



Reasons

- Raining heavily



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- **Intensely hot day**



Reasons

- Raining heavily
- Intensely hot day
- **Wind is particularly strong**





**How does the weather influence
the usage of these bikes?**

Healthy

Eco-friendly



Climate Impact on Urban Mobility

Analyzing Bike-Sharing Demand

- Temperature
- Humidity
- Wind speed

Content



- Data Sources
- Data Pipeline
- Methodology
- Results
 - Exploratory Data Analysis (EDA)
 - Correlation Analysis
- Findings
- Limitations



Datasets

Capital Bikeshare [6]

- Washington DC, USA
- 2011 – 2012
- 17,379 Samples



Seoul Bikeshare [7]

- Seoul, South Korea
- 2017 – 2018
- 8,760 Samples

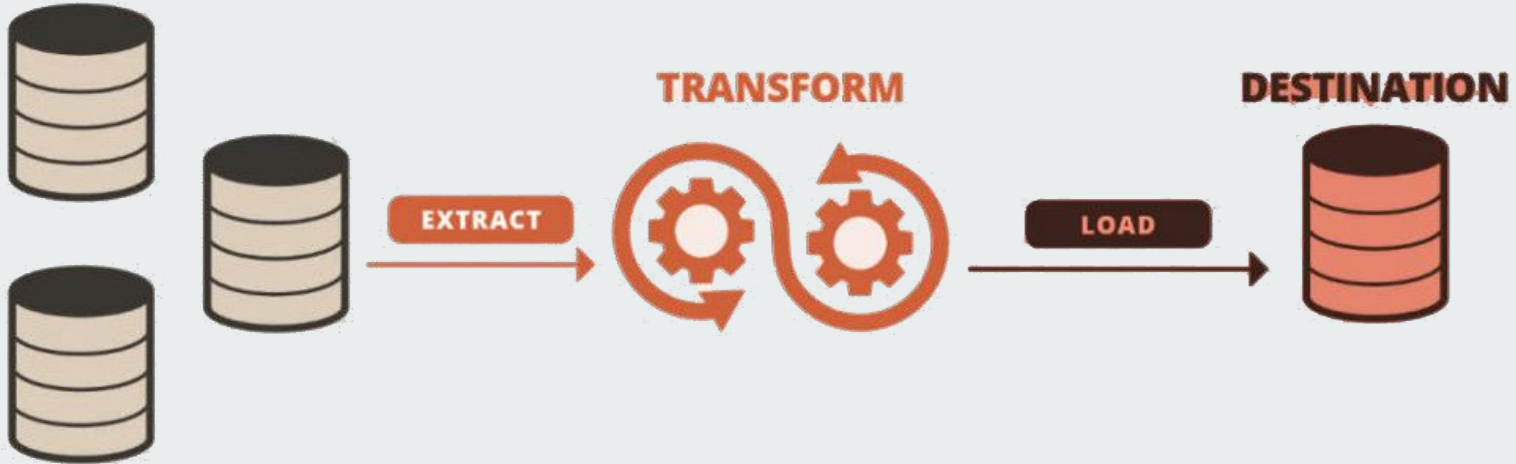


Pipeline

- Python
- ETL Pipeline Architecture

ETL Architecture [8]

SOURCE SYSTEMS



Datasets (Pipeline output)



Dataset Characteristics

- No significant missing
- No irrelevant features
- Min-max Normalized

Capital Bikeshare

	dteday	season	yr	mnth	hr	holiday	weekday	workingday	weathersit	temp	atemp	hum	windspeed	casual	registered	cnt
0	2011-01-01	1	0	1	0	0	6	0	1	0.24	0.2879	0.81	0.0	3	13	16
1	2011-01-01	1	0	1	1	0	6	0	1	0.22	0.2727	0.80	0.0	8	32	40
2	2011-01-01	1	0	1	2	0	6	0	1	0.22	0.2727	0.80	0.0	5	27	32
3	2011-01-01	1	0	1	3	0	6	0	1	0.24	0.2879	0.75	0.0	3	10	13
4	2011-01-01	1	0	1	4	0	6	0	1	0.24	0.2879	0.75	0.0	0	1	1

Seoul Bikeshare

	Date	Rented Bike Count	Hour	temp	hum	windspeed	Visibility (10m)	Dew point temperature(°C)	Solar Radiation (MJ/m2)	Rainfall(mm)	Snowfall (cm)	Seasons	Holiday	Functioning Day	yr	cnt
0	2017-12-01	254	0	0.220280	0.377551	0.297297	2000	-17.6	0.0	0.0	0.0	Winter	No Holiday	Yes	2017	254
1	2017-12-01	204	1	0.215035	0.387755	0.108108	2000	-17.6	0.0	0.0	0.0	Winter	No Holiday	Yes	2017	204
2	2017-12-01	173	2	0.206294	0.397959	0.135135	2000	-17.7	0.0	0.0	0.0	Winter	No Holiday	Yes	2017	173
3	2017-12-01	107	3	0.202797	0.408163	0.121622	2000	-17.6	0.0	0.0	0.0	Winter	No Holiday	Yes	2017	107
4	2017-12-01	78	4	0.206294	0.367347	0.310811	2000	-18.6	0.0	0.0	0.0	Winter	No Holiday	Yes	2017	78

Methodology

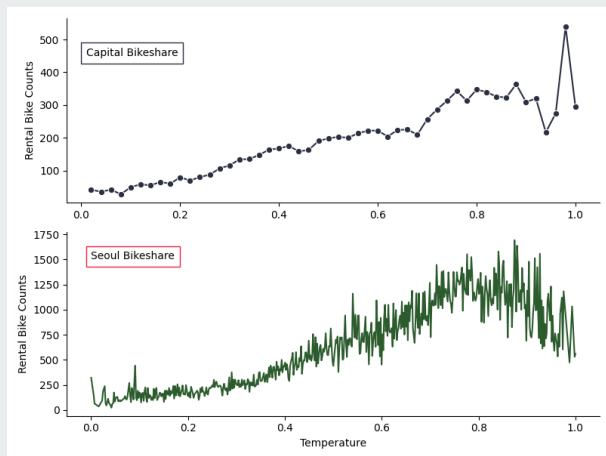


Technique Used

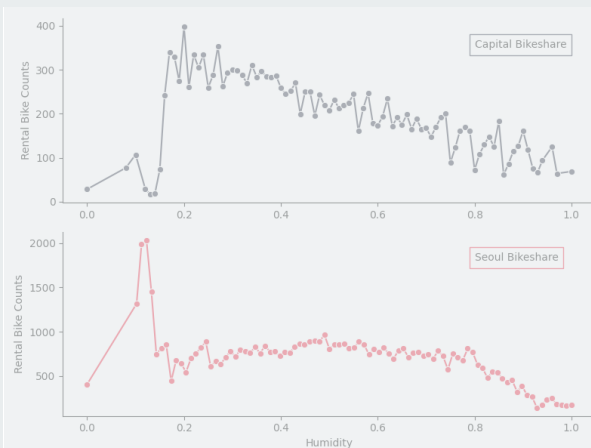
- Exploratory Data Analysis
- Correlation Analysis

Results: Exploratory Data Analysis

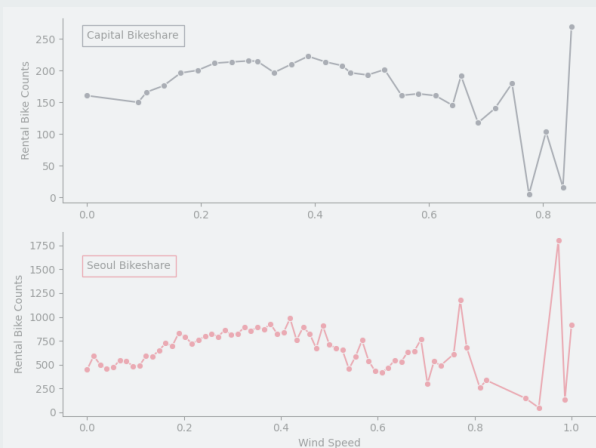
Temperature vs. Bike rental counts



Humidity vs. Bike rental counts

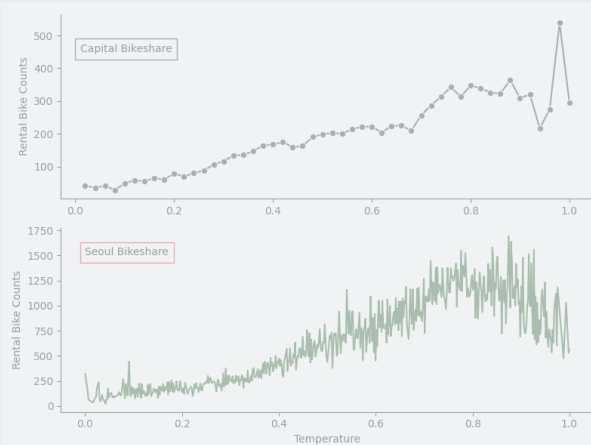


Windspeed vs. Bike rental counts

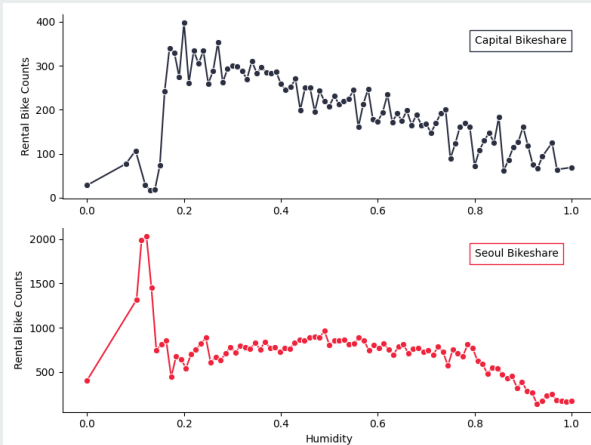


Results: Exploratory Data Analysis

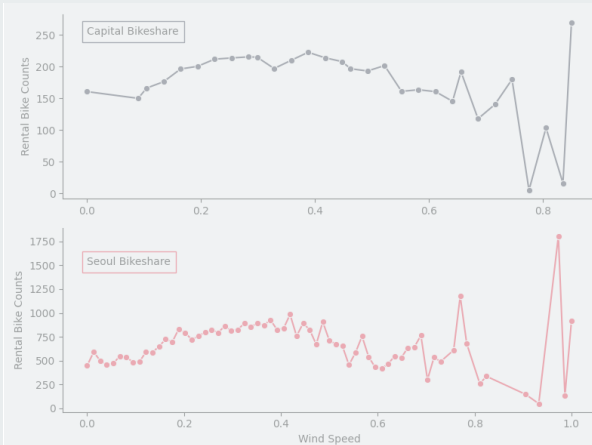
Temperature vs. Bike rental counts



Humidity vs. Bike rental counts

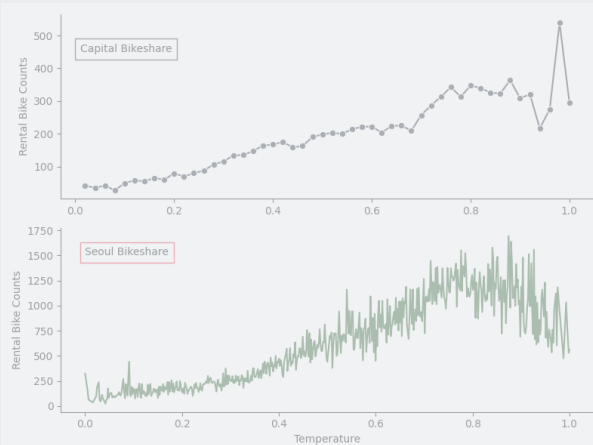


Windspeed vs. Bike rental counts

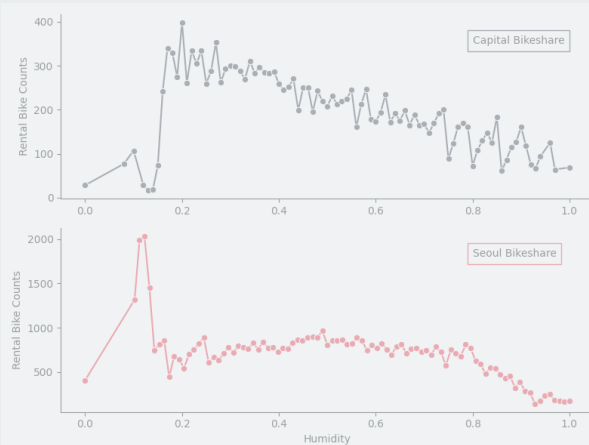


Results: Exploratory Data Analysis

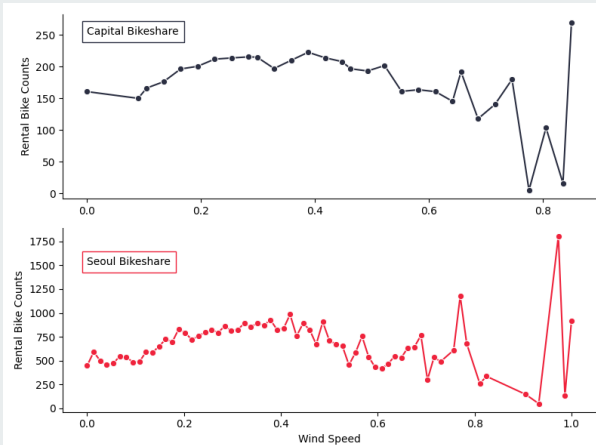
Temperature vs. Bike rental counts



Humidity vs. Bike rental counts



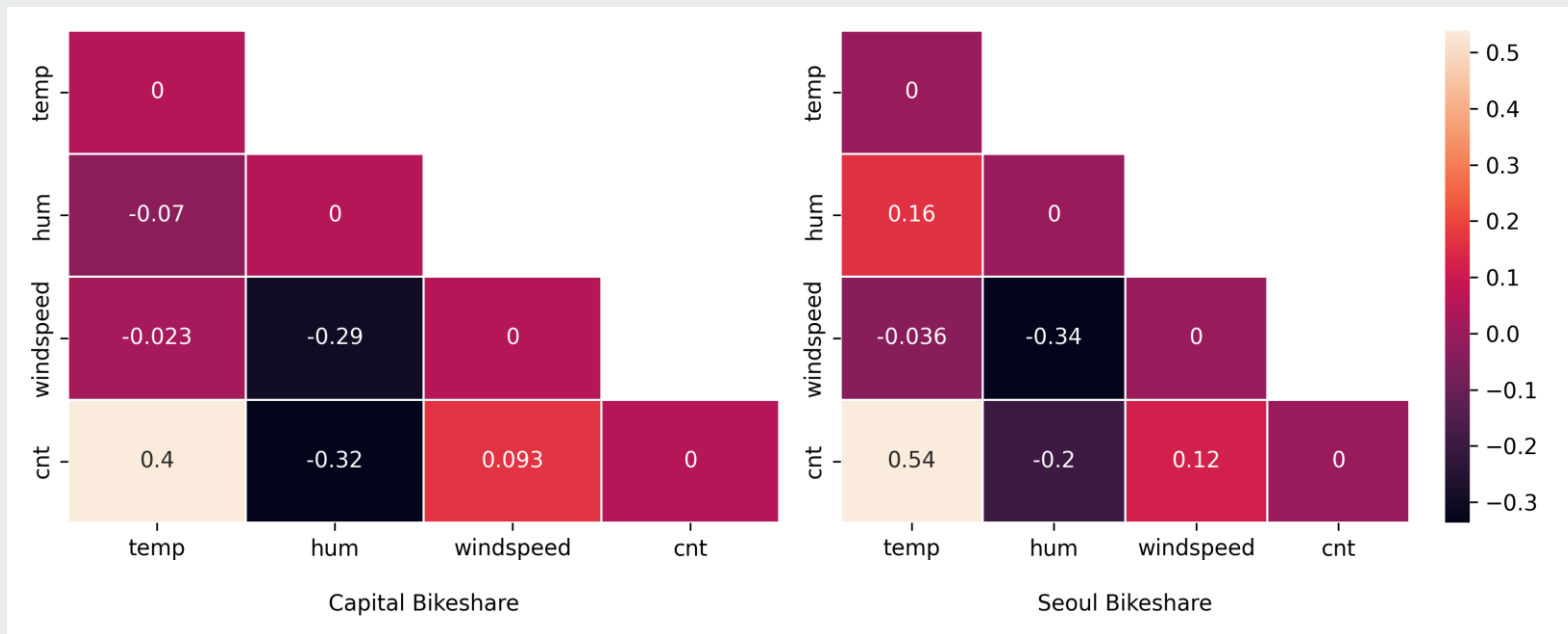
Windspeed vs. Bike rental counts



Results: Correlation Analysis



Heatmap of Weather Effects on Bike Rentals



Findings



Findings

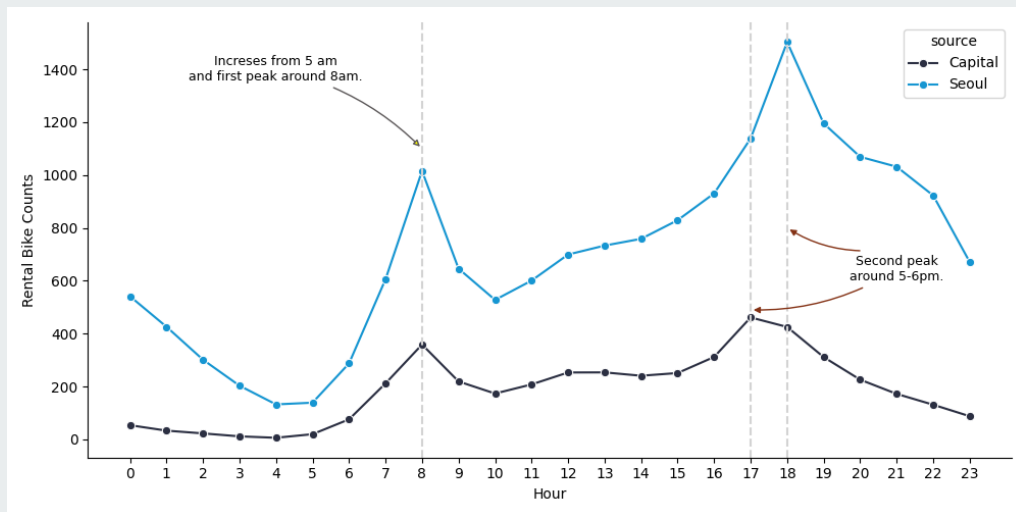
- Strong and clear relationship between climate and bike rentals
- Temperature has a significant positive importance
- Humidity negatively impacts bike rentals
- Less impact for Windspeed

This is NOT enough!

Limitations

- Limited to specific regions: USA & South Korea.
- Didn't include other weather factors such as rainfall, snowfall, seasonal changes, etc.
- Time of the day plays a significant role in rental behavior.

Hour vs. Bike rental counts



Thank You.

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References:

- [1] Frankie Fouganthin, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=427143>
- [2] Flickr photo by Ed Yourdon <https://flickr.com/photos/yourdon/4215944778> shared under a Creative Commons (BY-NC-SA) license
- [3] Cluster Health by Umwelt Bundesamt <https://www.umweltbundesamt.de/en/topics/climate-energy/climate-impacts-adaptation/adaption-to-climate-change/adaptation-at-the-federal-level/adaptation-action-plan/cluster-health>
- [4] Sander.v.Ginkel, CC BY-SA 4.0, <https://commons.wikimedia.org/w/index.php?curid=37248255>
- [5] Von jcrakow - originally posted to Flickr as Bike share, CC BY 2.0, <https://commons.wikimedia.org/w/index.php?curid=11507671>
- [6] Fanaee-T,Hadi. (2013). Bike Sharing. UCI Machine Learning Repository. <https://doi.org/10.24432/C5W894>
- [7] Seoul Bike Sharing Demand. (2020). UCI Machine Learning Repository. <https://doi.org/10.24432/C5F62R>
- [8] "Data Pipeline Architecture - A Deep Dive | StreamSets," Software AG. (accessed Jun. 03, 2024).