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The best IT project in Slovenia in 2023

Telco operators

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Manufacturing

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Transportation

Finance & Insurance

Gaming

Utility

Infrastructure

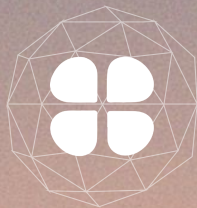Power Engineering

References

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Slovenian eGovernment

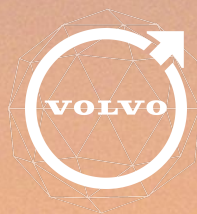Telekom Slovenije

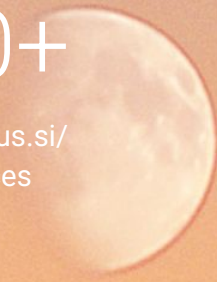Lottery Slovenia

Hisense

HSE group

Kontron

DARS

Nomago

Volvo

300+

www.medius.si/references
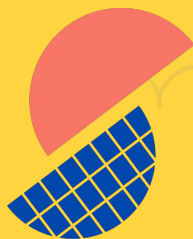
Sunsei

NWPsolarNet

A Generalized Deep Learning Model for **Regional Solar Power Forecasting**

Marko Rus, Viktor Brajak, dr. Tadej Justin
Medius d.o.o., Ljubljana

The Challenge

- **Solar power** is essential but highly variable due to weather.

- Accurate forecasting is crucial for grid stability.

- Most Machine Learning models are **site-specific**. They need extensive historical data for a single location and don't work for new installations.


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A Generalized Model: NWPsolarNet

- Our latest development is a **generalized** model for an entire region.

- Provides 120-hour forecasts for **any location**, even new ones.

- Requires **no site-specific historical power data** to make a forecast.

- Primary Input: Numerical Weather Prediction (NWP) data.

Sunsei
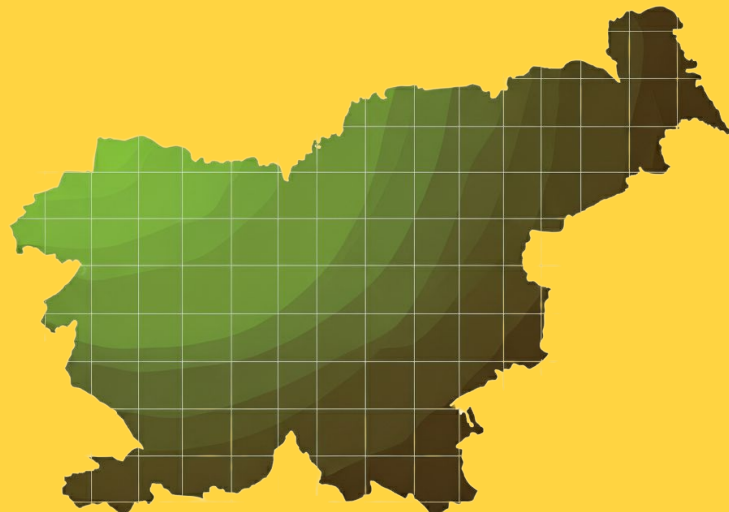
High-Level Architecture

- The model processes NWP data for a 5×5 grid around a target location.

- **NWP Encoder**: Extracts key spatio-temporal features from weather data.

- **Fusion Module**: Combines weather features with other data (like time of day) to generate the final 120-hour forecast.
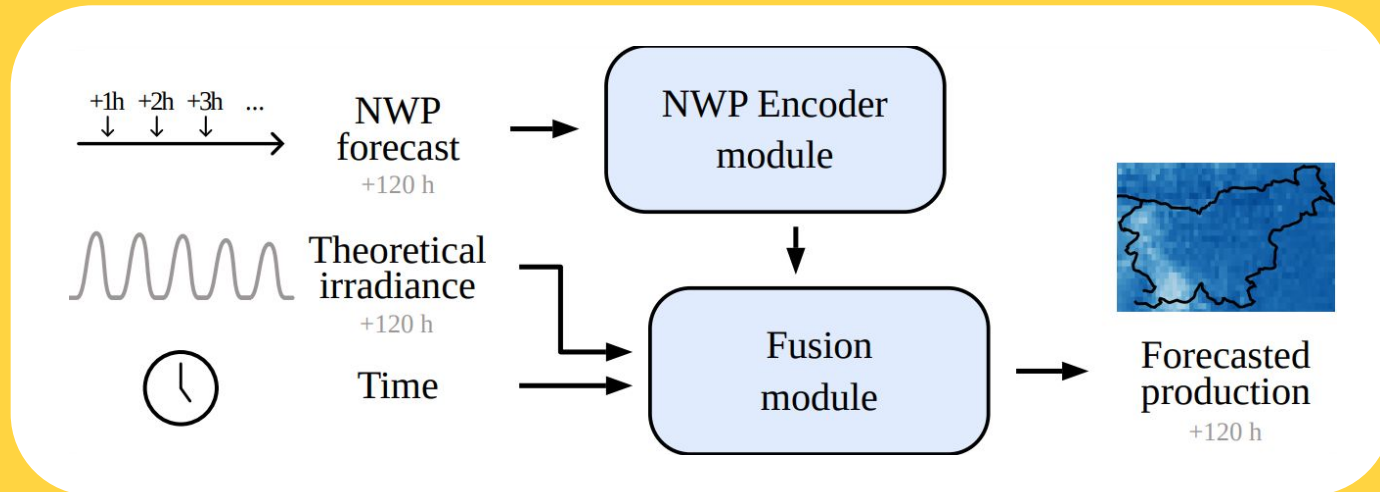
Results

- NWPsolarNet outperforms both benchmarks across all metrics.

- **7.6% lower error (MAE)** than the strong LightGBM baseline.

- **22.6% lower error (MAE)** than the operational Quartz forecast.

- The model is more effective at avoiding large, costly errors (lower RMSE).

Forecast Horizon	Model	MAE (%)	RMSE (%)
120 h	LightGBM	5.91	11.8
	NWPsolarNet	**5.46**	**11.2**
48 h	Quartz Solar Forecast	6.84	13.4
	NWPsolarNet	**5.29**	**10.9**

Sunsei

Dense Regional Forecasts

- Beyond single points, NWPsolarNet can generate a continuous power forecast map for the entire region.

- This is a powerful tool for regional grid management.
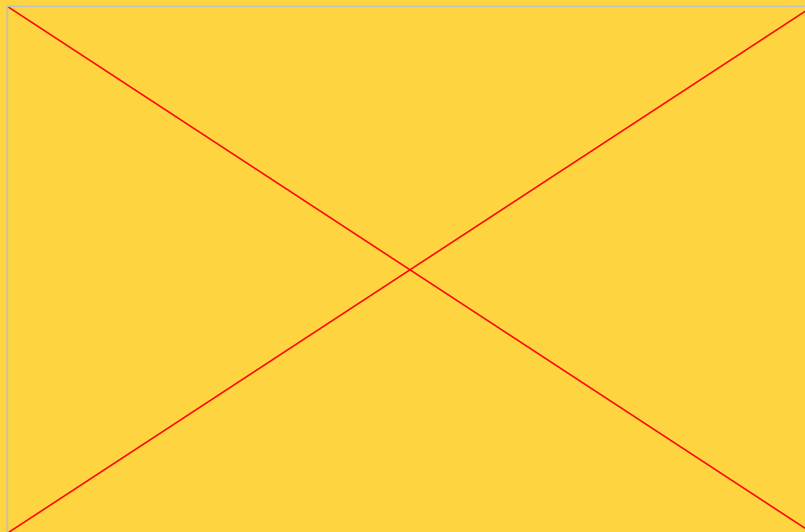
Forecast from 2023-08-01

Sunsei

Now Live: The Sunsei Platform

- We have launched **Sunsei**, a public platform showcasing real-time forecasts from NWPsolarNet.

- **API** is available for developers and grid operators to integrate our forecasts into their systems.

- Available at *sunsei.ai*

Forecast Forecast operations

| GET | /v1/forecast/historical | Get historical forecast data for a specific location |

| GET | /v1/forecast/latest | Get the latest 5-day forecast for a location |

| GET | /v1/forecast/latest-forecast-time | Get the timestamp of the latest forecast run |

ForecastModel ForecastModel operations

| GET | /v1/forecast-model | Get all available forecast models |

| GET | /v1/forecast-model/latest | Get metadata for the latest forecast model |

Sunsei

Conclusion

- NWPsolarNet provides a scalable and accurate solution for regional solar forecasting, complementing our site-specific models.

- Its key advantage is **generalization**: it works for new sites without needing historical data.

- It is publicly available and in production use via our **Sunsei** platform.

- **Future Work**: Expand the training dataset and test in new geographical regions.

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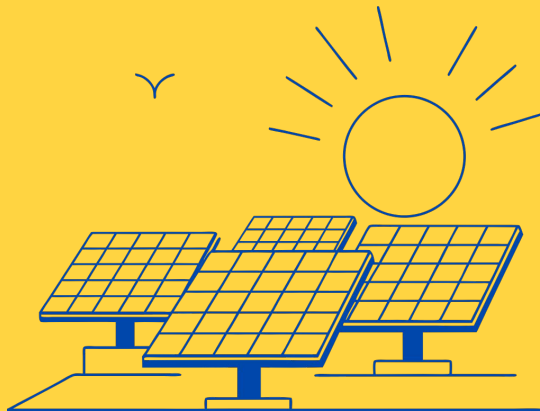
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