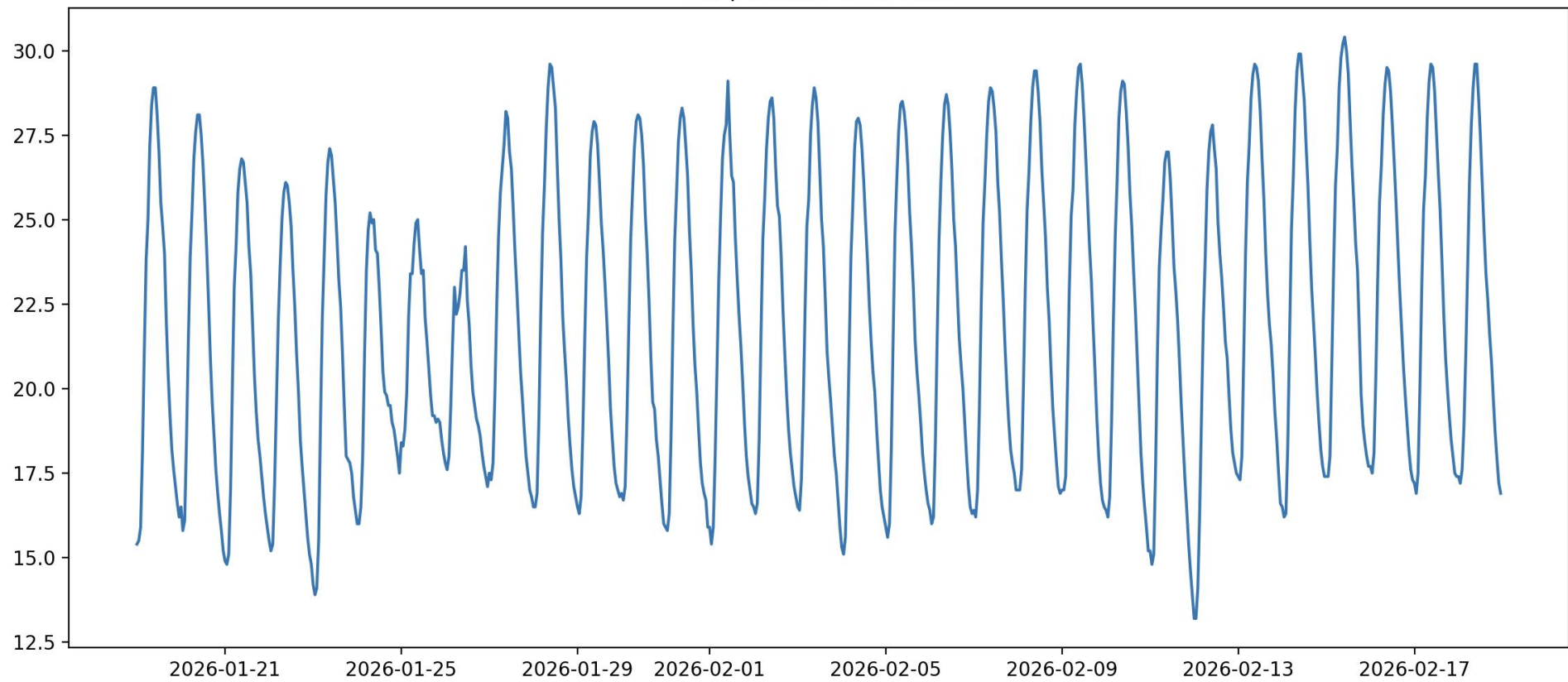
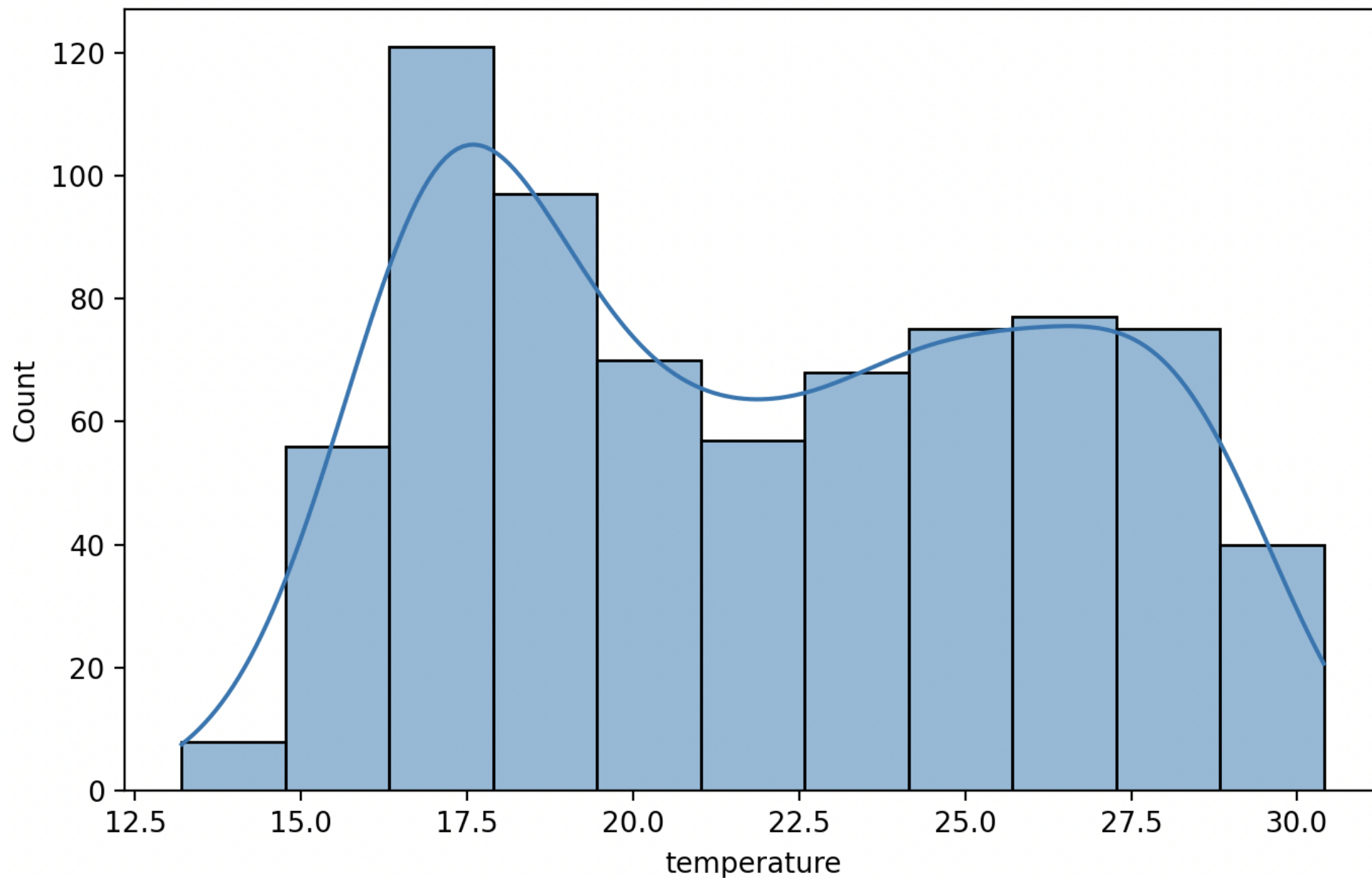


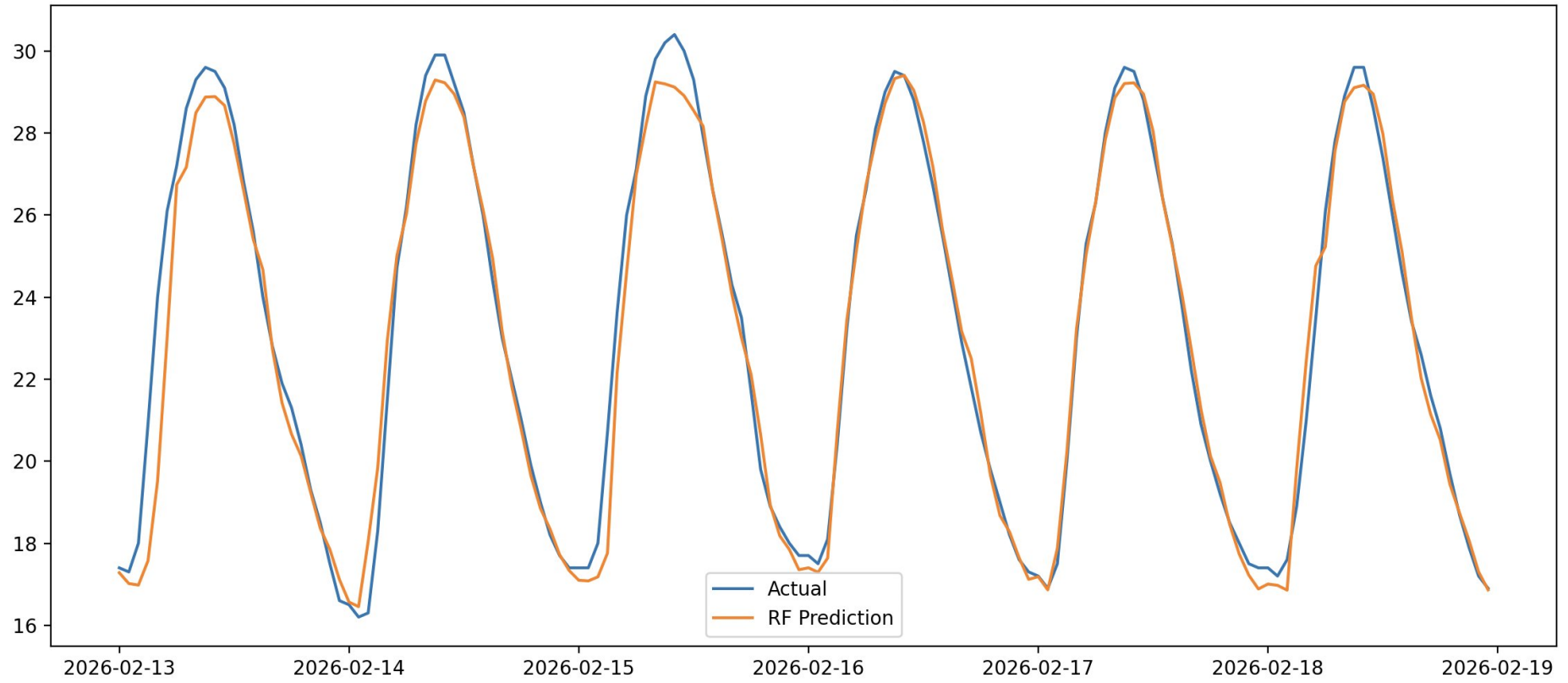
Temperature Over Time



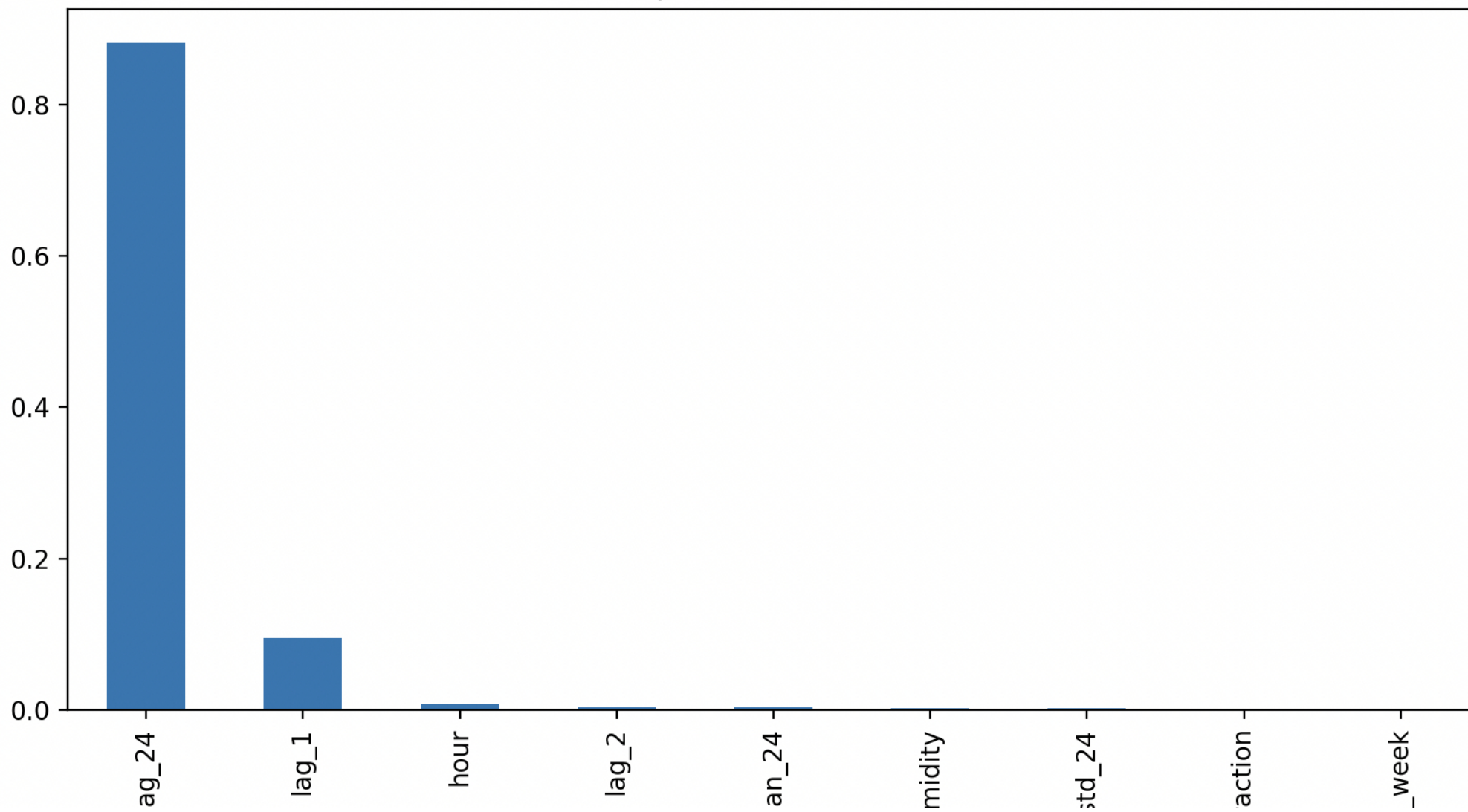
Temperature Distribution



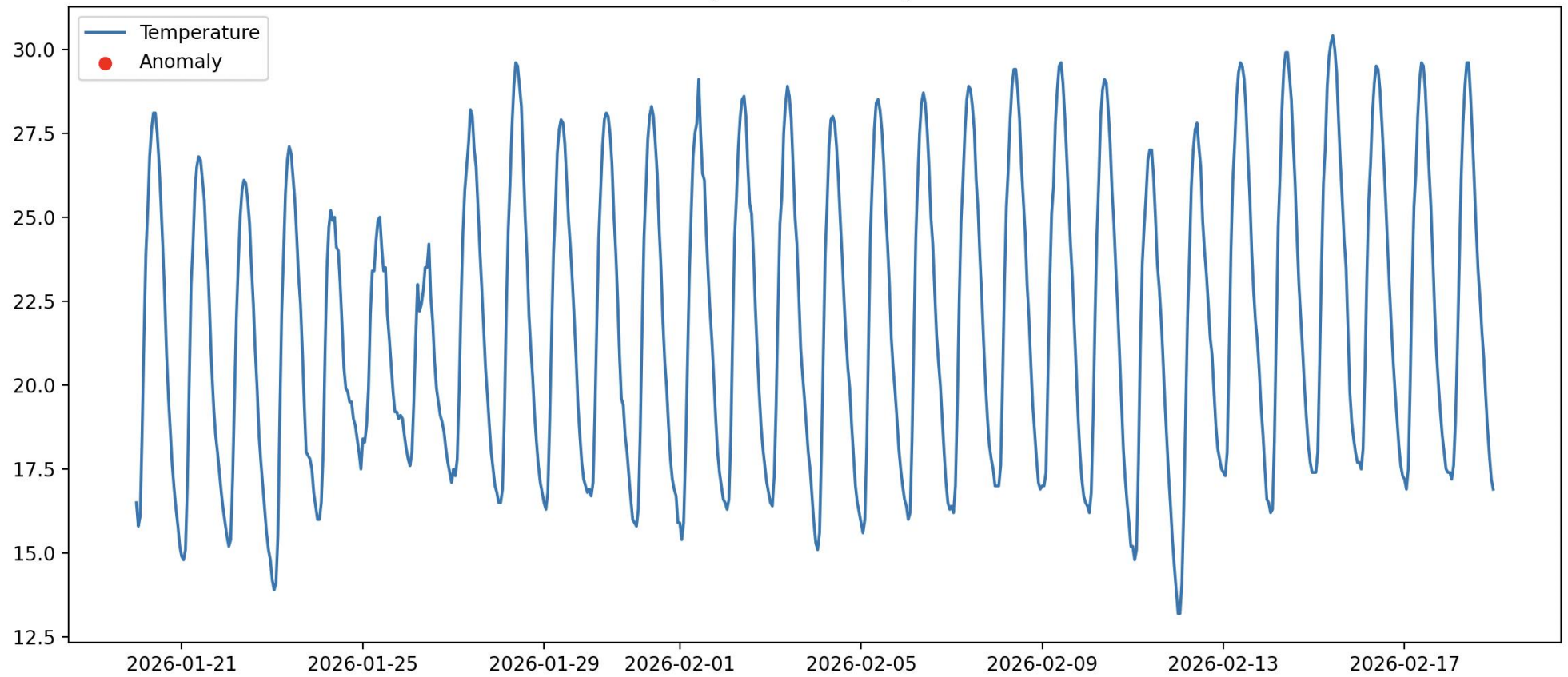
Actual vs Predicted Temperature



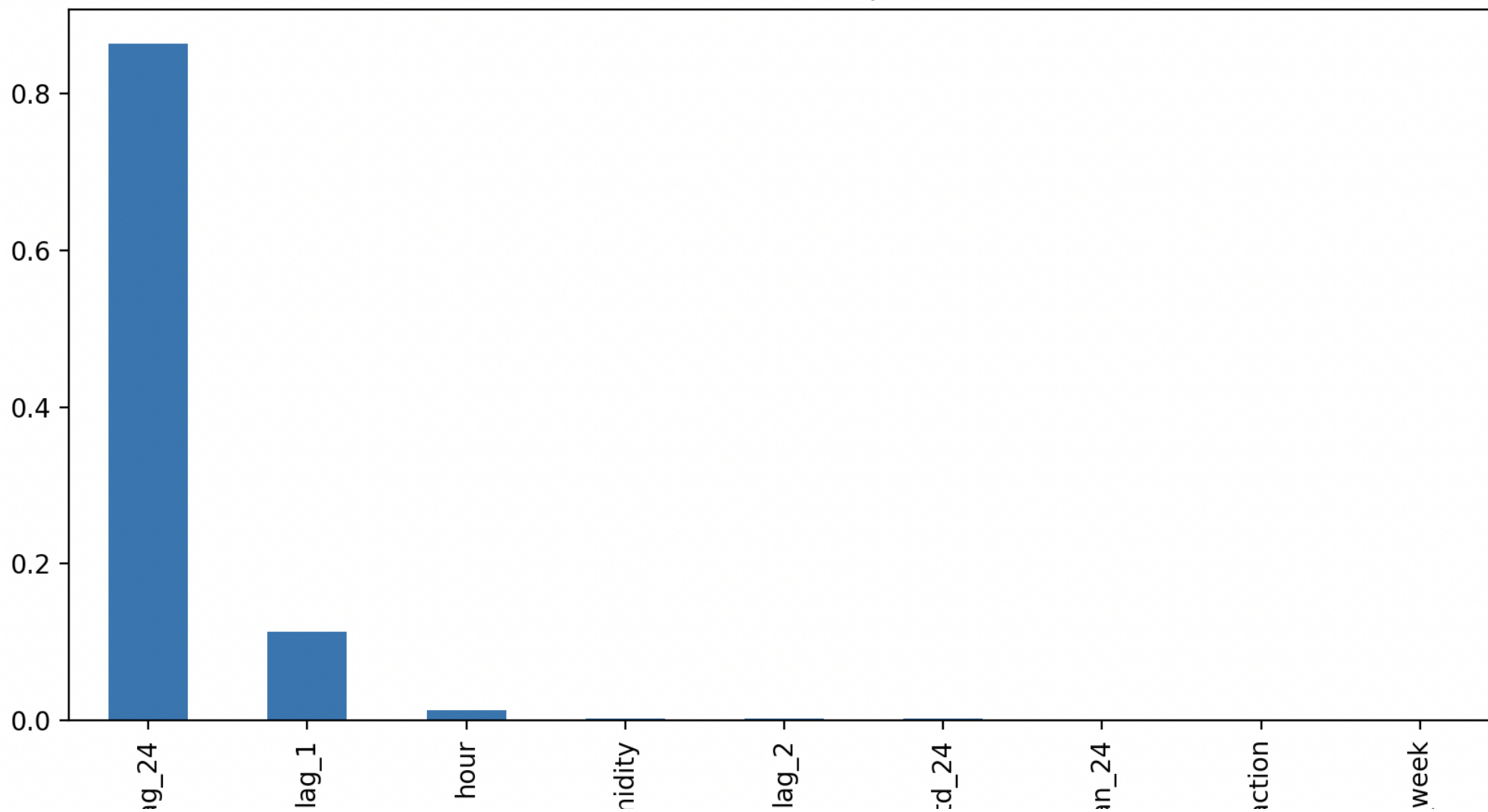
Feature Importance (Random Forest)



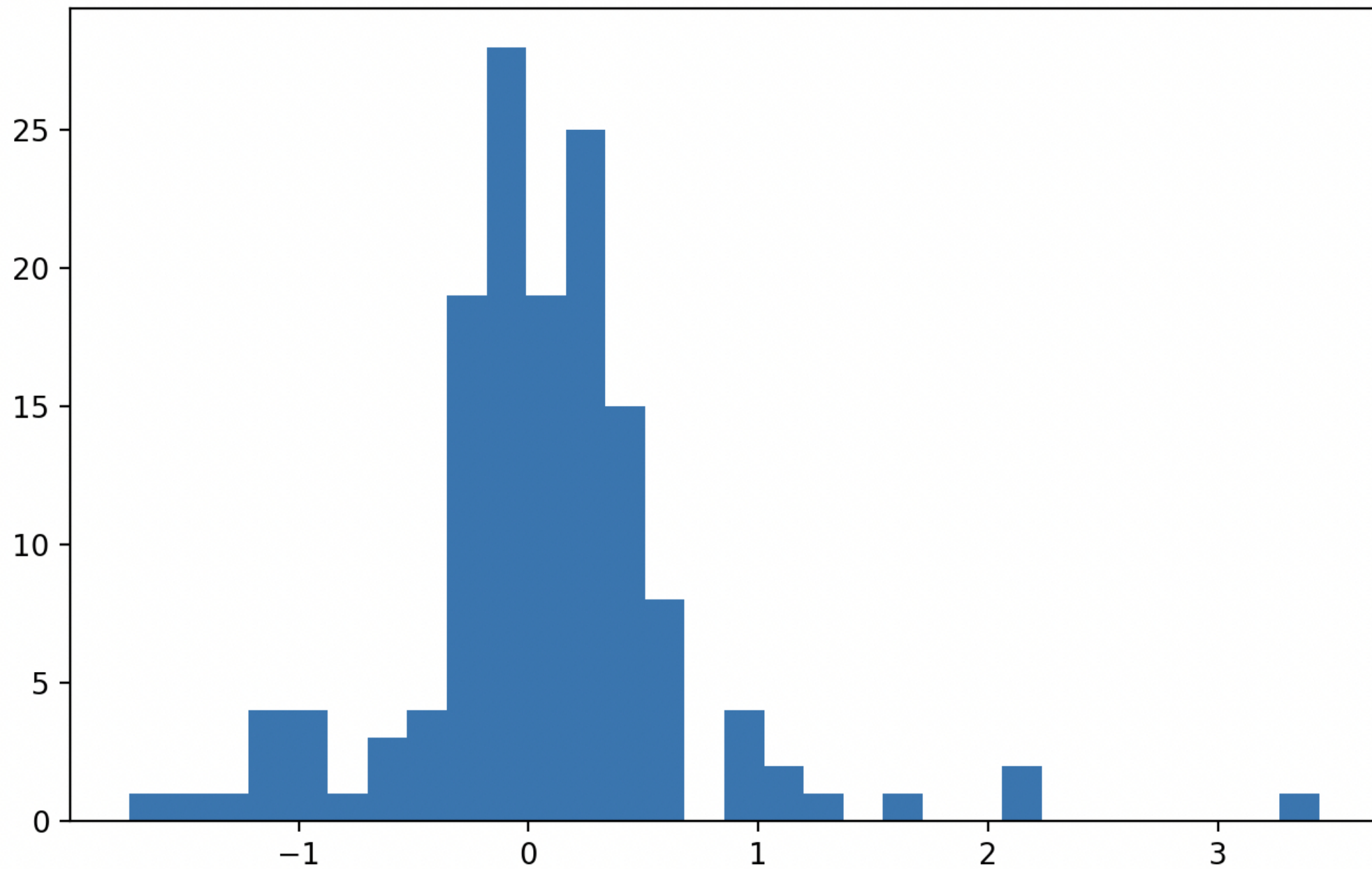
Anomaly Detection using Z-score



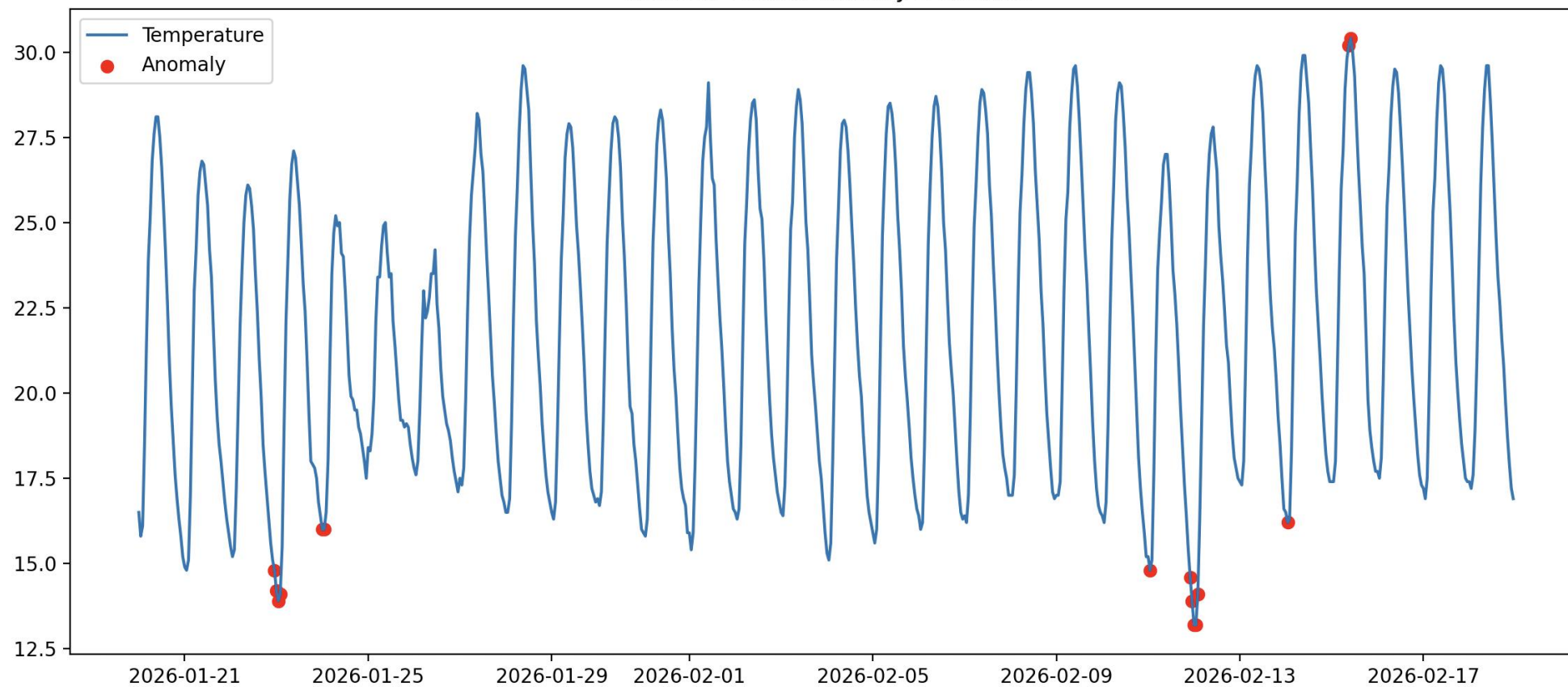
XGBoost Feature Importance



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