Notes & Reflections on PV_Hokk Coding

Notebook:	Var Notes		
Created:	2/10/2019 9:37 AM	**Updated:**	3/13/2019 5:11 AM
Author:	mhd3ella@yahoo.com		
URL:	https://www.data.jma.go.jp/obd/stats/data/en/smp/index.html		

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Rank the RMSE based on hour (to check if NWP's initialization time affect the accuracy). I think this already shown in 16 hours forecast results after run XGBoost models, the noon hours with highest error or less accurate.

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Comment on weather data accessibility from Judges on other contest on load forecasting (it seems need a vendor/provider to buy the data from)
https://cuusoo.com/projects/50136/challenges/result   https://cuusoo.com/projects/50136
"*Although this team had limited access to the weather forecast data in Japan and were not able to use a local weather vendor during the Actual Forecast, they derived very high accuracy in both forecast of the Annual Forecast and the Actual Forecast. This suggests that if the weather data from a local weather vendor was used, this team may improve their performance in the prediction.*"
" *Despite using data that can be obtained free of charge, their method devised a means of achieving stable load forecasts even when weather forecasts are inaccurate.*"
But this below Japanese website from the load forecast report seems have data daily, month, year (in Japanese language**)**
http://www.data.jma.go.jp/obd/stats/etrn/index.php?prec_no=&block_no=&year=2018&month=12&day=&view=
http://nlftp.mlit.go.jp/ksj-e/index.html
Try the global or American websites (saved in data collection presentation)

In the Q&A section of the PV contest description: https://cuusoo.com/projects/50369
Q. Why predict the past?
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with WRF are summarized in Table 1....including JMA and other NWPs)

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☑Forecasting wind gusts in winter storms using a calibrated convection-permitting ensemble, (COSMO-DE-EPS system contains various members from global models of four centers: ECMWF, DWD, National Centers for Environmental Prediction and JMA)

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- Check the weather data (solar radiation, cloud cover) for the month July for PV systems of S2, to see whether the weather is behind this low outcomes or the operational conditions, if operational it should be included for forecasts or excluding this period of time from training data.
- Draw boxplots hourly PV power before the trending and after the detrending (subtract or division of clear-sky model) or checking them by summary (min, max, mean, iqr, etc.).**..Done** (*It's not necessary that by detrending the variability becomes less, actually the variability could increase. But it is obvious that the seasonality is removed and the data become more stationary. *)

Std for PV S1 at 12:00
*   P_orig   P_det_div   P_det_sub*
* 0.2995686   0.3084343   0.2833698*
Std for PV S1 at 07:00
*   P_orig   P_det_div   P_det_sub*
* 0.1738884   0.3379325   0.1539123*

- Should the values of the trended data that are greater than 1 replaced by 1, **ypd[ypd>1]<- 1**, or there is no necessary, because that could leadd to confusion in the transforming back after the forecasting ?! (To solve this issue of values of detrend>1 I found using hours each 10 or 14 days better than 7 days in the filter: **df_h$S1=runmax(df_h$S1,14)**
- Include the albedo and check its effects on the solar power in the historical data,because Hokkaido is snowy region.
- To convince about the model complexity provide with and without results and improvement in forecasts skill. Such as using post processing approach to adjothe surface solar radiation from NWP(s) with its ground measurements and then using this approach to a adjust solar radiation at the locations of PV plants for further spatial refining.
- http://gpvjma.ccs.hpcc.jp/~gpvjma/   (Archive GPV-MSM from JMA)
- Weather Forecasts: https://www.meteoblue.com/en/weather/archive/yearcomparison/tokyo_japan_1850147
- Tables of Monthly (not hourly) Climate Statistics https://www.data.jma.go.jp/obd/stats/data/en/smp/index.html
- meteorological mesoscale model (MSM) https://www.jma.go.jp/jma/en/Activities/nwp.html
- Wunderground: https://www.wunderground.com/hourly/jp/sapporo?cm_ven=localwx_hour
- https://stackoverflow.com/questions/3200984/where-can-i-find-historical-raw-weather-data?rq=1 (**Stackoverflow question about where can raw weather data be found)

  Part 1. How to Use the Wunderground API · initialstate ... - GitHub

  https://github.com/topics/weather-underground

  https://github.com/Solcast/howto-pandas   (Github How-To Solcast - Python, Pandas, MatPlotLib, and PvLib/ Japan)
  https://wiki.solargis.com/display/public/Solargis+API+User+Guide
- https://opendata.stackexchange.com/questions/5225/is-there-a-public-web-service-that-will-provide-hourly-forecasts-of-the-solar-ra
- https://opendata.stackexchange.com/questions/297/how-does-one-parse-weather-data (weather forecasts, data parse)
- https://stackoverflow.com/questions/6264196/parse-weather-forecast-data-from-the-ndfd-in-c-sharp (weather forecasts, data parse in C#)
- https://www.geeksforgeeks.org/python-find-current-weather-of-any-city-using-openweathermap-api/ (**Latest data parse of weather forecasts, it is useful for python scripts. BUT historical forecasts are not free. mhd3ella@yahoo.com, a...4)
- https://github.com/ZeevG/python-forecast.io (Github for weather data parsing. Darksky: mhd3ella@yahoo, Mh...3+, Secret Key: 4c1d8ffee5fc3ba8762c24c23f084a52)

- https://stackoverflow.com/questions/53186669/is-there-a-free-historic-weather-data-api-with-latitude-longitude-support (Stackoverflow code of Dark Sky)
- https://github.com/jacobtomlinson/datapoint-python (similar to Dark Sky UK weather data via the Met Office's open data API known as Datapoint).
- https://nomads.ncdc.noaa.gov/data/gfsanl/ (GFS model archive)
- https://pypi.org/project/weather-api/ (For python scripts for weather data parsing)
- https://opendata.stackexchange.com/questions/297/how-does-one-parse-weather-data (Answered by [Jeanne Holm](), she is an expert on open data, API, [Data.gov]() and NASA/JP.)
- https://stackoverflow.com/questions/51313039/historical-weather-data-from-python-noaa-sdk-api-and-generator
- https://www.cpc.ncep.noaa.gov/products/wesley/wgrib2/compile_questions.html (compiling wgrib2 and info about Netcdf4)
- https://towardsdatascience.com/how-docker-can-help-you-become-a-more-effective-data-scientist-7fc048ef91d5 (since most function are based on Linux with weather data, see Docker to change the operation system virtually...."How Docker Can Help You Become A More Effective Data Scientist".
- Think of using just the weather data of last three months of 2018, Oct, Nov, Dec, in addition to the forecasting month Jan 2019.
- **NOTE (Post-processing Approach): I think the adjusting post-processing approach is good option. there is two stages for this approach. First, adjust the solar radiation by calibrating it with the solar radiation measurements to get adjusted POA solar. Second, use the adjusted solar radiation (POA) for solar power forecast at the location of the PV plants. Including both temperature and cloud cover data in both stages of this approach, it may be useful to incorporate information about surface albedo, aerosol optical depth (AOD), or snow fall in the Hokkaido location. I don't think the detrending of diurnal or annual variability might be necessary if the surface solar irradiance was provided as input to the forecast models!.**
- http://www.soda-pro.com/web-services/meteo-data/gfs-forecasts (Temperature, R.Humidity, Short-wave irradiance (GHI), wind, Snow, from GFS forecasts, as CSV. These forecasts are available for 1 month Only, so I used them for January 2019 at measurement and PV locations. **But it is not know which update are they, 00, 6:00,12:00, 18:00**?) because they should be at most at 18:00 updates not beyond in this contest.
- At the same website above, there is also MERRA forecasts http://www.soda-pro.com/web-services/meteo-data/merra;jsessionid=8AEFB9A88EC61CCCB6D0C19BEFCEA689
- I might look for easier grab website (similar to soda) online archive of GFS solar irradiance forecasts of but the updates should be clear and indicating which time the forecasts are generated each day, to be used in this contest.
- Package PVLIB_Python, especially topic of https://pvlib-python.readthedocs.io/en/latest/forecasts.html (Model data accessed with PVLIB-Python is returned as a pandas DataFrame with consistent column names: temp_air, wind_speed, total_clouds, low_clouds, mid_clouds, high_clouds, dni, dhi, **ghi**. and Tony Lorenzo Reps in GitHub.
- Also SolarData-master by Dazhi Yang has R code with grib commands for bring weather variable.
- http://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.EMC/.CFSv2/.MONTHLY_REALTIME/.FLXF/.surface/.DSWRF/
- http://iridl.ldeo.columbia.edu/SOURCES/.ISCCP/
- http://www2.mmm.ucar.edu/wrf/users/download/free_data.html (WRF input data).

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From: [大竹秀明]()
Sent: Wednesday, February 13, 2019 12:17 AM
To: [Mohamed Abuella]()

Subject: RE: Inquiry about English version of Japan weather data

Dear Mohamed Abuella

Thank you for your e-mail and your inquires on data access GPV-MSM.

JMA provided forecast data freely from the web site of Kyoto University.

However, the information on the data is explained in Japanese in the web site.

Would you have a contact the following address ([glob-atmos@rish.kyoto-u.ac.jp]())

After Dec 5, 2017, GHI forecasts from GPV-MSM and global model are provided from the database.

You can use the data base freely in the only research field.

http://database.rish.kyoto-u.ac.jp/arch/jmadata/gpv-original.html

Data base

http://database.rish.kyoto-u.ac.jp/arch/jmadata/data/gpv/original/

For a commercial use, you can receive the data from the The Japan Meteorological Business Support Center (JMBSC).

GPV datasets are not free for a commercial use.

http://www.jmbsc.or.jp/en/index-e.html

Best regards,

 Hideaki

————————————————

Hideaki Ohtake

Research Center for Photovoltaics

National Institute of Advanced Industrial Science and Technology (AIST), JAPAN

OSL, Central 2,1-1-1 Umezono, Tsukuba, Ibaraki 305-8568, Japan

tel: +81-29-849-1526, fax: +81-29-861-5829

From: Hiromasa Yoshimura
Sent: Sunday, February 17, 2019 7:18 PM
To: Mohamed Abuella

Subject: Re: Inquiry about English version of historical data of Japan weatherforecasts

Dear Mohamed Abuella,

Hello,

I search Web and find a homepage below.

http://apps.diasjp.net/gpv/

This is a Japanese homepage, but a download page below is English.

http://apps.diasjp.net/gpv/cgi-bin/GPVdate2b.sh

I hope it helps.

Sincerely,

Hiromasa Yoshimura

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Conflicting modification on March 11, 2019 at 08:46:39:

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- Tables of Monthly (not hourly) Climate Statistics https://www.data.jma.go.jp/obd/stats/data/en/smp/index.html
- meteorological mesoscale model (MSM) https://www.jma.go.jp/jma/en/Activities/nwp.html
- Wunderground: https://www.wunderground.com/hourly/jp/sapporo?cm_ven=localwx_hour
- https://stackoverflow.com/questions/3200984/where-can-i-find-historical-raw-weather-data?rq=1 (**Stackoverflow question about where can raw weather data be found)

  Part 1. How to Use the Wunderground API · initialstate ... - GitHub

  https://github.com/topics/weather-underground

  https://github.com/Solcast/howto-pandas   (Github How-To Solcast - Python, Pandas, MatPlotLib, and PvLib/ Japan)

  https://wiki.solargis.com/display/public/Solargis+API+User+Guide

- https://opendata.stackexchange.com/questions/5225/is-there-a-public-web-service-that-will-provide-hourly-forecasts-of-the-solar-ra
- https://opendata.stackexchange.com/questions/297/how-does-one-parse-weather-data (weather forecasts, data parse)
- https://stackoverflow.com/questions/6264196/parse-weather-forecast-data-from-the-ndfd-in-c-sharp (weather forecasts, data parse in C#)
- https://www.geeksforgeeks.org/python-find-current-weather-of-any-city-using-openweathermap-api/ (**Latest data parse of weather forecasts, it is useful for python scripts. BUT historical forecasts are not free. mhd3ella@yahoo.com, a...4)
- https://github.com/ZeevG/python-forecast.io (Github for weather data parsing. Darksky: mhd3ella@yahoo, Mh...3+, Secret Key: 4c1d8ffee5fc3ba8762c24c23f084a52)
- https://stackoverflow.com/questions/53186669/is-there-a-free-historic-weather-data-api-with-latitude-longitude-support (Stackoverflow code of Dark Sky)
- https://github.com/jacobtomlinson/datapoint-python (similar to Dark Sky UK weather data via the Met Office's open data API known as Datapoint).
- https://nomads.ncdc.noaa.gov/data/gfsanl/ (GFS model archive)
- https://pypi.org/project/weather-api/ (For python scripts for weather data parsing)
- https://opendata.stackexchange.com/questions/297/how-does-one-parse-weather-data (Answered by Jeanne Holm, she is an expert on open data, API, Data.gov and NASA/JP.)
- https://stackoverflow.com/questions/51313039/historical-weather-data-from-python-noaa-sdk-api-and-generator
- https://www.cpc.ncep.noaa.gov/products/wesley/wgrib2/compile_questions.html (compiling wgrib2 and info about Netcdf4)
- https://towardsdatascience.com/how-docker-can-help-you-become-a-more-effective-data-scientist-7fc048ef91d5 (since most function are based on Linux with weather data, see Docker to change the operation system virtually...."How Docker Can Help You Become A More Effective Data Scientist".
- Think of using just the weather data of last three months of 2018, Oct, Nov, Dec, in addition to the forecasting month Jan 2019.
- **NOTE (Post-processing Approach): I think the adjusting post-processing approach is good option. there is two stages for this approach. First, adjust the solar radiation by calibrating it with the solar radiation measurements to get adjusted POA solar. Second, use the adjusted solar radiation (POA) for solar power forecast at the location of the PV plants. Including both temperature and cloud cover data in both stages of this approach, it may be useful to incorporate information about surface albedo, aerosol optical depth (AOD), or snow fall in the Hokkaido location. I don't think the**

detrending of diurnal or annual variability might be necessary if the surface solar irradiance was provided as input to the forecast models!.

- http://www.soda-pro.com/web-services/meteo-data/gfs-forecasts (Temperature, R.Humidity, Short-wave irradiance (GHI), wind, Snow, from GFS forecasts, as CSV. These forecasts are available for 1 month Only, so I used them for January 2019 at measurement and PV locations. **But it is not know which update are they, 00, 6:00,12:00, 18:00**?) because they should be at most at 18:00 updates not beyond in this contest.
- At the same website above, there is also MERRA forecasts http://www.soda-pro.com/web-services/meteo-data/merra;jsessionid=8AEFB9A88EC61CCCB6D0C19BEFCEA689
- I might look for easier grab website (similar to soda) online archive of GFS solar irradiance forecasts of but the updates should be clear and indicating which time the forecasts are generated each day, to be used in this contest.
- Package PVLIB_Python, especially topic of https://pvlib-python.readthedocs.io/en/latest/forecasts.html (Model data accessed with PVLIB-Python is returned as a pandas DataFrame with consistent column names: temp_air, wind_speed, total_clouds, low_clouds, mid_clouds, high_clouds, dni, dhi, **ghi**. and Tony Lorenzo Reps in GitHub.
- Also SolarData-master by Dazhi Yang has R code with grib commands for bring weather variable.
- http://iridl.ldeo.columbia.edu/SOURCES/.NOAA/.NCEP/.EMC/.CFSv2/.MONTHLY_REALTIME/.FLXF/.surface/.DSWRF/
- http://iridl.ldeo.columbia.edu/SOURCES/.ISCCP/
- http://www2.mmm.ucar.edu/wrf/users/download/free_data.html (WRF input data).
- https://www.ecmwf.int/en/about/media-centre/fact-sheet-ensemble-weather-forecasting (EPS)
- https://www.youtube.com/watch?v=NLhRUun2iso
- https://www.wis-jma.go.jp/cms/sataid/ (Tried to search about archived data in JMA by Google images)

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Subject: RE: Inquiry about English version of Japan weather data

Dear Mohamed Abuella

Thank you for your e-mail and your inquires on data access GPV-MSM.

JMA provided forecast data freely from the web site of Kyoto University.

However, the information on the data is explained in Japanese in the web site.

Would you have a contact the following address (glob-atmos@rish.kyoto-u.ac.jp)

After Dec 5, 2017, GHI forecasts from GPV-MSM and global model are provided from the database.

You can use the data base freely in the only research field.

http://database.rish.kyoto-u.ac.jp/arch/jmadata/gpv-original.html

Data base

http://database.rish.kyoto-u.ac.jp/arch/jmadata/data/gpv/original/

For a commercial use, you can receive the data from the The Japan Meteorological Business Support Center (JMBSC).

GPV datasets are not free for a commercial use.

http://www.jmbsc.or.jp/en/index-e.html

Best regards,

 Hideaki

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Hideaki Ohtake

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From: Hiromasa Yoshimura
Sent: Sunday, February 17, 2019 7:18 PM
To: Mohamed Abuella

Subject: Re: Inquiry about English version of historical data of Japan weatherforecasts

Dear Mohamed Abuella,

Hello,

I search Web and find a homepage below.

http://apps.diasjp.net/gpv/

This is a Japanese homepage, but a download page below is English.

http://apps.diasjp.net/gpv/cgi-bin/GPVdate2b.sh

I hope it helps.

Sincerely,

Hiromasa Yoshimura

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http://apps.diasjp.net/gpv/cgi-bin/GPVdate2b.sh   (The links of the app mentioned above but the capacity is limited 2 Gb., and its for globe so I didn't figure out how to download the certain location's data)
http://apps.diasjp.net/gpv/cgi-bin/uncgi.cgi/GPVdate1a.sh
http://apps.diasjp.net/gpv/cgi-bin/uncgi.cgi/GPVdate3a.sh
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https://ds.data.jma.go.jp/ghg/kanshi/co2data/co2_mapdata_e.html   (Archived climate CO2 data from JMA, it could leads to archived data for weather variables as well)