

- hacer solo los mensuales o quincenales
- quiera usar solo el 2018 para predecir el 2019
  - o usar solo el 2020 para predecir el 2021)

artículo: what is time series forecasting?

The future is being predicted, but all prior observations are almost always treated equally. perhaps with some very minor temporal dynamics to overcome the idea of 'concept drift' such as only using the last year of observations rather than all data available.

$$y = \text{level} + \text{trend} + \text{seasonality} + \text{noise}$$

artículo: time series forecasting as supervised learning

In the majority of practical machine learning uses supervised learning.

Luego borre el archivo:

C:\Users\pedro.tobarra.AD.FPNATOOLS\OneDrive\Documentos\WindowsPowerShell\profile.ps1  
Lo con esto se daba un error.

Lo corras 'Anaconda Powershell Prompt (Anaconda 3)

Tambien puedes borrar desde Anaconda Navigator:

'CMD.ell Prompt'

'Powershell Prompt'

conda 4.9.2 -> conda -V

Python 3.8.5 -> python -V

conda update conda

conda update anaconda

versions - 20210227.ps1

deep-versions - 20210227.ps1

W:\user\glow\stream\_executor\platform\default\dsd\_loader.cc:60] Could not load dynamic library 'cudart64\_110.dll'; dlerror: cudart64\_110.dll not found

I [cudnn\stream\_executor\cuda\cudart\_stub.cc:29]

Ignore above cudart dlerror if you do not have a GPU set up on your machine.

2/14 2/6'

## artículo: Time Series Forecasting With Prophet in Python

Monthly Car Sales Dataset (csv)

Tiene 108 observaciones mensualizadas,  
I.E. tiene 9 años de datos desde 1960-01  
hasta 1968-12.

Naive Persistence Forecast:  $\text{MAE} = 3235$

To mean  
absolute  
error

range-of-data

Ahora q sabes lo facilito q es usar prophet  
consigue un dataset de valores medios  
semanales y hace una predicción a 12  
semanas → QUIZA INCLUSO TE SEA MÁS  
FACIL HACER PREDICCIONES DIARIAS

Lo \* investigalo en pandas y en prophet

31/10 3/6'

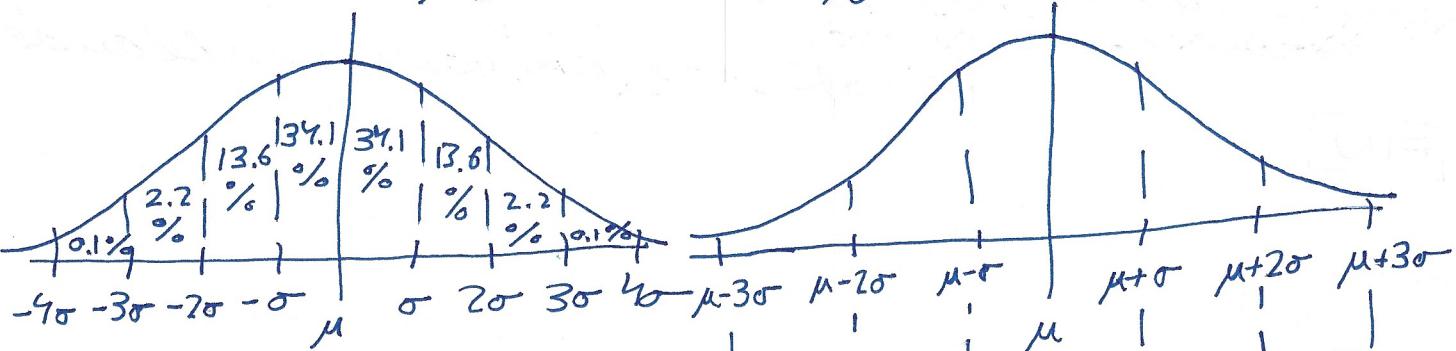
Las causaciones ~~son~~ grandes varia  
ables se pueden compensar

Los principios de 2015  
y mediados de 2018  
Traz y causaciones  
q son outliers y se  
compensan

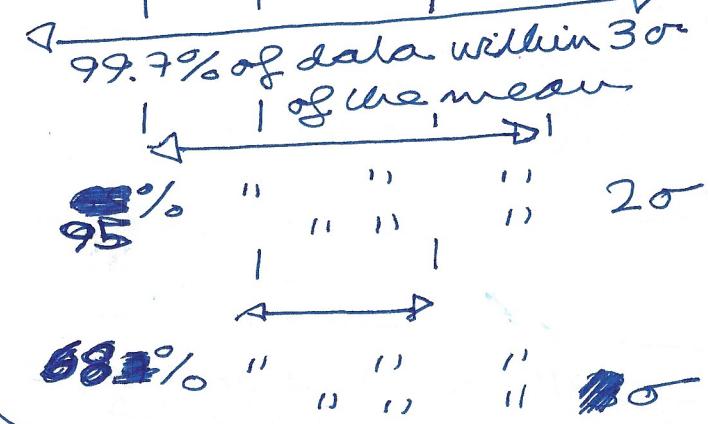
por ejemplo quitando de la cuenta  
las causaciones de mas de 50000eur

o por ejemplo quedandnos con los valores q estan  
dentro de 2 o alrededor de  $\mu$ .

$$\begin{aligned}\mu \pm \sigma &\rightarrow 68.2\% \text{ de los valores} \\ \mu \pm 2\sigma &\rightarrow 95.4\% \text{ de los valores} \\ \mu \pm 3\sigma &\rightarrow 99.8\% \text{ de los valores}\end{aligned}$$



\* idea quitar causacio-  
nes q sean outliers  
en los boxplots  
(valorar casi q no)  
Lo CASI Q NO  
PARA EVITAR SITUACIONES  
DEL TIPO



2021/10/30 8 REUNION AROMERALES ESTACIONALES  
precision realista → tener 1 año de datos  
precision optimista → tener 2 años de datos  
propuesta aromerales → quitar movimientos  
categorizado como outliers → apoyandonos  
en categorización de movimientos  
aromerales dice q la mayoría de la gente  
es como un reloj q tiene una rutina y  
unos gastos fijos concretos y luego vacaciones  
y nalgadas

4/14

4/6'

aromerales quiere previsiones semanales de tesoreria para el siguiente trimestre apoyandoros en un año de datos.

FIN

Loa pedir de miércoles por la tarde o jueves aromerales disponible llamar el jueves

20210308 CONVERSACION WHATSAPP AROMERALES

AR: sobre libros los podemos comprar la expres. Dime.

PT: le ve diciendo poco a poco y con prudencia gracias. Llegare a la solución (creo) pero tardare más en hacerlo q un mes.

AR: no te asombres. confio enq encontraras solución seguro.

PT: ok gracias. vamos hablando.

FIN

A continuacion repetimos el ejercicio con las siguientes premisas:

- Solo cogemos los años 2016, 2017, 2018, 2019
- Solo cogemos los outliers transacciones
- Tomamos como outliers transacciones superiores a 1000000 euro q en total solo va a haber 2 en 2017
- Como 2016 fue bisiesto el valor de la transaccion el 2016-2-29 eliminamos esa fila y sumamos su valor a 2016-2-28.

20210315 REU AROMERALES  
RGARCIA  
DPEREZ

a Roberto le ha invitado para unas conclusiones. lo siguiente sera presentacion con jferada. hacer predicción a 3 meses solo con datos del ultimo año. -> por dias y semanas. hacer predicción por semanas en lugar de por días.

clase: caymar  
codigo no varia sus ~~microservices~~ microservices  
(on-premises).  
subir ~~script~~ a maven > subir a repositorio gitlab  
integrar

FIN

- 5/14** 10 noviembre 5/6  
- hacemos una predicción desde el 1 de ~~9~~ febrero 2020 hasta el 9 de febrero 2021

- un sample forecast: del 2020-08-11 al 2020-11-10

~~del 10 al 17 de noviembre hasta el 17 de noviembre~~

prophet\_train\_dg → 2020-02-16 al 2020-11-15

prophet\_test\_dg → 2020-11-22 al 2021-02-14

~~verificar que las series sean~~ ~~yearly~~ ~~weekly~~ ~~daily~~ ~~monthly~~ = True

~~o ver si mejoran la predicción~~

~~locasi 2 10~~

prophet\_last\_year\_weekly\_dg

	BALANCE
2020-02-16	51648.717143
...	...
2021-02-14	803.59000

2021-02 prophet - last year - weekly - H. shape  
(53, 1)

prophet - last - year - ds

<u>DATE</u>	<u>BALANCE</u>
2020-02-10	38916.48
...	...
365	2021-02-09 650.59
366 rows x 2 columns	

20210317 REU GREET AROMERALES Y LLAMADA DPEREZ

calcularemos por días.  
presentaremos por semanas saldos medios de  
cada semana para tener graficos mas  
suavizados.

User Acceptance Testing (UAT) is one of the last stages of the software development cycle. It is performed after the software has been thoroughly tested. It is sometimes known as End User Testing.

Known as End User Testing.  
acordados con daniel y cc Roberto haras un  
script standalone despues de llamado  
a daniel haré un README.TXT con  
requisitos ejecucion script como environment  
con librerias, fichero entrada y fichero  
salida  
en vagable apox 9-abril - 2021  
3.4.2021 andres cor

con licencia, y  
salida  
llegar en vegable aprox 9-abril - 2021  
correo mandado daniel, roberlo, andres con  
pasos a seguir el 20210317 a las 16:55  
FENI

$$\text{fah} + \overset{\text{bias}}{\text{bias}} = \text{real}$$
$$\text{bias} = \text{real} - \text{fah}$$

6/14

6' 6"

## 20210224 NOTAS ESTIMACION SERIES TEMPORALES

book: deep learning for time series forecasting

book: deep learning with python

curso 7 dias: deep learning for time series

(findings comparing classical and machine learning methods for time series forecasting)

curso 7 dias: stop learning time series forecasting  
the slow way!

(what is time series forecasting)

(otros libros): master machine learning algorithms.  
machine learning mastery with R.

book: introduction to time series forecasting  
with python

(show you how to get results on univariate  
time series forecasting problems using the  
python ecosystem)

articulo: how to develop LSTM models for time series  
forecasting

- how to develop LSTM models for univariate  
time series forecasting
- how to develop LSTM models for multivariate  
time series forecasting
- how to develop LSTM models for multi-step  
time series forecasting

articulo: how to grid search deep learning models  
for time series forecasting

para preparar datos puedes hacer  
diferencias → restar el valor de 12 meses  
anteriores para quitar la  
estacionalidad  
restar el valor del mes  
anterior para quitar  
tendencia

- how to develop a generic grid searching  
framework for tuning model hyperparameters.
- how to grid search hyperparameters for a MLP  
model on the airline passengers multivariate  
time series forecasting problem.
- how to adopt the framework to grid search  
hyperparameters for convolutional and  
LSTM neural networks

artículo: why do I get different results each time in machine learning?

- machine learning algorithms will train different models if the learning dataset is changed.
- stochastic machine learning algorithms use randomness during learning, ensuring a different model is learned each run.
- differences in the development environment such as software versions or CPU type, can cause rounding error differences in predictions or model evaluations.

machine learning mastery EBook Catalog

- COMPARAR: Introduction to Time Series Forecasting With Python  
how to prepare data and develop models to predict the future.
- COMPARAR: Deep learning for Time Series Forecasting  
predict the future with MLPs, CNNs and LSTMs in Python

artículo: how to develop CNN models for time series forecasting

- how to develop CNN models for univariate time series forecasting
- how to develop CNN models for multivariate time series forecasting
- how to develop CNN models for multi-step time series forecasting

artículo: multi-step LSTM time series forecasting models for power usage

- how to develop and evaluate univariate or multivariate encoder-decoder LSTMs for multi-step time series forecasting
- how to develop and evaluate an CNN-LSTM encoder-decoder model for multi-step time series forecasting
- how to develop and evaluate a ConvLSTM encoder-decoder model for multi-step time series forecasting

6 quedas leyendo en 'LSTM Model With Univariate Input and Vector Output'  
interesante sobre este artículo es ver los siguientes links:

+ Introduction to Time Series Forecasting  
(Python)

- Step 1: discover time series forecasting
  - + what is time series forecasting?
- Step 2: discover time series as supervised learning
  - + time series forecasting as supervised learning
- Step 3: discover how to get good at delivering results with Time Series Forecasting
  - + Time Series Forecasting With Python Mini-Course
  - + Time Series Forecasting With Python (my book)

7 lessons each lesson could take you 60 seconds or up to 30 minutes :

+ Deep Learning for Time Series Forecasting

- Step 1: discover the promise (and limitations) of deep learning for time series
  - + 3 posts
- Step 2: discover how to develop robust baseline and defensible forecasting models
- Step 3: discover how to build deep learning models for time series forecasting
  - + How to develop LSTM models for Time Series Forecasting

articles: multivariate time series forecasting with LSTMs in Keras

- how to transform a raw dataset into something we can use for time series forecasting
- how to prepare data n fit a LSTM for a multivariate time series forecasting problem
- how to make a forecast n rescale the result back into the original units

## artículo: Time Series Forecasting as Supervised Learning

- what supervised learning is and how it is the foundation for all predictive modelling machine learning algorithms
- the sliding window method for framing a time series dataset in how to use it
- how to use the sliding window ~~method~~ for multivariate data and multi-step forecasting

### summary:

- supervised learning is the most popular way of framing problems for ML as a collection of observations with inputs n outputs
- sliding window is the way to restructure a time series dataset as a supervised learning problem.
- multivariate and multi-step forecasting time series can also be framed as supervised learning using the sliding window method

## artículo: how to convert a time series to a supervised learning problem in python

- how to develop a function to transform a time series dataset into a supervised learning dataset
- how to transform univariate time series data for ML.
- how to transform multivariate time series data for ML.

### you learned:

- about the pandas ~~get~~<sup>shift()</sup> function n how it can be used to automatically define supervised learning datasets from time series data
- how to reframe a univariate time series into one-step n multistep supervised learning problems
- how to reframe multivariate time series into one-step and multi-step supervised learning problems

## artículo: 11 classical time series forecasting methods in python (ideal sheet)

el mejor que te da Holt Winter's Exponential Smoothing (HWES)

puedes usar este artículo para obtener resultados a andres y a darwin a costa plazos

artículo: what is time series forecasting?

- standard definitions of time series, time series analysis, and time series forecasting.
- the important components to consider in time series data.
- examples of time series to make your understanding concrete

summary, you learned:

- about time series and the difference between time series analysis and time series forecasting
- the constituent components that a time series may be decomposed into when performing an analysis
- examples of time series forecasting problems to make these ideas concrete.

artículo: gentle introduction to predictive modeling

artículo: how to setup your python environment for ML with anaconda

1. download anaconda
2. install anaconda
3. start and update anaconda
4. update scikit-learn library
5. install deep learning libraries

artículo: your first ML project in python step by step

1. downloading, installing, and starting python  
scipy
  - 1.1 install scipy libraries  
scipy, numpy, matplotlib, pandas, sklearn  
check versions
  - 1.2 start python n check version
2. load the data
  - 2.1 import libraries
  - 2.2 load dataset
3. summarize the dataset
  - 3.1 dimensions of dataset
  - 3.2 peek at the data
  - 3.3 statistical summaries
  - 3.4 class distribution
  - 3.5 complete example

- 4. data visualization
  - 4.1 univariate plots
  - 4.2 multivariate plots
  - 4.3 complete example
- 5. evaluate some algorithms
- 5. evaluate some algorithm dataset
- 5.1 create a validation dataset
- 5.2 Test Harness
- 5.3 Build Models
- 5.4 Select Best Model
- 5.5 Complete Example
- 6. make predictions
- 6.1 make predictions
- 6.2 evaluate predictions
- 6.3 complete example

remember, you can use the help ("Function Name") in python to get help on any function

articles: a gentle introduction to K-fold cross-validation

you will know:

- that K-fold cross validation is a procedure used to estimate the skill of the model on new data
- there are common tactics that you can use to select the value of K for your dataset
- there are commonly used variations on cross-validation such as stratified and repeated that are available in scikit-learn

you learned:

- that K-fold cross validation is a procedure used to estimate the skill of the model on new data.
- there are common tactics that you can use to select the value of K for your dataset.
- there are commonly used variations on cross-validation, such as stratified and repeated, that are available in scikit-learn

articles: time series forecast case study with python: annual water usage in Baltimore

- how to confirm your python environment is correctly defined a time series forecasting problem
- how to create a test harness for evaluating models, develop a baseline forecast, and better understand your problem with the tools of time series analysis
- how to develop a autoregressive integrated moving average model, save it to a file, n later load it to make predictions for new time steps

1. environment  
scipy, numpy, matplotlib, pandas, scikit-learn,  
statsmodels
2. problem description
3. test harness
- 3.1 validation dataset
- 3.2 model evaluation
- 3.2.1 performance measure
- 3.2.2 test strategy
4. Persistence
5. Data Analysis
- 5.1 Summary Statistics
- 5.2 Line Plot
- 5.3 Density Plot
- 5.4 Box and Whisker Plots
- 6 ARIMA Models
- 6.1 Manually Configured ARIMA
- 6.2 Grid Search ARIMA Hyperparameters
- 6.3 Review Residual Errors
7. Model Validation
- 7.1 Evaluate Model
- 7.2 Make Prediction
- 7.3 Validate Model

### summary:

- how to develop a test harness with a performance measure in evaluation method or how to quickly develop a baseline forecast or still
- how to use time series analysis to raise ideas for how to best model the forecast problem.
- how to develop our ARIMA model, save it, and later load it to make predictions on new data

articles: how to batch machine learning models for time series forecasting

- you will know:
- the limitations of traditional methods of model evaluation from ML and why evaluating models on out of sample data is required
  - how to create train-test splits in multiple train-test splits of time series data for model evaluation in Python

**summary:****you learned:**

- about the importance of evaluating the performance of models on unseen or out-of-sample data
- how to create train-test splits of time-series data, and how to create multiple such splits automatically
- how to use walk-forward validation to provide the most realistic test harness for evaluating your models.

**articles:** how to create an ARIMA Model for Time Series Forecasting in Python

after completing this tutorial you will know:

- about the ARIMA model, the parameters used in assumptions made by the model
- how to fit arima model to data & use it to make forecast
- how to configure the ARIMA model on your time series problem

**you learned:**

- about the ARIMA model, how it can be configured, and assumptions made by the model.
- how to perform a quick time series analysis using the ARIMA model.
- how to use an ARIMA model to forecast out of sample predictions

**articles:** how to grid search ARIMA model hyperparameters with python

after completing this tutorial you will know:

- a general procedure that you can use to tune the ARIMA hyperparameters
- how to apply ARIMA hyperparameter optimization on a standard univariate time series dataset
- ideas for extending the procedure for more elaborate & robust models

**summary: specifically, you learned:**

- a procedure that you can use to grid search ARIMA hyperparameters for a one-step rolling forecast
- how to apply ARIMA hyperparameters tuning on standard univariate time series datasets
- ideas on how to further improve grid searching of ARIMA parameters