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Forecasting how much power di Dominican grid need each hour, one day ahead

A fixed-model test pon all 8,784 hour inna 2024

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Wa di study find

Wi test whether a linear regression can forecast hourly active power pon di Dominican Republic interconnected grid closer dan copying a earlier reading. Wi fit di model wid 26,087 eligible hour before 2024 an test every method pon di same 8,784 hour inna 2024. Di regression cut di mean absolute error from 123.42 MW fi di day-before rule to 105.39 MW, a 14.6% drop. It call demand 30.91 MW too low pon average. Di usual size a di miss drop, but di bias toward forecasting too low grow. [1, 2]

Weh di risorch a aks?

If a model use past demand an di calendar, can it forecast load 24 hour ahead better dan yesterday reading fi di same hour?

Data an metad

Wi use version 5 a Rafael Uceta SENI dataset. Di target come from active_power_mw. Di file have 35,039 hourly reading from 2 January 2021 at 1 a.m. to 31 December 2024 at 11 p.m. Wi check each timestamp against di month an hour column, check seh no timestamp repeat, an match up past reading by di clock. Di first 168 reading never have a week-earlier reading inna di supplied series. [1, 2]

Fi target hour t, di regression use demand at t−24, t−48 an t−168 hour, a constant an indicator fi hour, day a di week an month. Di reading at t−24 haffi ready when di forecast go out. Wi fit ordinary least squares pon all eligible hour up to di end a 2023 an keep di coefficient dem fixed all through 2024. Di two comparison rule dem copy di reading at t−24 or t−168. All three have di same history available each time dem forecast.

Wi work out mean absolute error inna megawatt. Signed error mean forecast minus observation. Fi estimate uncertainty inna di gain over di day-before rule, wi tek di daily average a di paired difference inna absolute error. Wi draw 5,000 circular sample from block a seven day inna one stretch, an keep 366 day inna each sample. Di seed a 20261120. Wi repeat di check wid 14-day block.

Rizolt dem

Di day-before rule have mean absolute error a 123.42 MW, an di week-before rule have 162.97 MW. Di regression get 105.39 MW an beat di day-before rule every one a di 12 month dem. July have di biggest regression error, 130.38 MW. [1]

Di average gain over di day-before rule a 18.04 MW. Di 95% percentile interval run from 11.40 to 24.31 MW wid seven-day block, an 12.20 to 24.12 MW wid 14-day block. Mean

signed error a −30.91 MW fi di regression an −0.39 MW fi di day-before rule. Di root mean square error dem a 137.42 an 170.29 MW, inna dat order. [1]

Average size a di hourly forecast error inna 2024



A smaller number mean a smaller miss. Every method use di same 8,784 hourly reading weh wi keep back fi di test. Source [1], author calculation.

Wa di rizolt mean

A grid planner weh care most bout di usual size a di hourly miss woulda pick di regression fi dis test year. Anybody weh need a forecast widout a lean to one side shoulda check di shortfall too. Dat average 30.91 MW gap call fi a separate test a di busy hour dem. If somebody fit a correction wid di 2024 error dem, dem need fresh reading fi test it.

Limit a di study

Dis test look back pon one full year a data weh di dataset author dem prepare. It assume di load reading come out inna time. It nuh recreate past delay or revision. Wi leave out di actual weather at di target hour because nobody woulda have dat reading when di forecast go out. Wi never test unmet demand, reserve requirement, plant scheduling cost or di grid operator performance. Di block interval dem describe variation inside di test year wid di fitted model.

Run di analysis agen

Download datos_modelo.csv from version 5 [1]. Read di date as day/month/year an check di month an hour column.

Match di hourly reading dem wid di reading from 24, 48 an 168 hour before. Fit di regression before 2024 an use di first category fi each calendar variable as di reference.

Tek di absolute forecast error fi every hour inna 2024 an find di average. Fi join up di monthly value dem, weight each month by how much hour it have.

Data tiebl

Month inna 2024	Hour	Day-before mean absolute error (MW)	Week-before mean absolute error (MW)	Regression mean absolute error (MW)
1	744	102.297	125.613	92.504
2	696	126.808	178.018	102.88
3	744	108.949	158.052	95.925
4	720	130.14	207.691	112.416
5	744	132.782	230.034	116.888
6	720	120.838	172.054	98.426
7	744	163.895	180.52	130.382
8	744	126.179	117.589	104.585
9	720	112.595	164.216	103.157
10	744	117.224	122.403	107.985
11	720	120.623	163.38	105.494
12	744	118.673	138.836	93.773

Suos dem

[1] Uceta, R. (2025). Short-Term Forecasting Dataset SENI Dominican Rep, version 5. Kaggle. File: datos_modelo.csv.

[2] Uceta-Acosta et al. (2025). A dataset of exogenous variables and historical electricity demand for short-term load forecasting of the national interconnected electric system (SENI) in the Dominican Republic from 2021 to 2024. Data in Brief 63, 112057.

Weh di data come fram

Uceta, SENI v5. Original hourly data: CC BY-NC-SA 4.0. CAIA evaluation results.