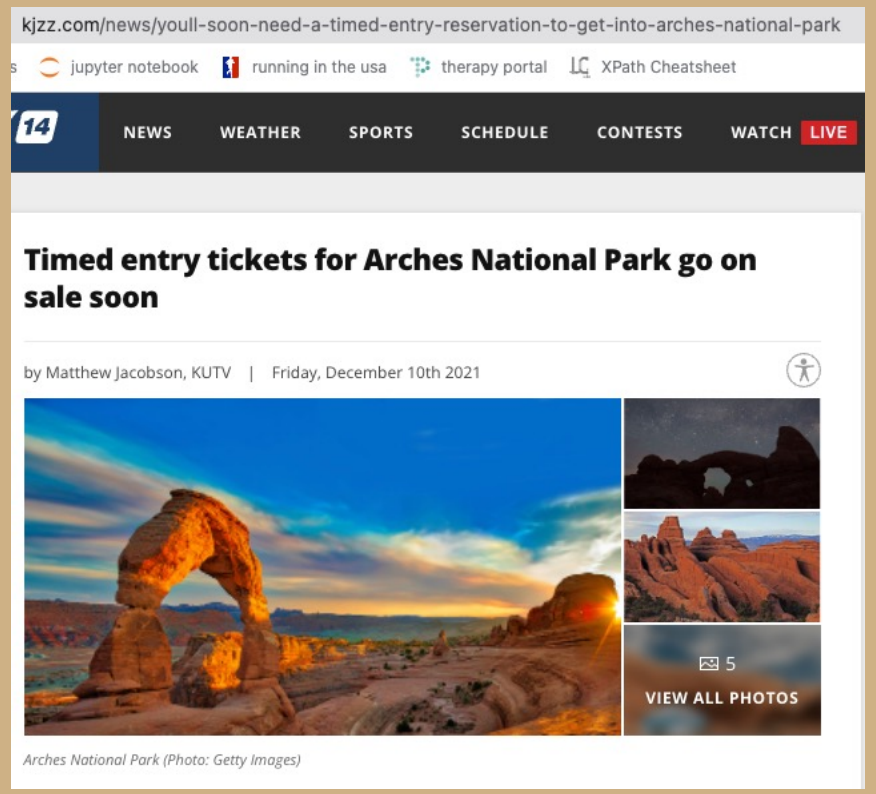
Turransky Regression Project

An assessment on public National Park trail data

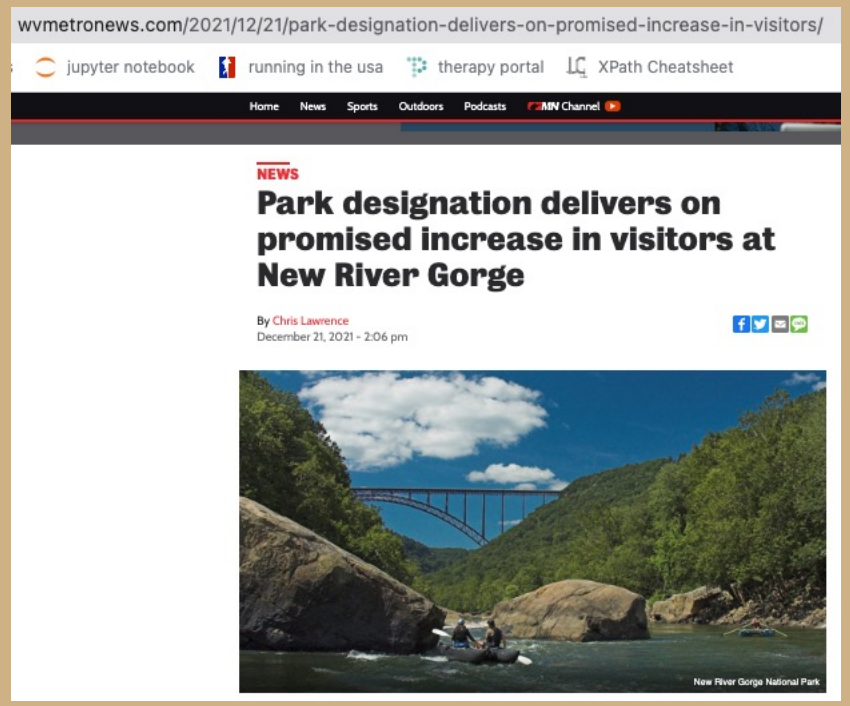
Introduction

- There are 63 sites declared by Congress as a US National Parks
- National Park designation helps provide adequate protection of the area’s resources.
- As new land areas are designated as National Parks, they see a surge in attendance.
- More hikers means more maintenance, security etc. are needed.
- Knowing what draws hikers to a trail will help new areas plan accordingly

Hiker attendance is a big issue for old and new national parks!



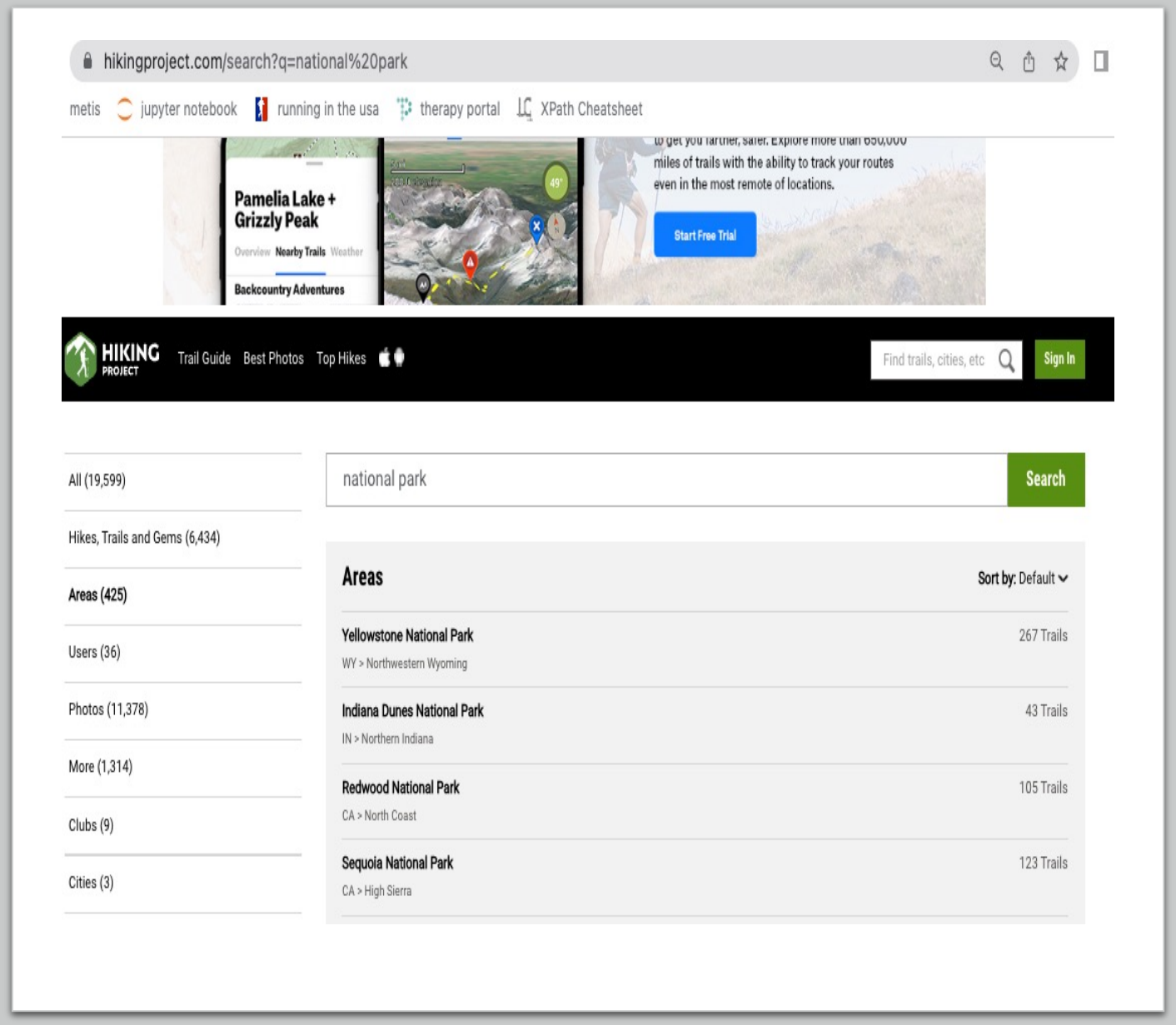
Arches, Zion and other national parks saw such an influx in visitors during the pandemic they had to implement restrictive measures liked timed entry tickets or a lottery to do certain hikes.



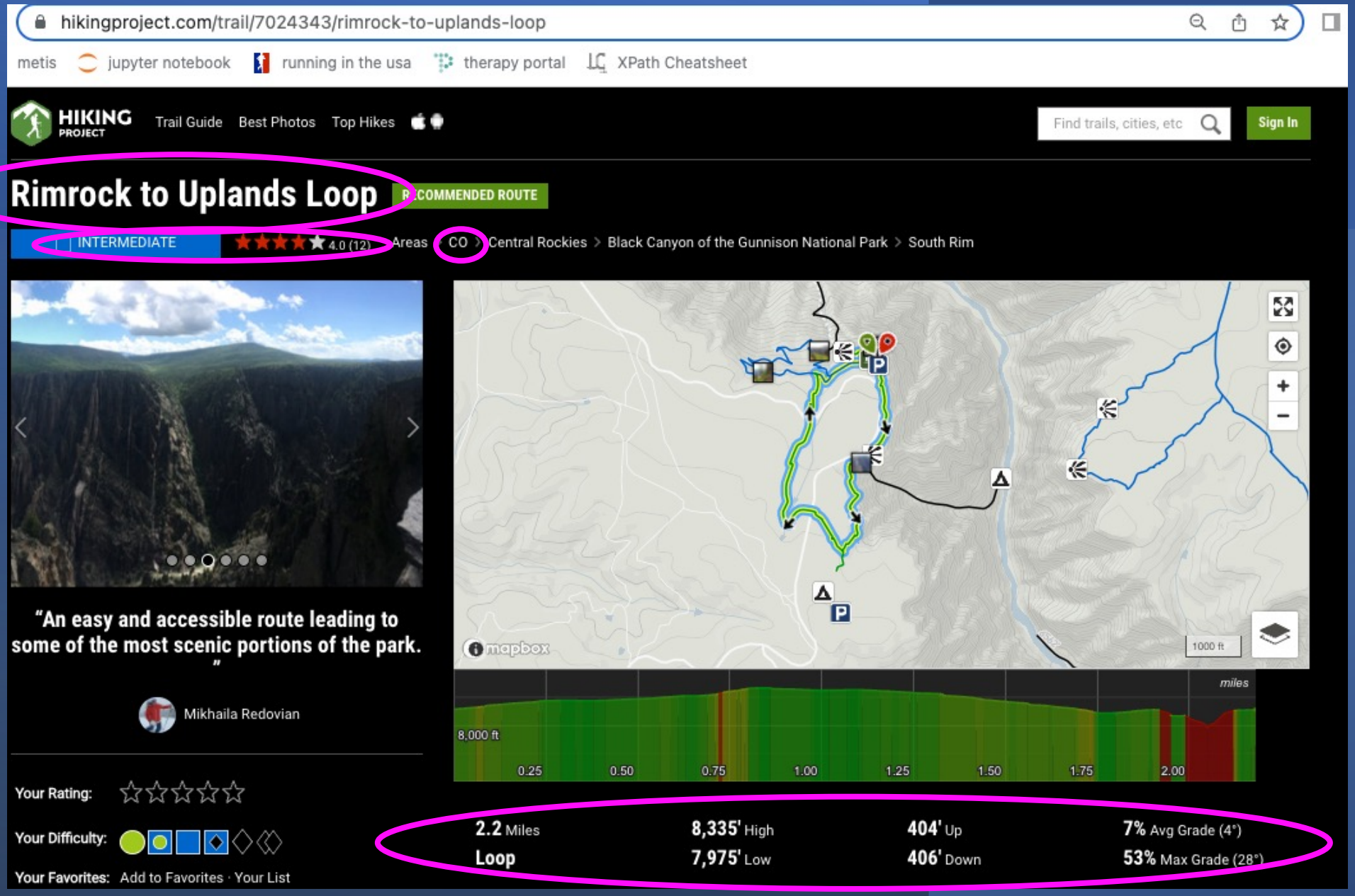
From the above website:…"Officials promised there would be at least a 20 percent increase in traffic and visitation in the year the park designation is added. …visitor numbers have jumped well over 20 percent for 2021."

Methodology

- Used Selenium to dynamically navigate HikingProject.com to get individual national park websites and websites for each trail at each national park
- Used beautiful soup to parse HTML code for desired data.



Sample trail page and some details scraped:



All Scraped Details

- Features:
  1. Park Name
  2. Trail Website
  3. Trail difficulty
  4. Average Rating of the trail
  5. Number of people who rated the trail
  6. Distance in miles
  7. High elevation
  8. Low elevation
  9. Distance hiker goes uphill
  10. Distance hiker goes downhill
  11. Trail type (loop, out and back etc.)
  12. Average grade (%)
  13. Max grade(%)
  14. Checkins
  15. State
  16. Dog policy

```
: np_trail_df.info()

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2938 entries, 0 to 2937
Data columns (total 18 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   Unnamed: 0        2938 non-null   int64
 1   index             2938 non-null   object
 2   park_name         2938 non-null   object
 3   website           2938 non-null   object
 4   difficulty        2938 non-null   object
 5   avg_rating        2938 non-null   float64
 6   num_raters        2938 non-null   int64
 7   distance_(miles)  2938 non-null   float64
 8   high_(ft)         2938 non-null   int64
 9   low_(ft)          2938 non-null   int64
 10  up(ft)            2938 non-null   int64
 11  down(ft)          2938 non-null   int64
 12  trail_type        2938 non-null   object
 13  average_grade(%)  2938 non-null   int64
 14  max_grade(%)      2938 non-null   int64
 15  checkins          2938 non-null   int64
 16  State             2938 non-null   object
 17  dog_policy        2881 non-null   object
```

Regression Methodology Highlights

Performed Train/Validation/Test separation on model

Utilized dummy variables to assess categorical non-numeric values.

Grouped parks by regions

Measured improvements on R-Squared using stat model and Sklearn

Target was number of people who rated each trail. The more people who hike a trail, the more ratings a trail will have. Since the website did not have a ‘completed’ option this next best correlated well with our target.

Improvements in R_squared for Training and Validation data

How it started

```
fit_train=trail_model_t.fit()
fit_train.summary()
```

3]:

OLS Regression Results

Dep. Variable:	num_raters	**R-squared:**	0.081
Model:	OLS	**Adj. R-squared:**	0.074
Method:	Least Squares	**F-statistic:**	11.55
Date:	Tue, 17 May 2022	**Prob (F-statistic):**	8.21e-16
Time:	15:41:31	**Log-Likelihood:**	-3950.5
No. Observations:	1060	**AIC:**	7919.
Df Residuals:	1051	**BIC:**	7964.
Df Model:	8		
Covariance Type:	nonrobust		

Initial Train R_squared: 0.081
Initial Validate R_squared: 0.070

How it ended

```
2]: newX=X_train.drop(columns=['Trail_name','checkins', 'park_name', 'website', 'trail_type',
    test_model=sm_model_stats(newX,y_train)
```

OLS Regression Results

Dep. Variable:	num_raters	R-squared:	0.114
Model:	OLS	Adj. R-squared:	0.099
Method:	Least Squares	F-statistic:	7.458
Date:	Tue, 17 May 2022	Prob (F-statistic):	1.79e-18
Time:	15:42:05	Log-Likelihood:	-3930.9
No. Observations:	1060	AIC:	7900.
Df Residuals:	1041	BIC:	7994.
Df Model:	18		
Covariance Type:	nonrobust		

Final Train R_squared: 0.114 (+0.033)
Initial Validate R_squared: 0.097 (+0.027)

Train + validate model vs test data results

- Train and Validation data combined resulted in a R_squared score of 0.119.
- Running the above model on test data resulted in a R_squared score of 0.124.
- Features that had the largest impact on number of raters:
  - Average rating
  - Distance
  - Location (Parks in Colorado Plateau region (including Zion, Grand Canyon, Arches etc.) did especially well

Future Model Evaluation

- In December 2020, congress designated 72,808 acres of land in WV as New River Gorge National Park.
- Because of how recent this happened, Hikingproject.com did not have that park on the list of National Parks.
- This data could be scraped at a later time and compared against the trail model for further testing/validation of the model.