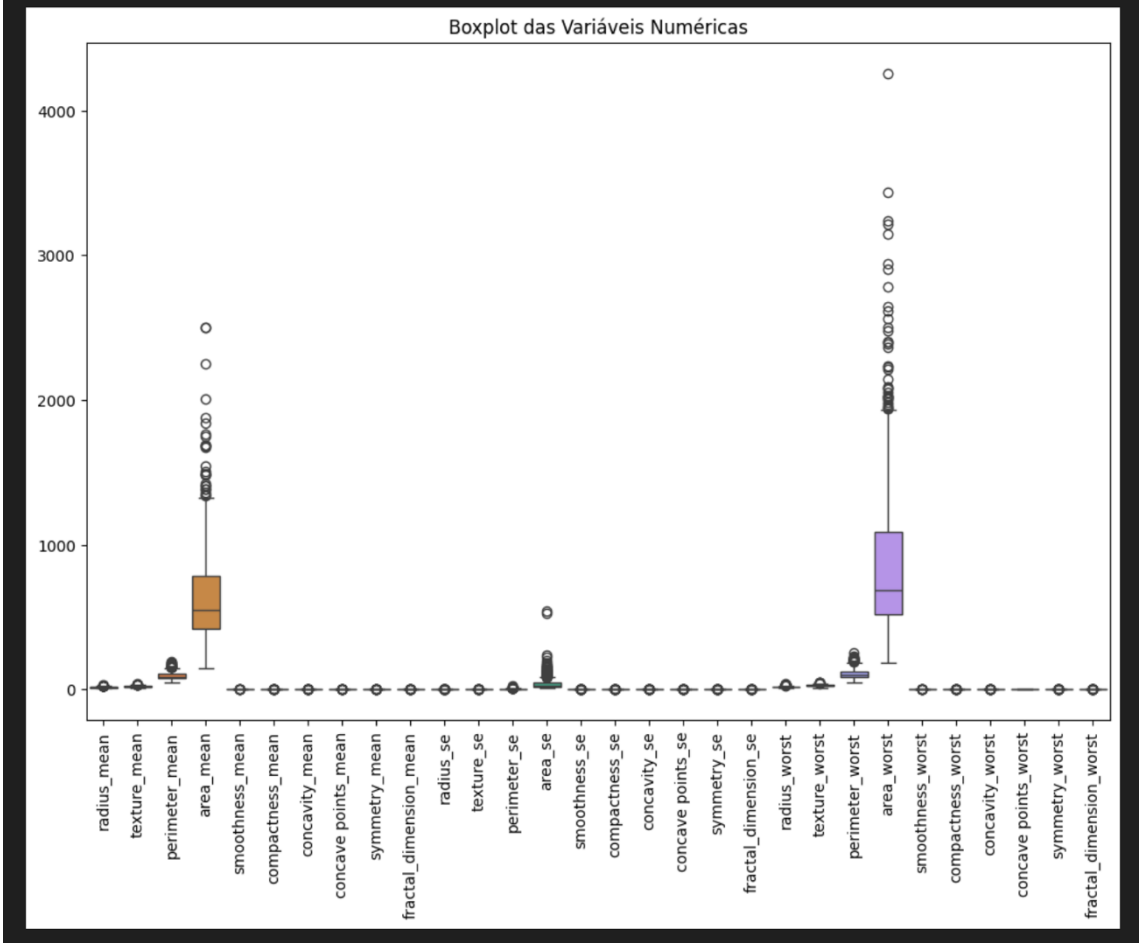



```
diagnosis
B    357
M    212
Name: count, dtype: int64
```

7- Mostra o gráfico de boxplot do dataset

```
plt.figure(figsize=(12,8))
sns.boxplot(data=data.drop(columns=['id', 'diagnosis', 'Unnamed: 32']))
plt.xticks(rotation=90)
plt.title('Boxplot das Variáveis Numéricas')
plt.show()
```

✓ 0.3s



8- Tem valores ausentes? Se sim quais?

```
missing_values = data.isnull().sum()
print("Valores ausentes:")
print(missing_values[missing_values > 0])
```

✓ 0.0s

```
Valores ausentes:
Unnamed: 32    569
dtype: int64
```

9- Realiza a padronização (standardization)

```
Clique para adicionar um ponto de interrupção 'Unnamed: 32', 'id'])

# Separando os dados em X (features) e y (alvo)
X = data_cleaned.drop(columns=['diagnosis'])
y = data_cleaned['diagnosis']

# Convertendo o rótulo de diagnóstico para valores binários (M = 1, B = 0)
y = y.map({'M': 1, 'B': 0})

# Padronizando os dados
scaler = StandardScaler()
X_scaled = scaler.fit_transform(X)

# Exibindo as primeiras linhas dos dados padronizados
pd.DataFrame(X_scaled, columns=X.columns).head()
✓ 0.0s
```

	radius_mean	texture_mean	perimeter_mean	area_mean	smoothness_mean	compactness_mean	concavity_mean	concave points_mean	symmetry_mean	fractal_dimension_mean	...	radius_worst	texture_worst	perimeter_worst	area_worst	smoothness_worst	compactness_worst	concavity_worst	concave points_worst	symmetry_worst	fractal_dimension_worst
0	1.097064	-2.073335	1.269934	0.984375	1.568466	3.283515	2.652874	2.532475	2.217515	2.255747	...	1.886900	-1.359293	2.303601	2.001237	1.307686	2.616665	2.109526	2.296076	2.750622	1.937015
1	1.829821	-0.353632	1.685955	1.908708	-0.826962	-0.487072	-0.023846	0.548144	0.001392	-0.868652	...	1.805927	-0.369203	1.535126	1.890489	-0.375612	-0.430444	-0.146749	1.087084	-0.243890	0.281190
2	1.579888	0.456187	1.566503	1.558884	0.942210	1.052926	1.363478	2.037231	0.939685	-0.398008	...	1.511870	-0.023974	1.347475	1.456285	0.527407	1.082932	0.854974	1.955000	1.152255	0.201391
3	-0.768909	0.253732	-0.592687	-0.764464	3.283553	3.402909	1.915897	1.451707	2.867383	4.910919	...	-0.281464	0.133984	-0.249939	-0.550021	3.394275	3.893397	1.989588	2.175786	6.046041	4.935010
4	1.750297	-1.151816	1.776573	1.826229	0.280372	0.539340	1.371701	1.428493	-0.009560	-0.562450	...	1.298575	-1.466770	1.338539	1.220724	0.220556	-0.313395	0.613179	0.729259	-0.868353	-0.397100

5 rows × 30 columns

10- Se tiver outlier fazer a remoção deles e mostrar o boxplot do dataset.

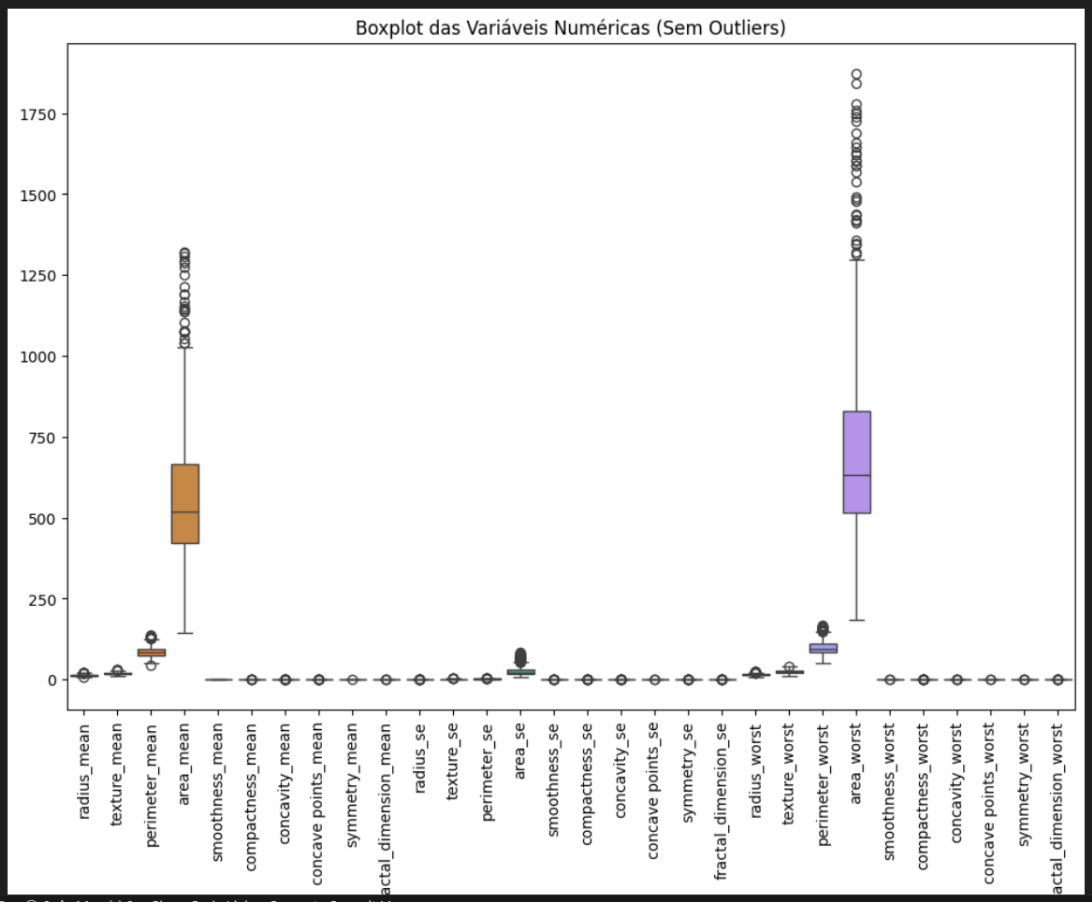
```python
# Calculando os quartis e o IQR
Q1 = data.drop(columns=['id', 'diagnosis', 'Unnamed: 32']).quantile(0.25)
Q3 = data.drop(columns=['id', 'diagnosis', 'Unnamed: 32']).quantile(0.75)
IQR = Q3 - Q1

# Definindo os limites
lower_bound = Q1 - 1.5 * IQR
upper_bound = Q3 + 1.5 * IQR

# Removendo os outliers
data_no_outliers = data.drop(columns=['id', 'diagnosis', 'Unnamed: 32']).mask(
    (data.drop(columns=['id', 'diagnosis', 'Unnamed: 32']) < lower_bound) |
    (data.drop(columns=['id', 'diagnosis', 'Unnamed: 32']) > upper_bound)
).dropna()

# Exibindo o novo boxplot
plt.figure(figsize=(12,8))
sns.boxplot(data=data_no_outliers)
plt.xticks(rotation=90)
plt.title('Boxplot das Variáveis Numéricas (Sem Outliers)')
plt.show()
```

✓ 0.3s



11- Dividir o dataset em training (80%) e testing (20%)

```python
X_train, X_test, y_train, y_test = train_test_split(X_scaled, y, test_size=0.2, random_state=42)
```

✓ 0.0s

12- Faz a classificação usando o algoritmo KNN com K = 3, K = 5, K = 7 e mostrar as métricas de accuracy, recall e precision para cada K.

```python
# Função para treinar e avaliar o modelo KNN com diferentes valores de K
def evaluate_knn(k):
    knn = KNeighborsClassifier(n_neighbors=k)
    knn.fit(X_train, y_train)
    y_pred = knn.predict(X_test)

    accuracy = accuracy_score(y_test, y_pred)
    recall = recall_score(y_test, y_pred)
    precision = precision_score(y_test, y_pred)

    print(f"K={k}: Accuracy={accuracy:.4f}, Recall={recall:.4f}, Precision={precision:.4f}")

# Avaliando o modelo KNN com K=3, K=5, e K=7
for k in [3, 5, 7]:
    evaluate_knn(k)
```

✓ 0.0s

```
K=3: Accuracy=0.9474, Recall=0.9302, Precision=0.9302
K=5: Accuracy=0.9474, Recall=0.9302, Precision=0.9302
K=7: Accuracy=0.9474, Recall=0.9302, Precision=0.9302
```