Anticipating earthquake disasters in Mexico (Predicting probability of occurrence)

Model metrics file

Five models were trained during this project. The chosen model was the following:

Random Survival Forest model

Parameters and hyperparameters:

- n_estimators=100
- max_depth=None
- min_samples_split=6
- min_samples_leaf=3
- min_weight_fraction_leaf=0.0
- max_features='auto'
- max_leaf_nodes=None
- random_state=0

'X' dataset rows and features:

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 16424 entries, 0 to 39936
Data columns (total 78 columns):
 #   Column               Non-Null Count  Dtype
---  ------               --------------  -----
 0   Month=10             16424 non-null  float64
 1   Month=11             16424 non-null  float64
 2   Month=12             16424 non-null  float64
 3   Month=2              16424 non-null  float64
 4   Month=3              16424 non-null  float64
 5   Month=4              16424 non-null  float64
 6   Month=5              16424 non-null  float64
 7   Month=6              16424 non-null  float64
 8   Month=7              16424 non-null  float64
 9   Month=8              16424 non-null  float64
 10  Month=9              16424 non-null  float64
 11  Day=10               16424 non-null  float64
 12  Day=11               16424 non-null  float64
 13  Day=12               16424 non-null  float64
 14  Day=13               16424 non-null  float64
 15  Day=14               16424 non-null  float64
 16  Day=15               16424 non-null  float64
 17  Day=16               16424 non-null  float64
 18  Day=17               16424 non-null  float64
 19  Day=18               16424 non-null  float64
 20  Day=19               16424 non-null  float64
```

```
21  Day=2                16424 non-null  float64
22  Day=20               16424 non-null  float64
23  Day=21               16424 non-null  float64
24  Day=22               16424 non-null  float64
25  Day=23               16424 non-null  float64
26  Day=24               16424 non-null  float64
27  Day=25               16424 non-null  float64
28  Day=26               16424 non-null  float64
29  Day=27               16424 non-null  float64
30  Day=28               16424 non-null  float64
31  Day=29               16424 non-null  float64
32  Day=3                16424 non-null  float64
33  Day=30               16424 non-null  float64
34  Day=31               16424 non-null  float64
35  Day=4                16424 non-null  float64
36  Day=5                16424 non-null  float64
37  Day=6                16424 non-null  float64
38  Day=7                16424 non-null  float64
39  Day=8                16424 non-null  float64
40  Day=9                16424 non-null  float64
41  Magnitude            16424 non-null  float64
42  Latitude             16424 non-null  float64
43  Longitude            16424 non-null  float64
44  Depth                16424 non-null  float64
45  State=BCS            16424 non-null  float64
46  State=CAMP           16424 non-null  float64
47  State=CDMX           16424 non-null  float64
48  State=CHIH           16424 non-null  float64
49  State=CHIS           16424 non-null  float64
50  State=COAH           16424 non-null  float64
51  State=COL            16424 non-null  float64
52  State=DGO            16424 non-null  float64
53  State=GRO            16424 non-null  float64
54  State=GTO            16424 non-null  float64
55  State=HGO            16424 non-null  float64
56  State=JAL            16424 non-null  float64
57  State=MEX            16424 non-null  float64
58  State=MICH           16424 non-null  float64
59  State=MOR            16424 non-null  float64
60  State=NAY            16424 non-null  float64
61  State=NL             16424 non-null  float64
62  State=OAX            16424 non-null  float64
63  State=PUE            16424 non-null  float64
64  State=QR             16424 non-null  float64
65  State=QRO            16424 non-null  float64
66  State=SIN            16424 non-null  float64
67  State=SLP            16424 non-null  float64
68  State=SON            16424 non-null  float64
69  State=TAB            16424 non-null  float64
70  State=TAMS           16424 non-null  float64
71  State=TLAX           16424 non-null  float64
72  State=VER            16424 non-null  float64
73  State=YUC            16424 non-null  float64
74  State=ZAC            16424 non-null  float64
```

```
 75  Plate=north_america  16424 non-null  float64
 76  Plate=pacific        16424 non-null  float64
 77  Plate=rivera         16424 non-null  float64
dtypes: float64(78)
memory usage: 10.4 MB
```

'y' label dataset:

The label dataset was a structured array with the following dtypes and shape.

```
dtype([('Status', '?'), ('Time_to_event', '<f8')])

shape: (16424,)
```

Performance metrics of the chosen model and the additional models for comparison:

Model	CI_IPCW	AUC	IBS
CPH	0.766	0.562	-
OOB RSF (chosen model)	**0.845**	**0.893**	**0.106**
Optimized RSF	0.829	0.839	0.108
OOB GBS	0.811	0.710	-
Optimized GBS	0.819	0.795	0.120