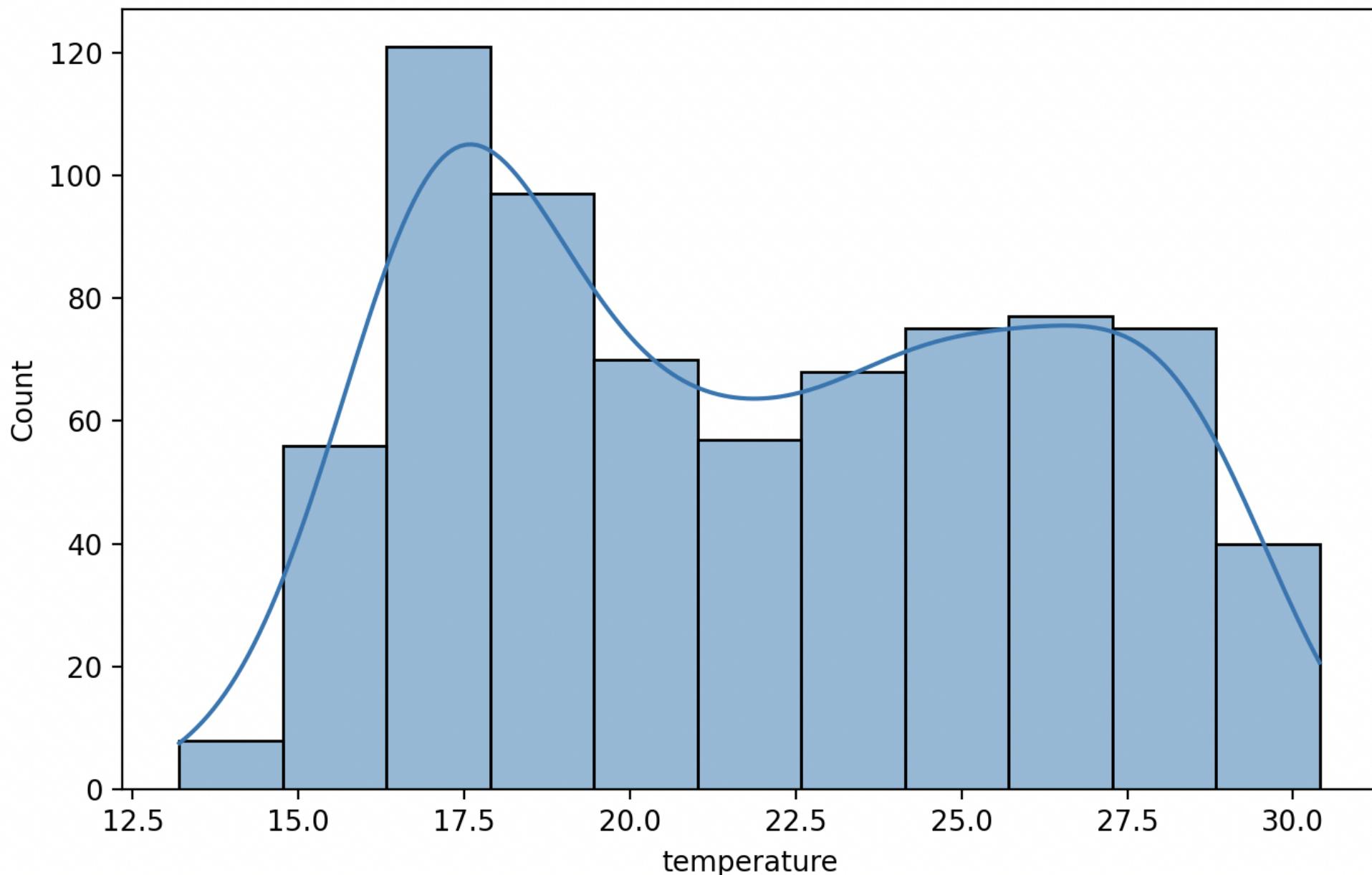
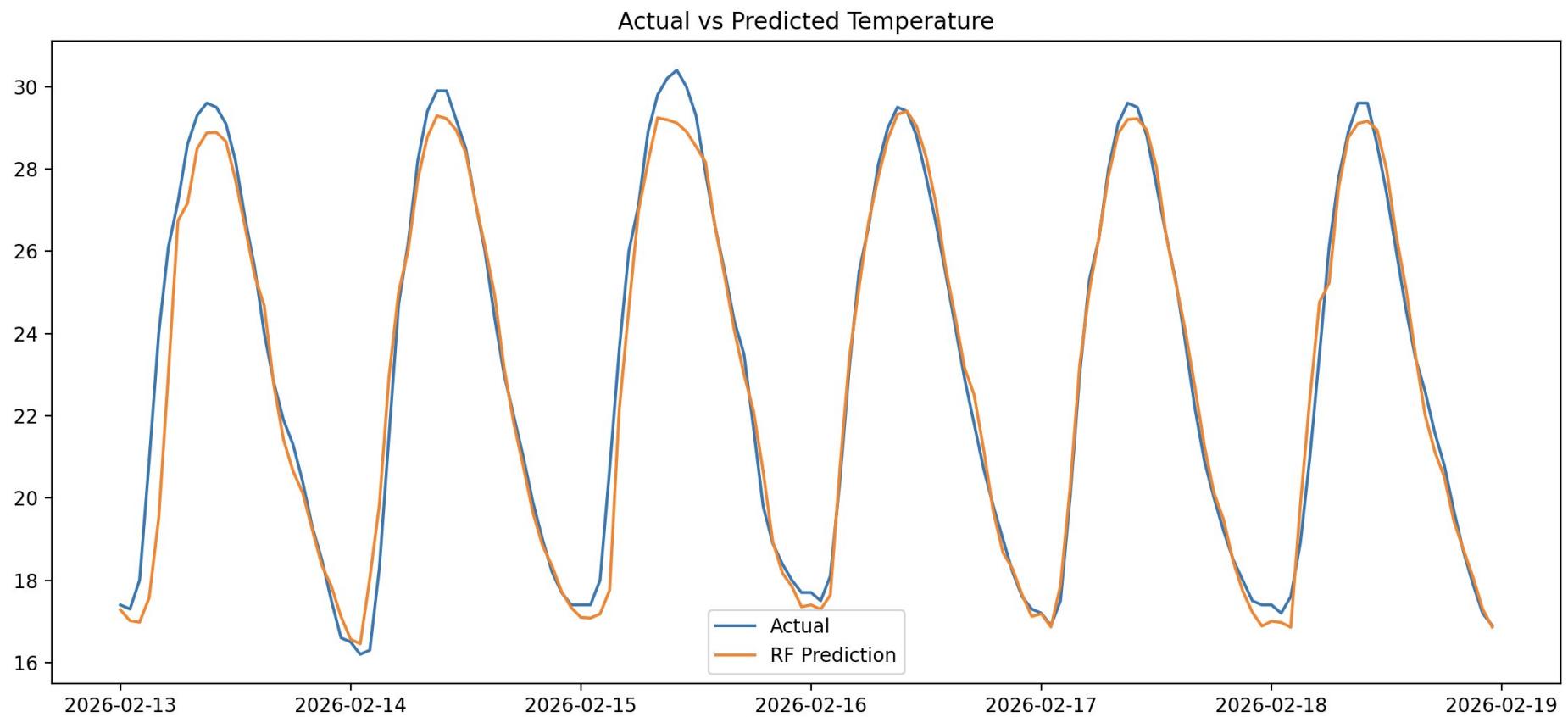
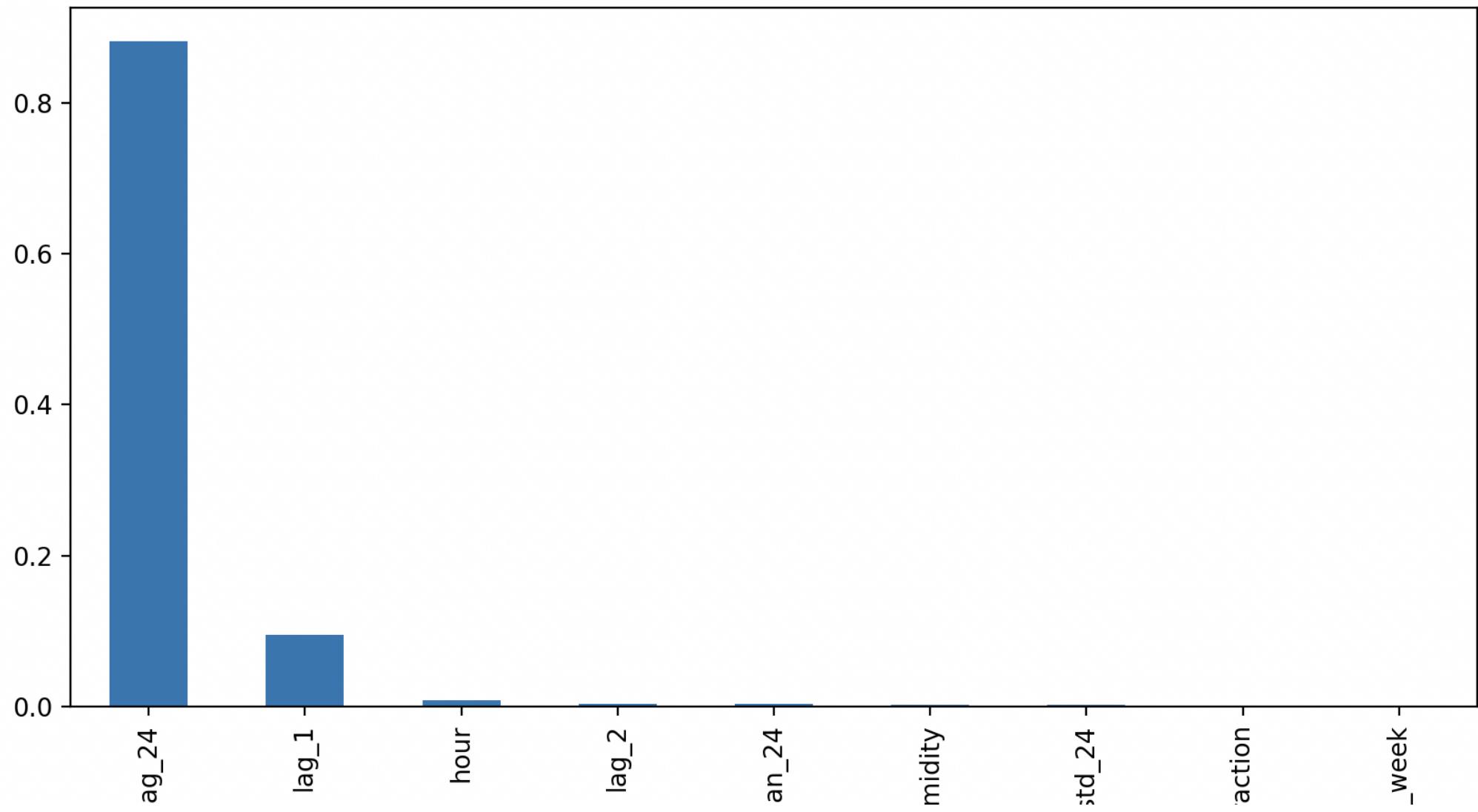


Temperature Distribution

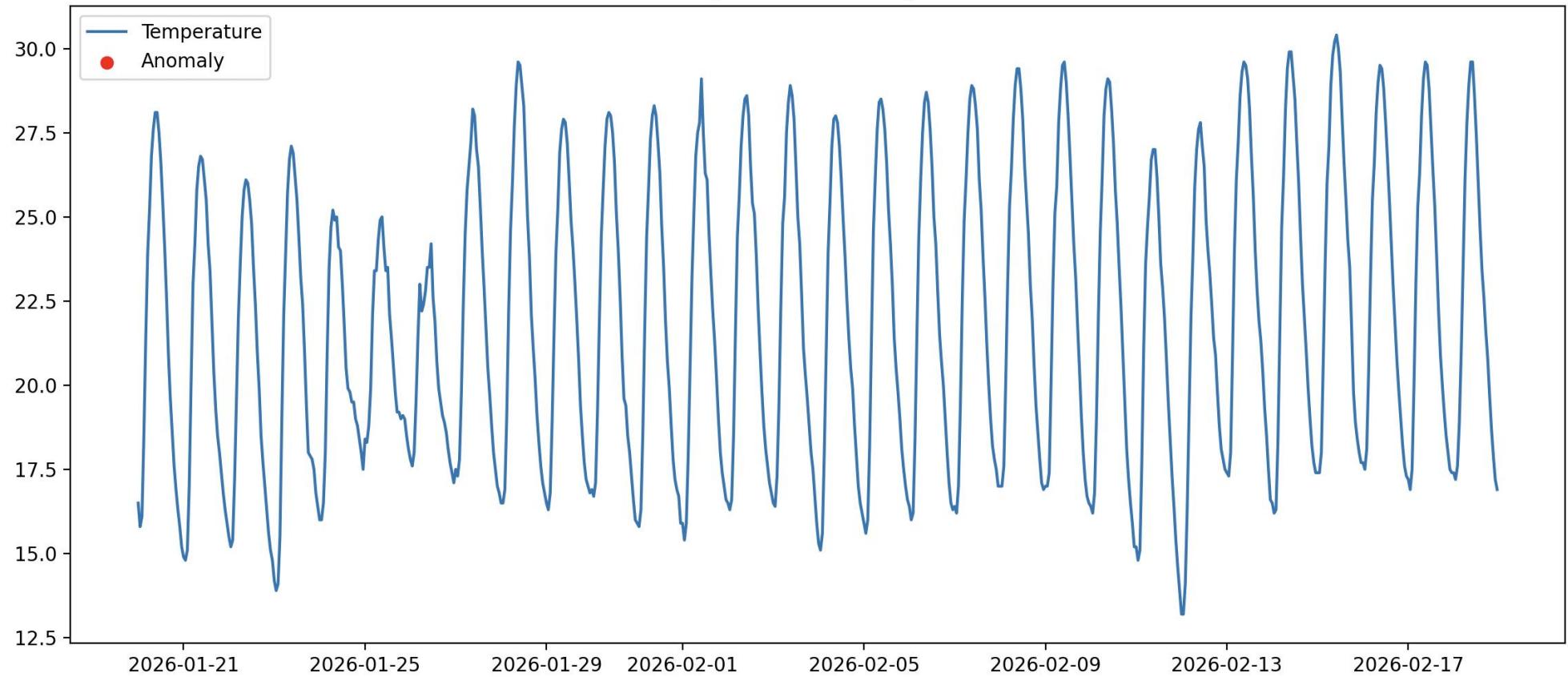




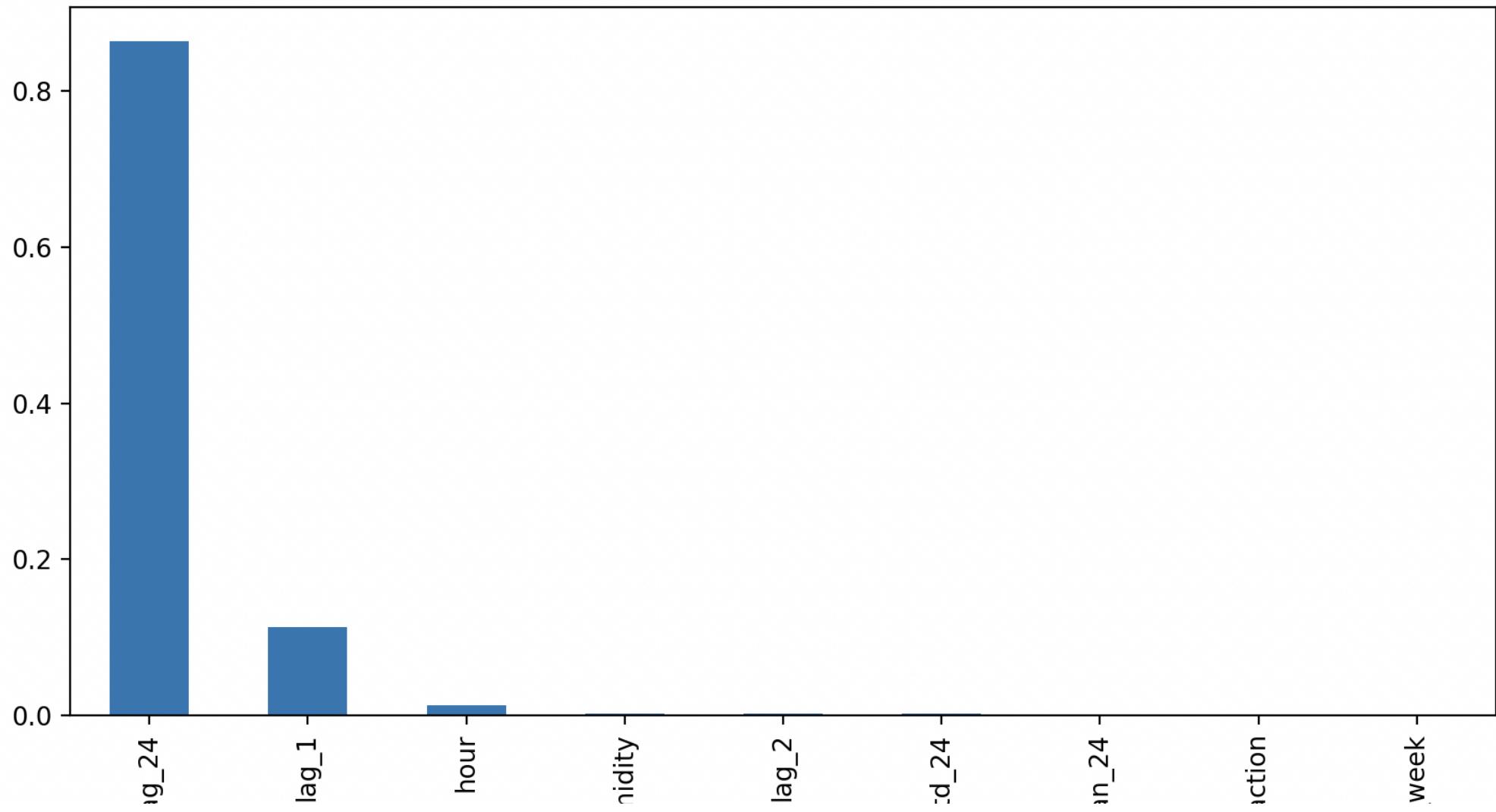
Feature Importance (Random Forest)



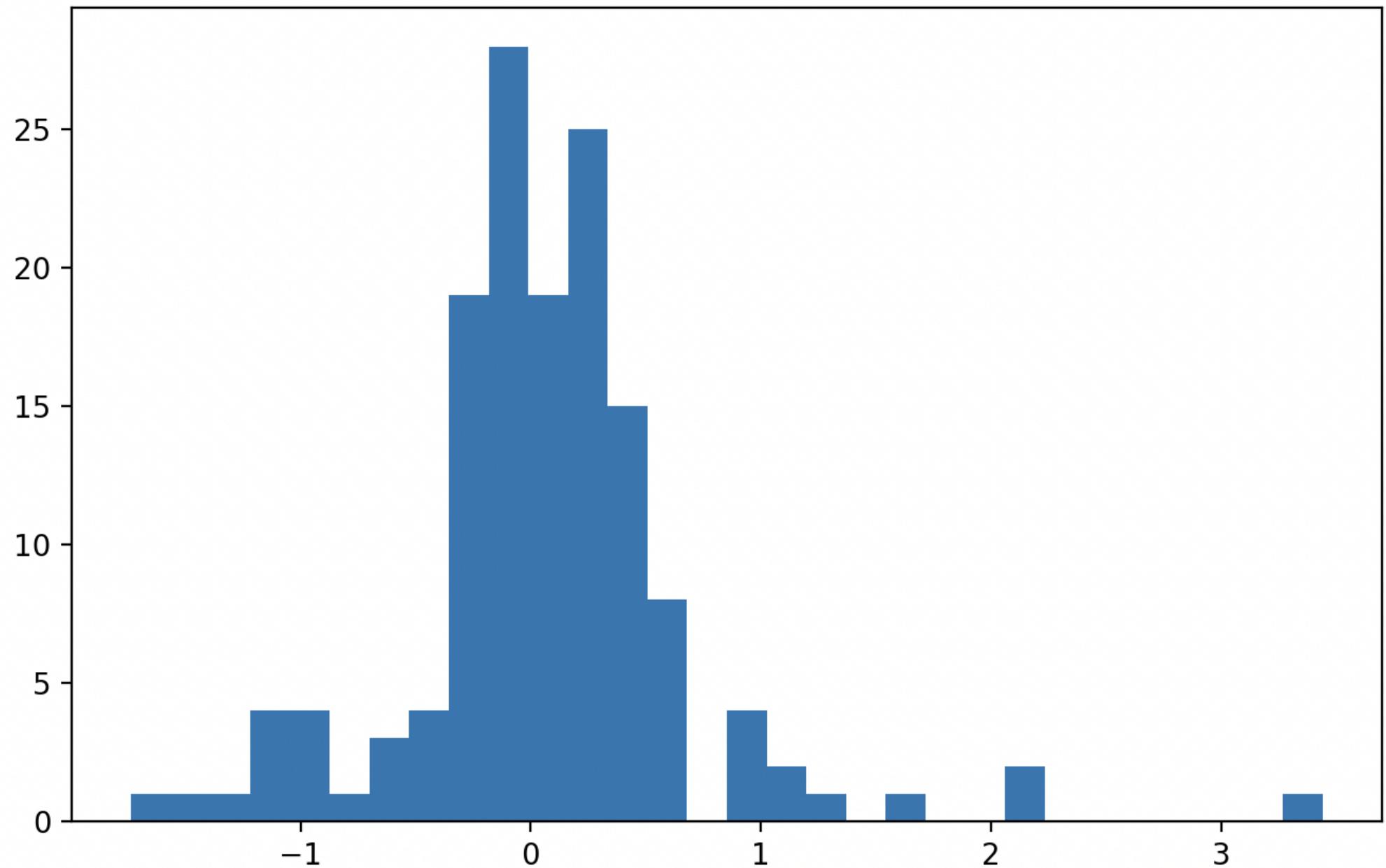
Anomaly Detection using Z-score



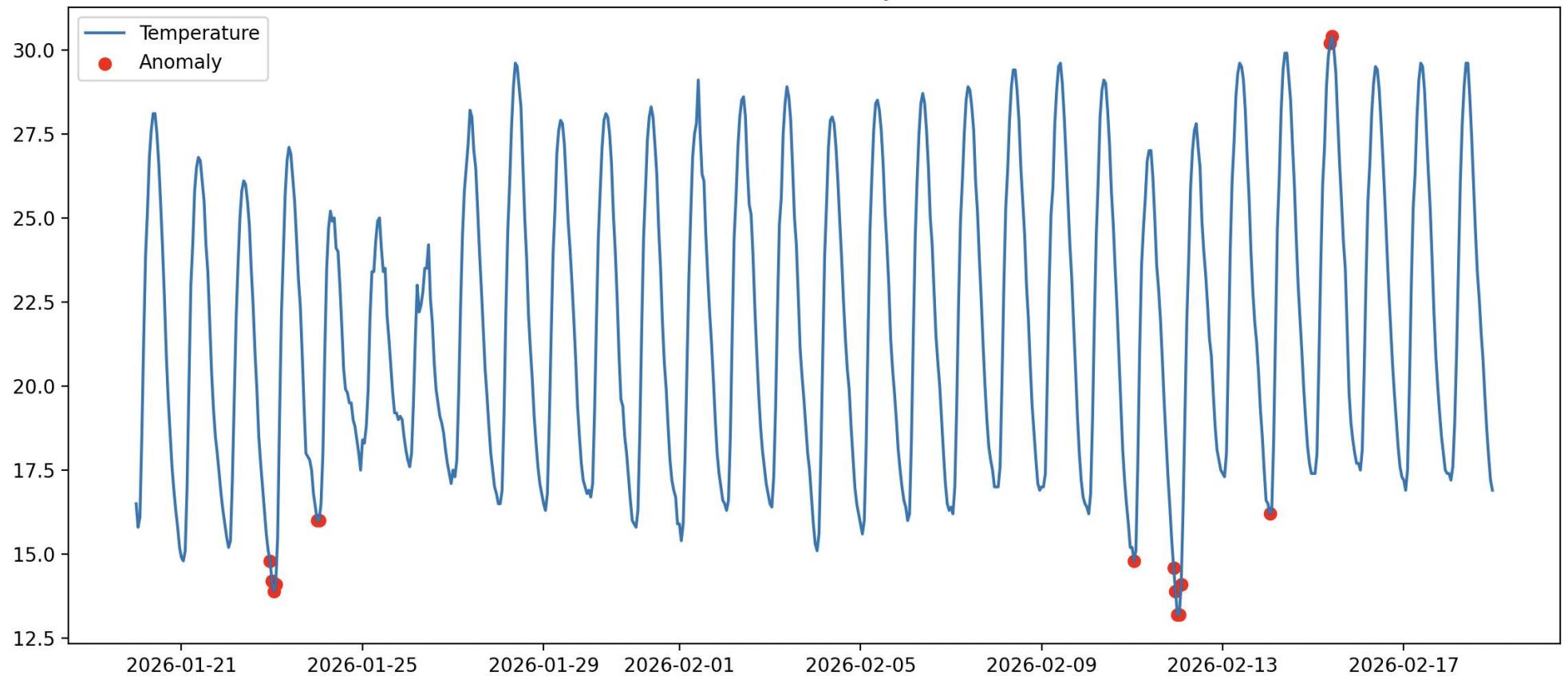
XGBoost Feature Importance



Residual Distribution



Isolation Forest Anomaly Detection



```
/Users/amshumathshetty/PyCharmMiscProject/.venv/bin/python /Users/amshumathshetty/PyCharmMiscProject/script4.py
```

```
Total Rows: 744
```

```
      temperature  humidity  
time  
2026-01-19 00:00:00      15.4      85  
2026-01-19 01:00:00      15.5      88  
2026-01-19 02:00:00      15.9      87  
2026-01-19 03:00:00      18.1      75  
2026-01-19 04:00:00      21.1      59
```

```
Missing values:
```

```
temperature      0
```

```
humidity        0
```

```
dtype: int64
```

```
Correlation:
```

```
      temperature  humidity  
temperature    1.000000 -0.888193  
humidity     -0.888193  1.000000
```

```
      temperature  humidity  hour  day_of_week  
time  
2026-01-19 00:00:00      15.4      85      0      0  
2026-01-19 01:00:00      15.5      88      1      0  
2026-01-19 02:00:00      15.9      87      2      0  
2026-01-19 03:00:00      18.1      75      3      0  
2026-01-19 04:00:00      21.1      59      4      0
```

```
New shape: (720, 10)
```

```
Train size: (576, 9)
```

```
Test size: (144, 9)
```

```
Linear Regression Performance
```

```
MAE: 0.32744802954636243
```

```
RMSE: 0.4270673256279571
```

```
R2: 0.9911389211884496
```

Random Forest Performance

MAE: 0.4866388888888845

RMSE: 0.7914413297725978

R2: 0.9695679394048664

XGBoost Performance

MAE: 0.47980964713626445

RMSE: 0.6983885786937744

R2: 0.9763032839124898

Feature Importance:

lag_24 0.881626

lag_1 0.095484

hour 0.007954

lag_2 0.003636

rolling_mean_24 0.003180

humidity 0.002826

rolling_std_24 0.002194

temp_humidity_interaction 0.001754

day_of_week 0.001345

dtype: float64

Total anomalies detected: 0

XGBoost Performance

MAE: 0.4161603185865615

RMSE: 0.6381298967983843

R2: 0.9802160915971495

XGBoost Feature Importance:

lag_24 0.864370

lag_1 0.113404

XGBoost Feature Importance:

| | |
|---------------------------|----------|
| lag_24 | 0.864370 |
| lag_1 | 0.113404 |
| hour | 0.012633 |
| humidity | 0.002566 |
| lag_2 | 0.001875 |
| rolling_std_24 | 0.001769 |
| rolling_mean_24 | 0.001511 |
| temp_humidity_interaction | 0.000974 |
| day_of_week | 0.000897 |

dtype: float32

Residual Mean: 0.07877372635735397

Total anomalies: 15

Next hour predicted temperature: 16.749643

Temperature within safe range.

Next hour predicted temperature: 16.749643

Temperature within safe range.

Process finished with exit code 0