The Influence of Bicycle Paths on the Use of Rental Bikes in Munich

MADE - 17th January 2024

Cycling in European Cities

Does Munich's regional bicycle infrastructure influence the use of the MVG rental bike service?

Outline

1. Methods

2. Results

3. Analysis

4. Conclusion

1. Methods

Datasource 1: "Fahrten mit dem MVG Rad"
(Eng.: Rides with the MVG bike)

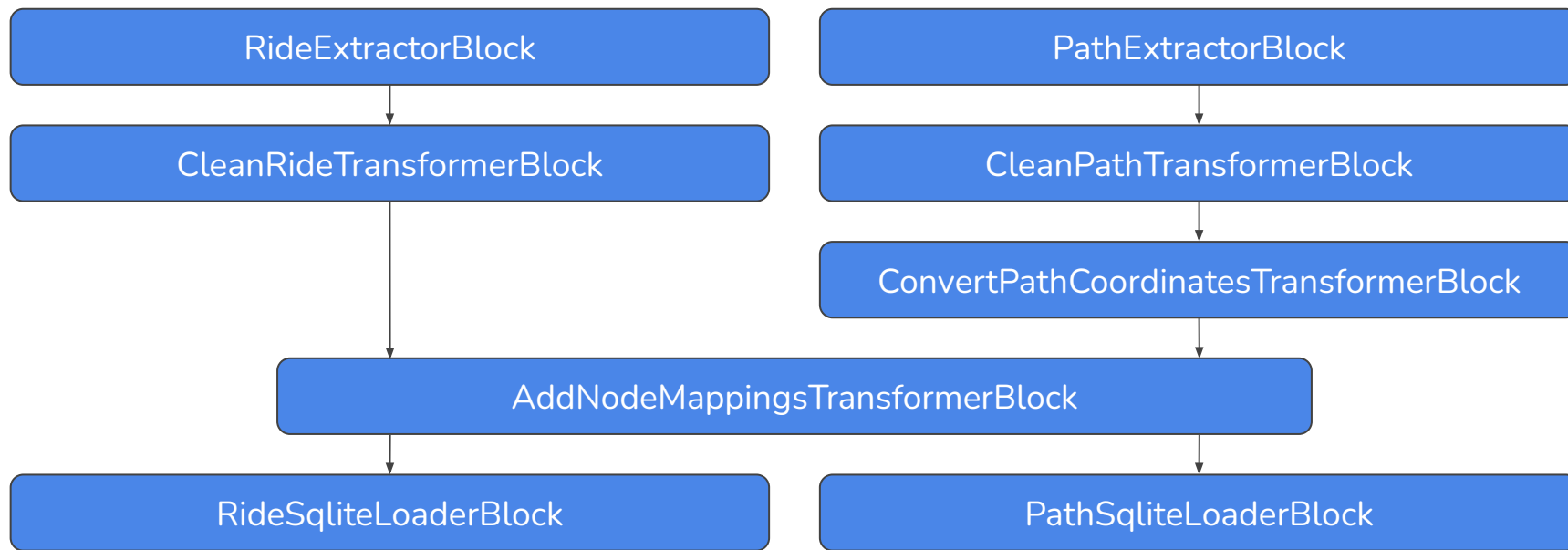|	1	2	3	4	5
Row	1	2	3	4	5
STARTTIME	2022-01-01 00:02	2022-01-01 00:03	2022-01-01 00:16	2022-01-01 00:16	2022-01-01 00:21
ENDTIME	2022-01-01 00:09	2022-01-01 00:07	2022-01-01 00:29	2022-01-01 00:29	2022-01-01 00:44
STARTLAT	48.13658	48.13659	48.16849	48.16852	47.88872
STARTLON	11.59283	11.59282	11.55028	11.5502	11.29944
ENDLAT	48.14159	48.14165	48.15526	48.15526	48.12047
ENDLON	11.59721	11.59701	11.54012	11.54012	11.54213
RENTAL_IS_STATION	0	0	0	0	0
RENTAL_STATION_NAME	*<null>*	*<null>*	*<null>*	*<null>*	*<null>*
RETURN_IS_STATION	0	0	1	1	0
RETURN_STATION_NAME	*<null>*	*<null>*	Albrechtstraße	Albrechtstraße	*<null>*

Datasource 2: "Radverkehrsanlagen im Straßen- unterhalt der Landeshauptstadt München"
(Eng.: Cycling facilities in road maintenance in the City of Munich)

	1	2	3	4	5
FID	0	1	2	3	4
STRASSENNA	Blumenauer Straße	Blumenauer Straße	Haidelweg	Hugo-Troendle-Straße	Lilienthalallee
Shape_Leng	68.37723801	7.453105966	23.49634591	9.409102565	4.733965487
d_RADWEGAR	Getrennter Rad- und Gehweg	Getrennter Rad- und Gehweg	Getrennter Rad- und Gehweg	Übergang	Übergang
START_X	682779.2316	682823.9375	682823.9375	686740.5708	693648.8775
START_Y	5334790.039	5334738.483	5334738.483	5338656.127	5340915.69
END_X	682823.9375	682830.2181	682822.3478	686742.3456	693653.6114
END_Y	5334738.483	5334734.616	5334715.073	5338665.367	5340915.665

Data Pipeline

```
RideExtractorBlock                              PathExtractorBlock
         │                                             │
         ▼                                             ▼
CleanRideTransformerBlock                   CleanPathTransformerBlock
         │                                             │
         │                                             ▼
         │                            ConvertPathCoordinatesTransformerBlock
         │                                             │
         ▼                                             │
              AddNodeMappingsTransformerBlock          │
         │                                             │
         ▼                                             ▼
RideSqliteLoaderBlock                          PathSqliteLoaderBlock
```
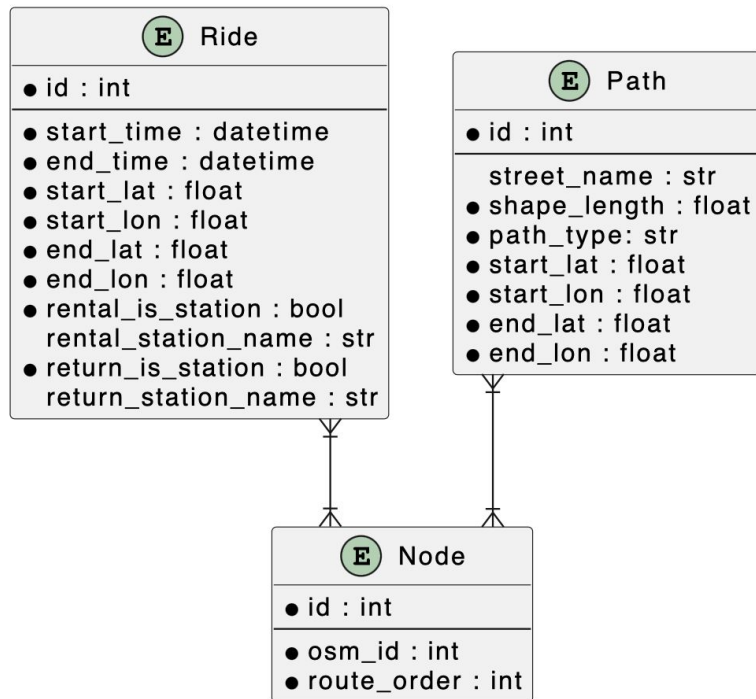
2. Results

Entity Relationship Diagram

bike_data.sqlite

Database Tables:

- Ride
- Path
- Node

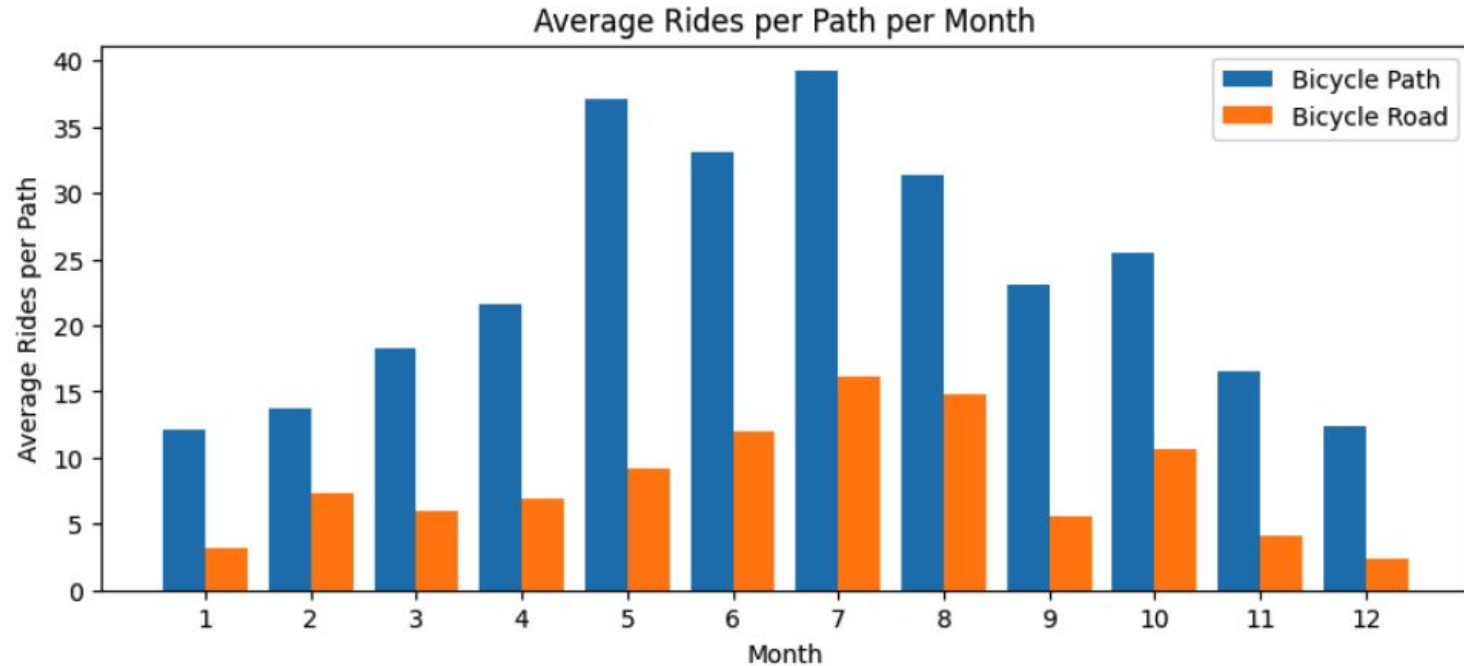N:M Relationships:

- Ride-Node Mapping
- Path-Node Mapping

Ride
- id : int
- start_time : datetime
- end_time : datetime
- start_lat : float
- start_lon : float
- end_lat : float
- end_lon : float
- rental_is_station : bool
  rental_station_name : str
- return_is_station : bool
  return_station_name : str

Path
- id : int
  street_name : str
- shape_length : float
- path_type: str
- start_lat : float
- start_lon : float
- end_lat : float
- end_lon : float

Node
- id : int
- osm_id : int
- route_order : int

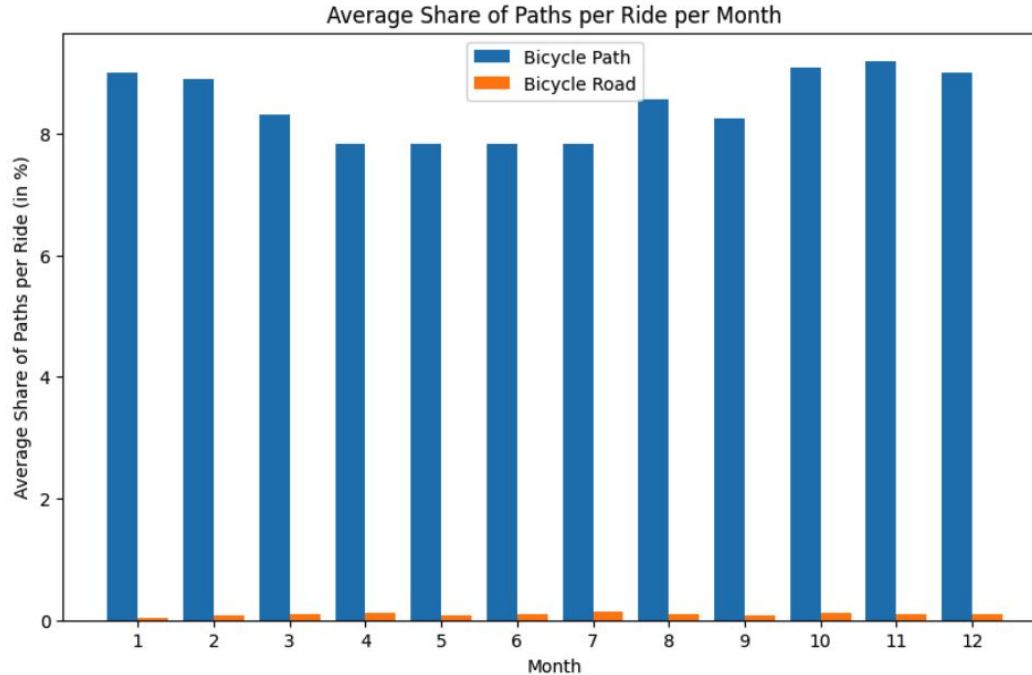# Visualization of a Ride Route

3. Analysis

a) Average Rides per Path per Month

b) Average Share of Paths per Ride per Month

4. Conclusion

Findings

- **Medium** average rides per bicycle **path** per month ~ 12-40
- **Low** average rides per bicycle **road** per month ~ 3-15
- Concentration of rides per path during the summer months
- **Low** percentage of routes traversing bike **paths** ~ 8-10%
- **Very low** percentage of routes traversing bike **roads** ~ 0-0.5%

→ Potential correlation between infrastructure and rides

→ Other factors also influencing the use of rental bikes

Limitations

- Significantly reduced dataset due to computation time
- Predicted routes for the MVG bike rides
- Conversion of UTM coordinates to lon./lat.
- Consideration of paths per ride only for full traversal
- All rides and paths in Munich
- MVG Rad data only from 2022
- OSM data and Baureferat data potentially from other dates

Thank you!