EDA

December 19, 2020

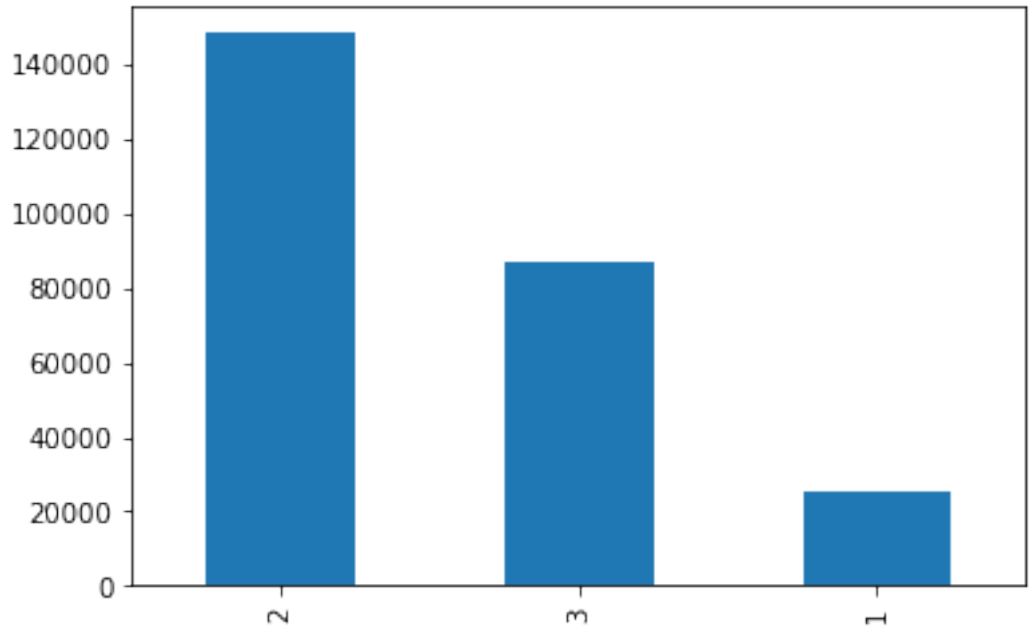
[1]:
```
import pandas as pd
import os
```

[2]:
```
path = "../input/"
os.listdir(path)
```

[2]:
```
['submission_format.csv',
 'train_values.csv',
 'train_labels.csv',
 'test_values.csv']
```

0.0.1 train_labels.csv

[3]:
```
train_labels = pd.read_csv(path+"train_labels.csv")
train_labels.damage_grade.value_counts().plot.bar();
```



0.1 train_values.csv

[4]:
```
train_values = pd.read_csv(path+"train_values.csv")
```

[5]:
```
train_values.head()
```

[5]:

	building_id	geo_level_1_id	geo_level_2_id	geo_level_3_id	count_floors_pre_eq	age	area_percentage	height_percentage	land_surface_condition	foundation_type	…	has_secondary_use_agriculture	has_secondary_use_hotel	has_secondary_use_rental	has_secondary_use_institution	has_secondary_use_school	has_secondary_use_industry	has_secondary_use_health_post
0	802906	6	487	12198	2	30	6	5	t	r	…	0	0	0	0	0	0	0
1	28830	8	900	2812	2	10	8	7	o	r	…	0	0	0	0	0	0	0
2	94947	21	363	8973	2	10	5	5	t	r	…	0	0	0	0	0	0	0
3	590882	22	418	10694	2	10	6	5	t	r	…	0	0	0	0	0	0	0
4	201944	11	131	1488	3	30	8	9	t	r	…	0	0	0	0	0	0	0

```
   has_secondary_use_gov_office  has_secondary_use_use_police  \
0                             0                             0
1                             0                             0
2                             0                             0
3                             0                             0
4                             0                             0

   has_secondary_use_other
0                        0
1                        0
2                        0
3                        0
4                        0

[5 rows x 39 columns]
```

[68]:
```
def describe_columns(df, label=None):

    import matplotlib.pyplot as plt
    import numpy as np
    import seaborn as sns

    ### Overview ###

    print("Shape:", df.shape, "\n")
    print("Unique dtypes:", df.dtypes.unique(), "\n")

    for dtype in df.dtypes.unique():
        print(f"{dtype}: # of columns", df.select_dtypes(include=dtype).
↪shape[1])
    print("\n")

    for col in df.columns:
        null_sum = df[col].isnull().sum()
        if null_sum>0:
            print(col, "% missing values:", df[col].isnull().sum()/df.shape[1])


    fig, ax1 = plt.subplots(figsize=(13,13))
    sns.heatmap(df.select_dtypes(exclude="object").drop(["building_id"],␣
↪axis=1).corr(), cbar=False, annot=True, fmt=".1f", ax=ax1)
    fig.suptitle("Numerical Features", fontsize=16)


    cnt=0
```

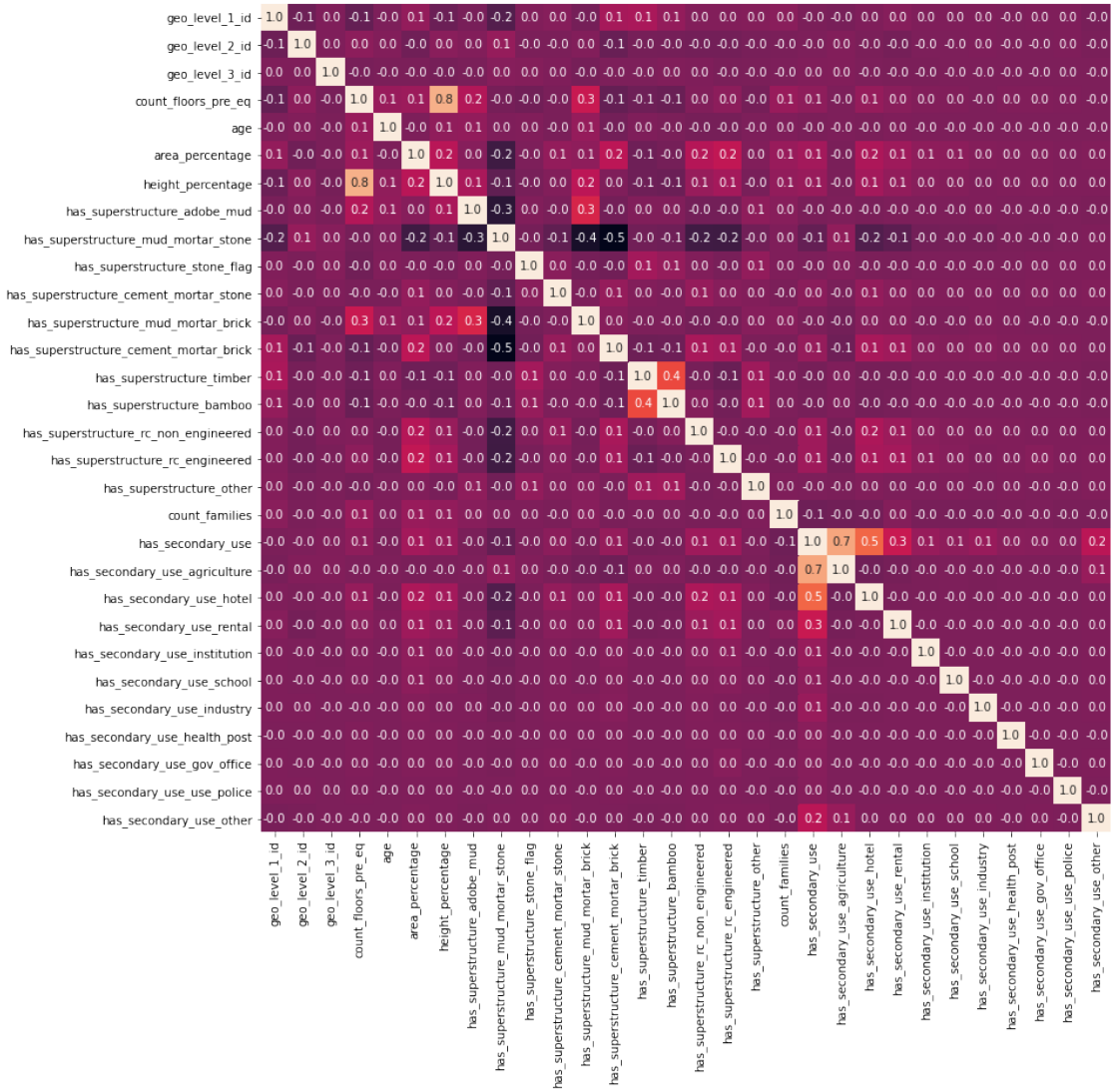
```
    for col in df.select_dtypes(exclude="object").drop(["building_id"], axis=1).
↪columns:
        if len(df[col].unique())==2:
            cnt+=1

    print("# Binary columns:", cnt)

    try:

        dummy_df = df.copy(deep=True)
        dummy_df["damage"] = label.values

        ### Categorical Columns ###

        categorical_levels = []
        label_variance = []

        for col in df.select_dtypes(include="object").columns:
            categorical_levels.append(len(df[col].unique()))

            label_variance.append(dummy_df.groupby(by=col)["damage"].var().
↪values)

        fig, [ax2, ax3, ax4] = plt.subplots(nrows=3, ncols=1, figsize=(18,13),␣
↪sharex=True)

        ax2.bar(x=range(df.select_dtypes(include="object").shape[1]),␣
↪height=categorical_levels)
        ax2.set_ylabel("Number of categorical\nlevels", fontsize=15)

        ax3.plot(list(map(lambda col_vals: np.mean(col_vals), label_variance)),␣
↪"o--")
        ax3.set_ylabel("Label variance\ngroup by column", fontsize=15)

        ax4.boxplot(label_variance, positions=range(df.
↪select_dtypes(include="object").shape[1]))
        ax4.set_ylabel("Label variance\ngrouped by column", fontsize=15)
        ax4.set_xticks(range(df.select_dtypes(include="object").shape[1]))
        ax4.set_xticklabels(df.select_dtypes(include="object").columns,␣
↪rotation=90, fontsize=13)

        fig.suptitle("Categorical Features", fontsize=16)

        ### Numerical Columns ###

        label_variance = []
```

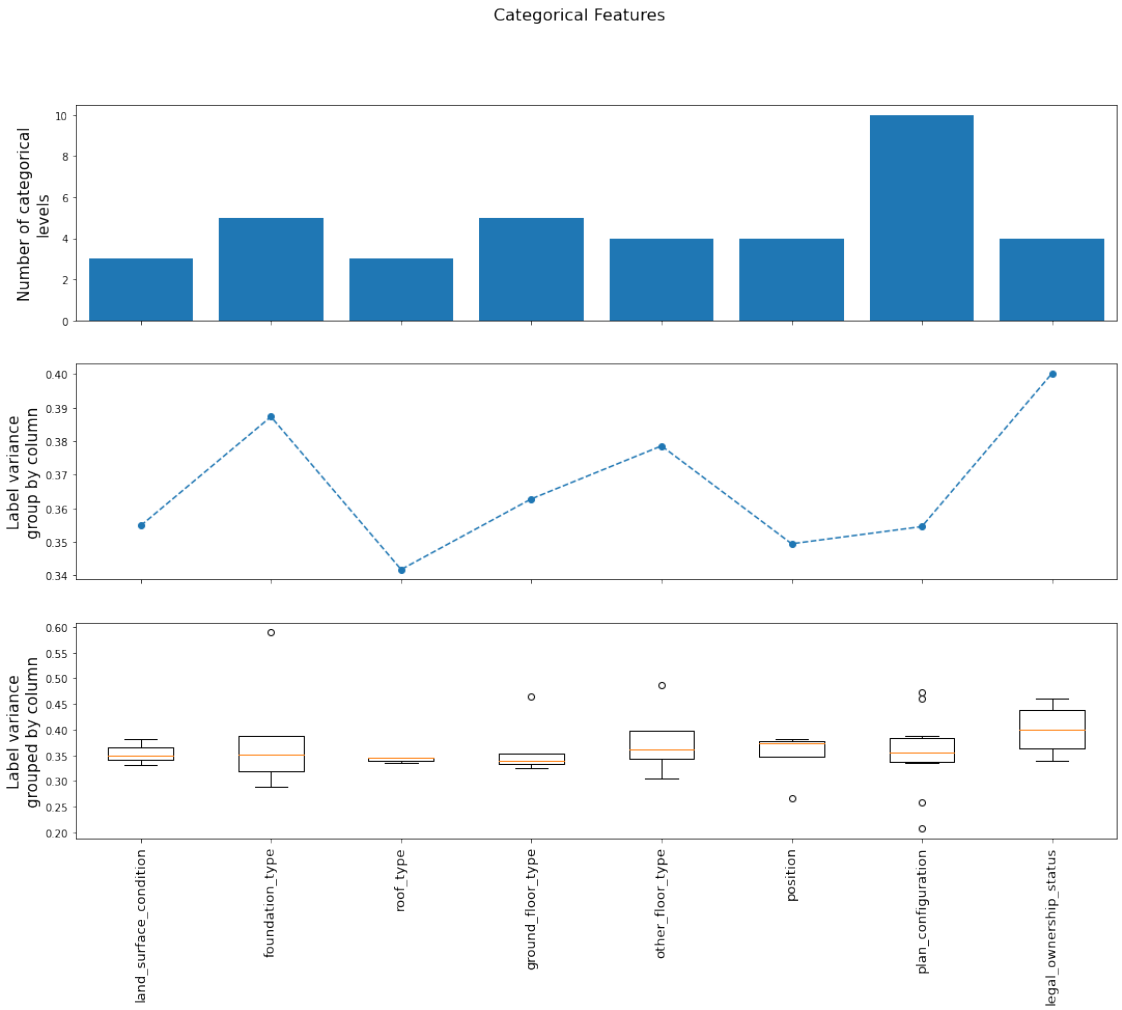
```
        binary_cols = []
        for col in df.select_dtypes(exclude="object").drop(["building_id"],␣
↪axis=1).columns:
            if len(df[col].unique())==2:
                label_variance.append(dummy_df.groupby(by=col)["damage"].var().
↪values)
                binary_cols.append(col)

        fig, ax5 = plt.subplots(figsize=(13,5))
        ax5.plot(list(map(lambda col_vals: col_vals[0], label_variance)),␣
↪"o--", alpha=0.3)
        ax5.plot(list(map(lambda col_vals: col_vals[1], label_variance)),␣
↪"o--", alpha=0.3)
        ax5.plot(list(map(lambda col_vals: np.mean(col_vals), label_variance)),␣
↪"o--")
        ax5.set_xticks(range(len(label_variance)))
        ax5.set_xticklabels(binary_cols, rotation=90)
        ax5.set_ylabel("Label variance\ngrouped by binary", fontsize=15)

    except:
        pass
```

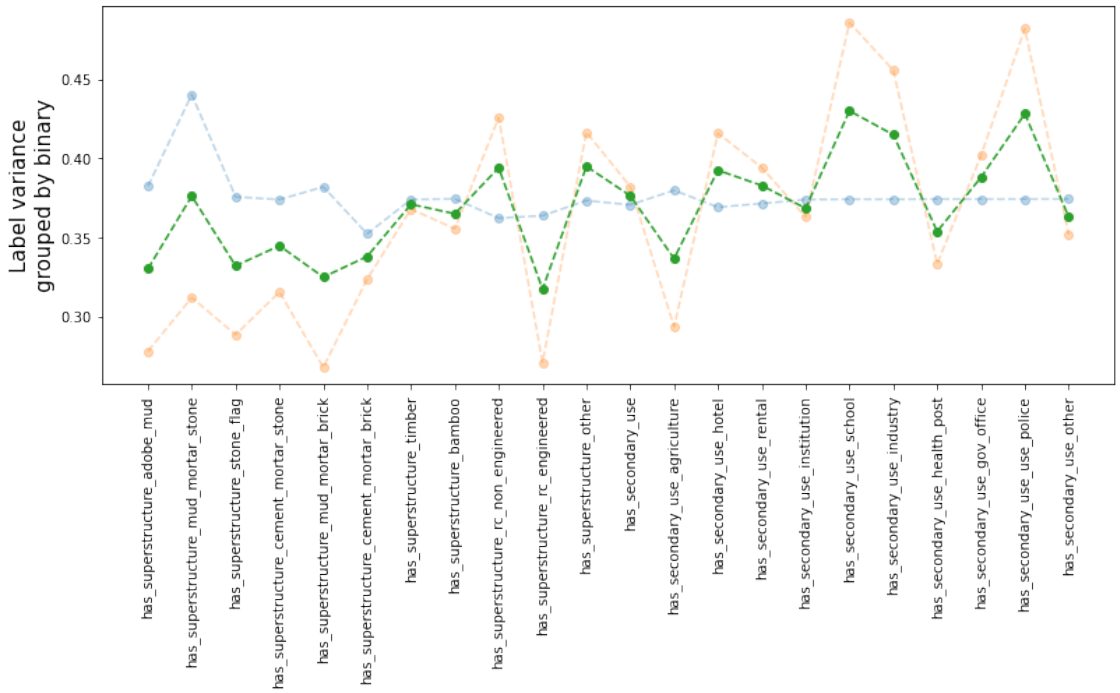
[69]:
```
describe_columns(train_values, train_labels["damage_grade"])
```

```
Shape: (260601, 39)

Unique dtypes: [dtype('int64') dtype('O')]

int64: # of columns 31
object: # of columns 8


# Binary columns: 22
```

Numerical Features




Categorical Features
Number of categorical levels
Label variance group by column
Label variance grouped by column
land_surface_condition
foundation_type
roof_type
ground_floor_type
other_floor_type
position
plan_configuration
legal_ownership_status



[ ]:

0.2 test_values.csv

[71]:
```
test_values = pd.read_csv(path+"test_values.csv")
```

[73]:
```
test_values.head()
```

[73]:

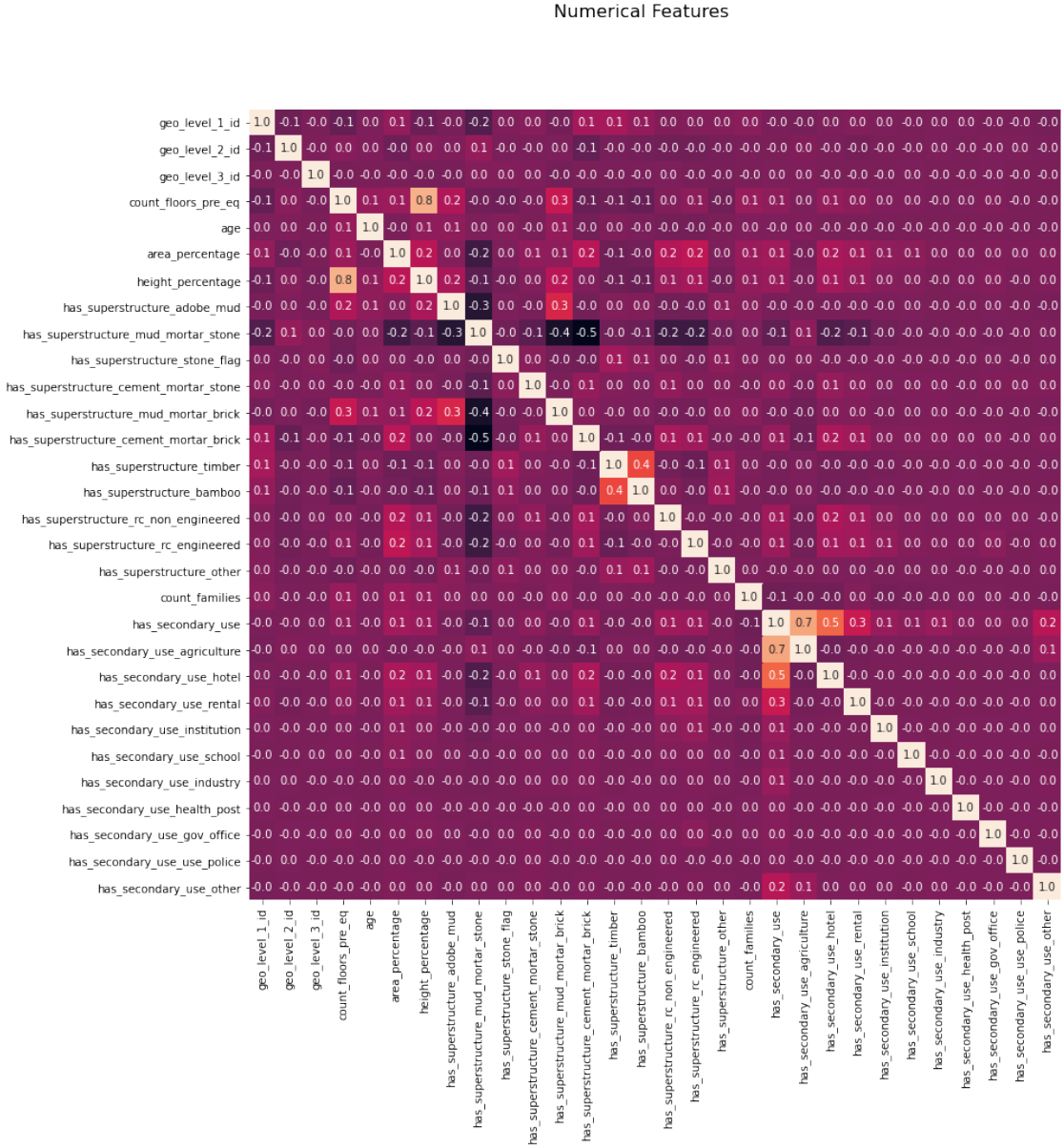
	building_id	geo_level_1_id	geo_level_2_id	geo_level_3_id	count_floors_pre_eq	age	area_percentage	height_percentage	land_surface_condition	foundation_type	…	has_secondary_use_agriculture
0	300051	17	596	11307	3	20	7	6	t	r	…	0
1	99355	6	141	11987	2	25	13	5				
2	890251	22	19	10044	2	5	4	5				
3	745817	26	39	633	1	0	19	3				
4	421793	17	289	7970	3	15	8	7				

```
1                     t              r  …                            1
2                     t              r  …                            0
3                     t              r  …                            0
4                     t              r  …                            0

  has_secondary_use_hotel has_secondary_use_rental  \
0                       0                        0
1                       0                        0
2                       0                        0
3                       0                        1
4                       0                        0

  has_secondary_use_institution has_secondary_use_school  \
0                             0                        0
1                             0                        0
2                             0                        0
3                             0                        0
4                             0                        0

   has_secondary_use_industry  has_secondary_use_health_post  \
0                           0                              0
1                           0                              0
2                           0                              0
3                           0                              0
4                           0                              0

   has_secondary_use_gov_office  has_secondary_use_use_police  \
0                             0                             0
1                             0                             0
2                             0                             0
3                             0                             0
4                             0                             0

   has_secondary_use_other
0                        0
1                        0
2                        0
3                        0
4                        0

[5 rows x 39 columns]
```

[74]:
```
describe_columns(test_values)
```

```
Shape: (86868, 39)

Unique dtypes: [dtype('int64') dtype('O')]
```

```
int64: # of columns 31
object: # of columns 8


# Binary columns: 22
```



[ ]: