



Reasons

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- **Intensely hot day**



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



A still from the movie Toy Story showing Woody and Buzz Lightyear. Woody is on the left, looking slightly concerned. Buzz is on the right, wearing his green and white space suit, with his arms outstretched in a reassuring gesture. The background is a simple room with a door and some toys on the floor.

IT'S OK

YOU'RE NOT ALONE

makeameme.org



**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
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Datasets

Capital Bikeshare [6]

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



Seoul Bikeshare [7]

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



Sources:

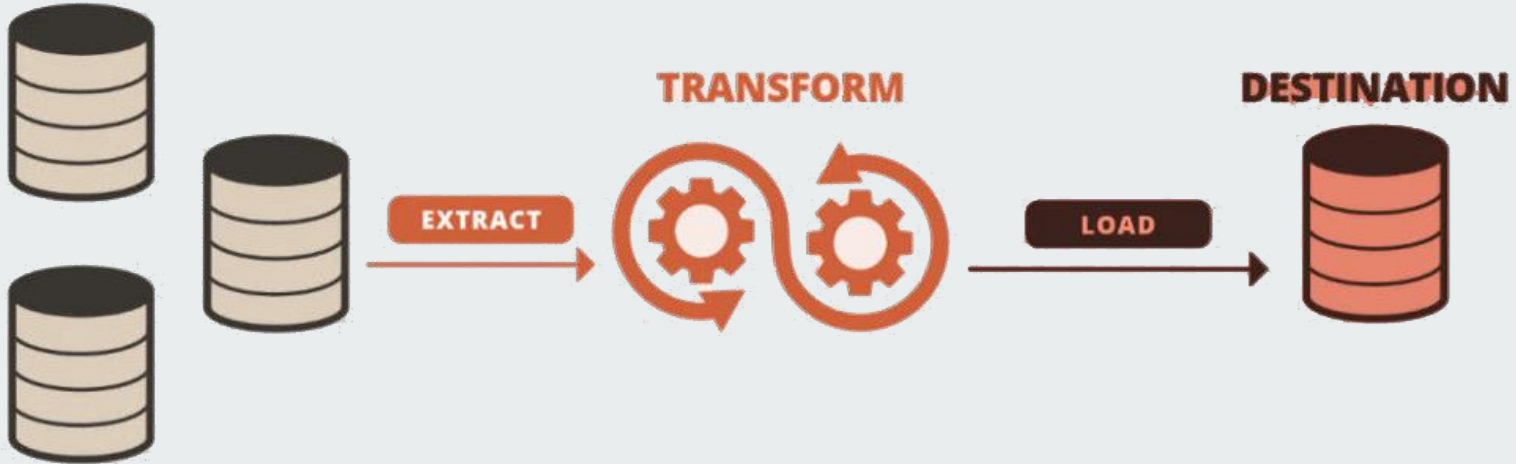
- UCI Machine Learning Repository

Pipeline

- Python
- ETL Pipeline Architecture

ETL Architecture [8]

SOURCE SYSTEMS



Datasets (Pipeline output)

Dataset Characteristics

- No significant missing
- No irrelevant features
- Filled with backfill
- Min-max Normalized

Data Quality

- Accuracy
- Timeliness
- Relevancy

Capital Bikeshare

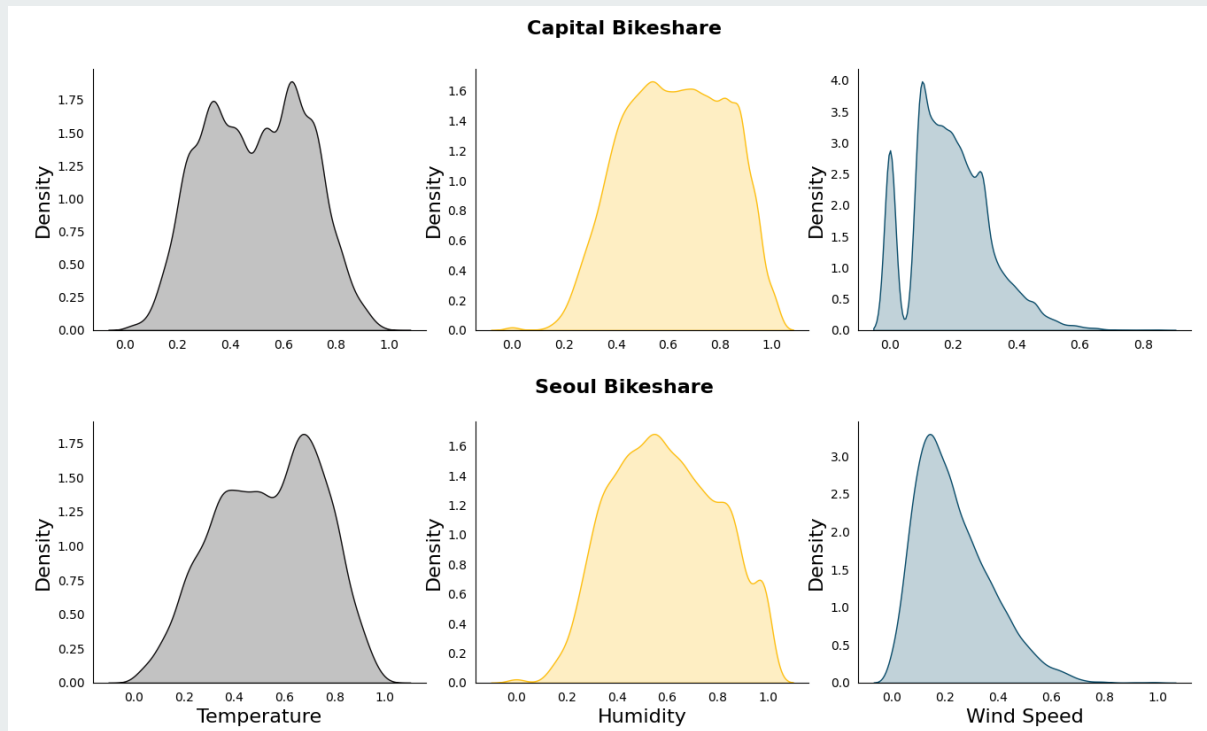
	dteday	season	yr	mnth	hr	holiday	weekday	workingday	weathersit	temp	atemp	hum	windspeed	casual	registered	cnt
0	2011-01-01	1	0	1	0	0	6	0	1	0.24	0.2879	0.81	0.0	3	13	16
1	2011-01-01	1	0	1	1	0	6	0	1	0.22	0.2727	0.80	0.0	8	32	40
2	2011-01-01	1	0	1	2	0	6	0	1	0.22	0.2727	0.80	0.0	5	27	32
3	2011-01-01	1	0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

Feature Distributions

- Temperature and Humidity approximates normal distribution (bell-shaped curves)
- Wind speed is right-skewed.



Methodology

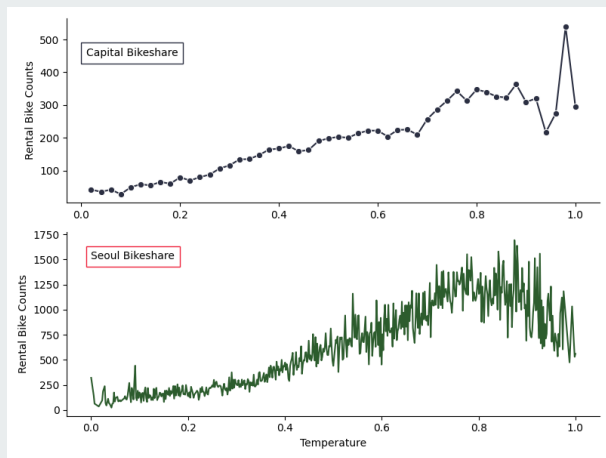


Technique Used

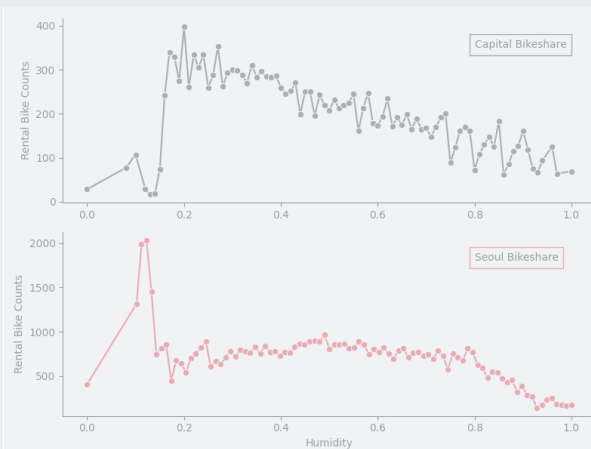
- Exploratory Data Analysis
- Correlation Analysis

Results: Exploratory Data Analysis

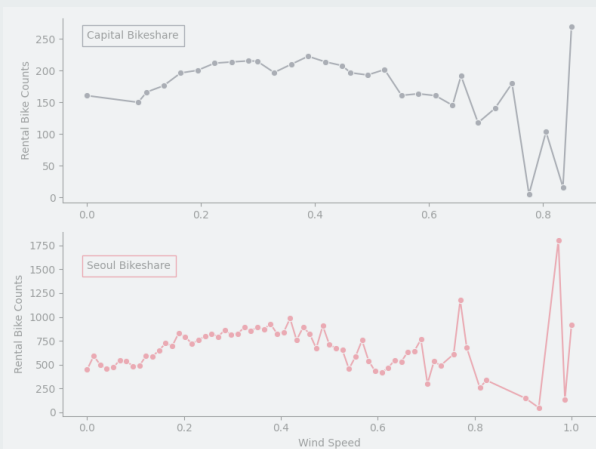
Temperature vs. Bike rental counts



Humidity vs. Bike rental counts

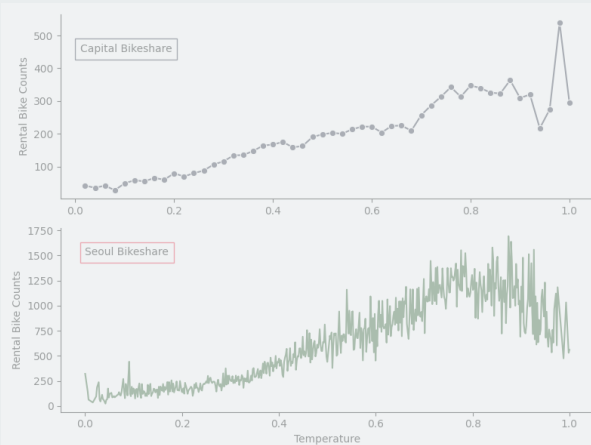


Windspeed vs. Bike rental counts

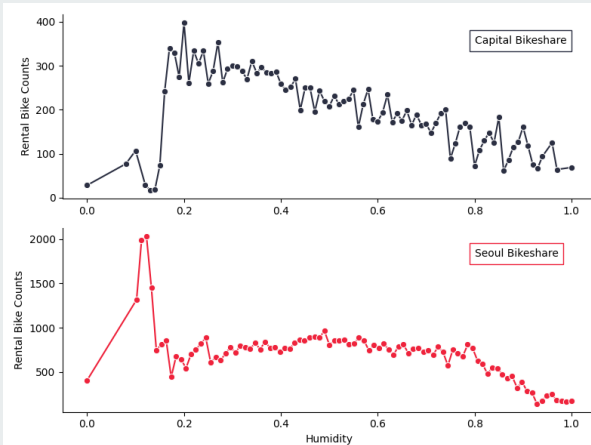


Results: Exploratory Data Analysis

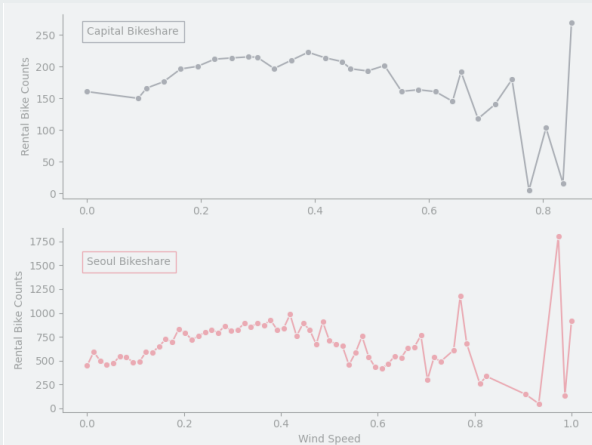
Temperature vs. Bike rental counts



Humidity vs. Bike rental counts

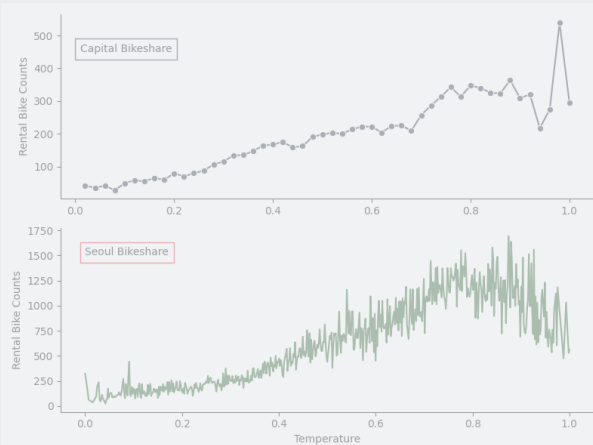


Windspeed vs. Bike rental counts

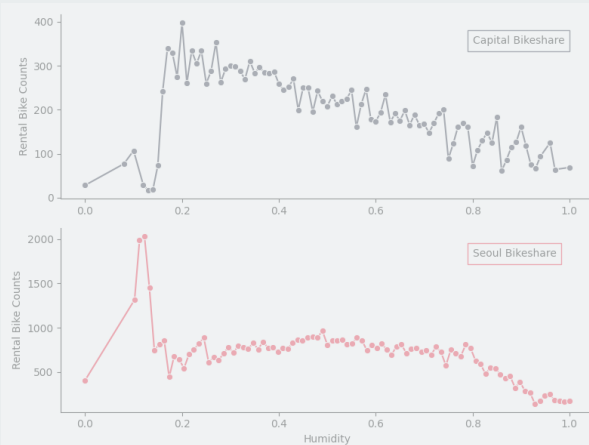


Results: Exploratory Data Analysis

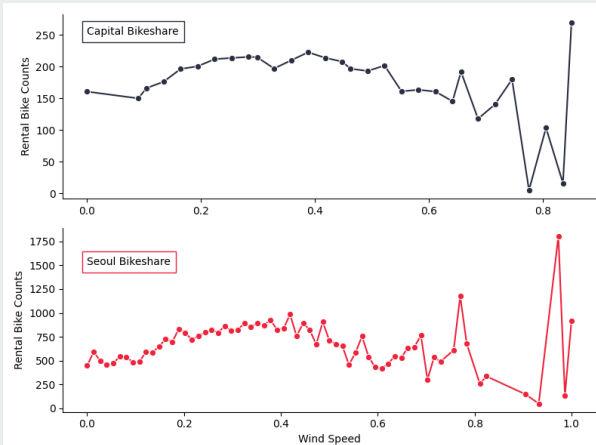
Temperature vs. Bike rental counts



Humidity vs. Bike rental counts



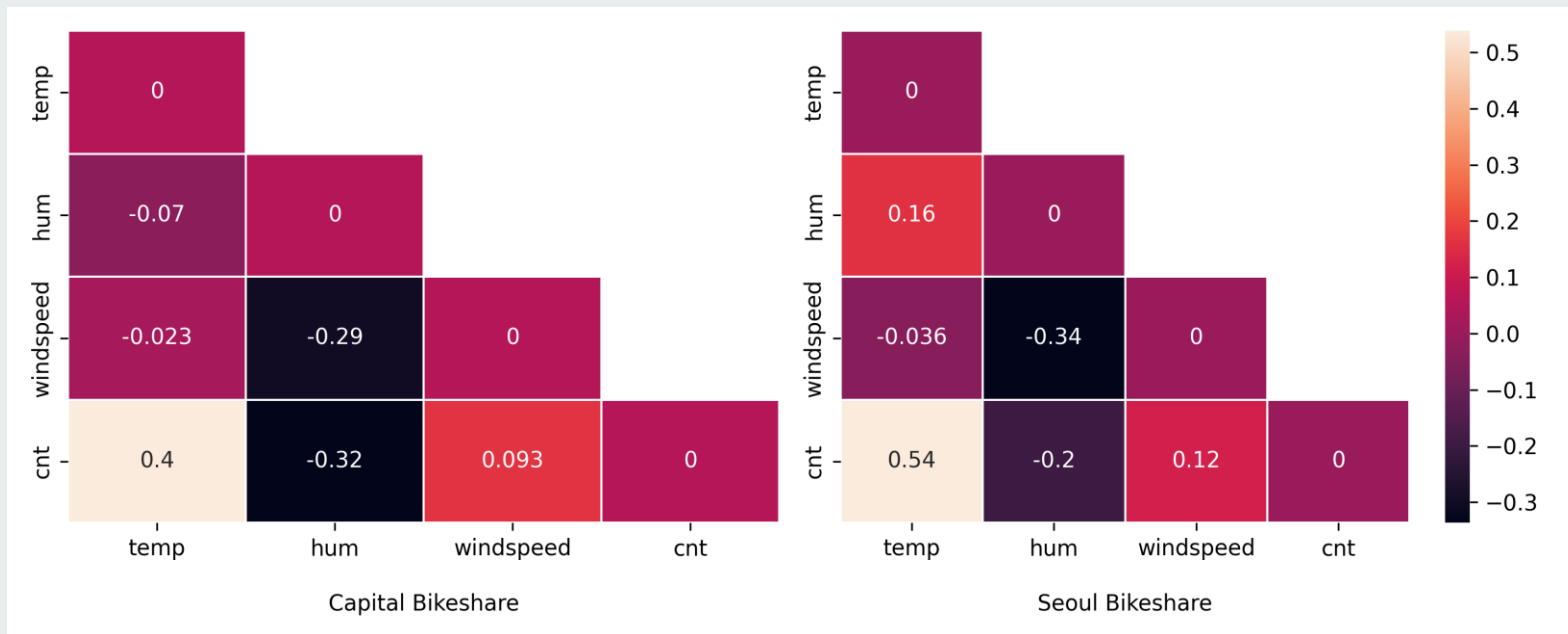
Windspeed vs. Bike rental counts



Results: Correlation Analysis



Heatmap of Weather Effects on Bike Rentals



Findings



Findings

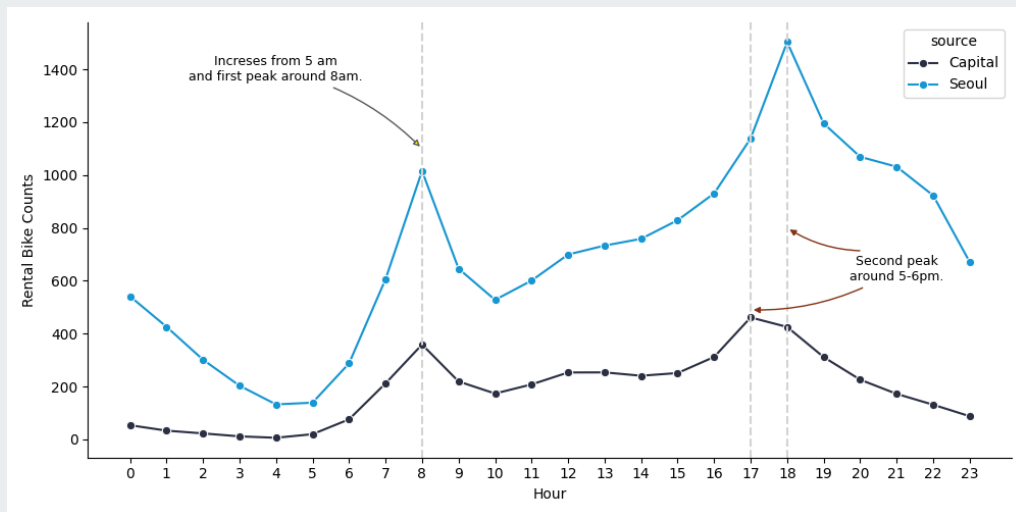
- Strong and clear relationship between climate and bike rentals
- Temperature has a significant positive importance
- Humidity negatively impacts bike rentals
- Less impact for Windspeed

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.

License and References



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<https://creativecommons.org/licenses/by/4.0/deed.en>

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).