



# Machine Learning 101

Technical Primer

+vRay Escobar

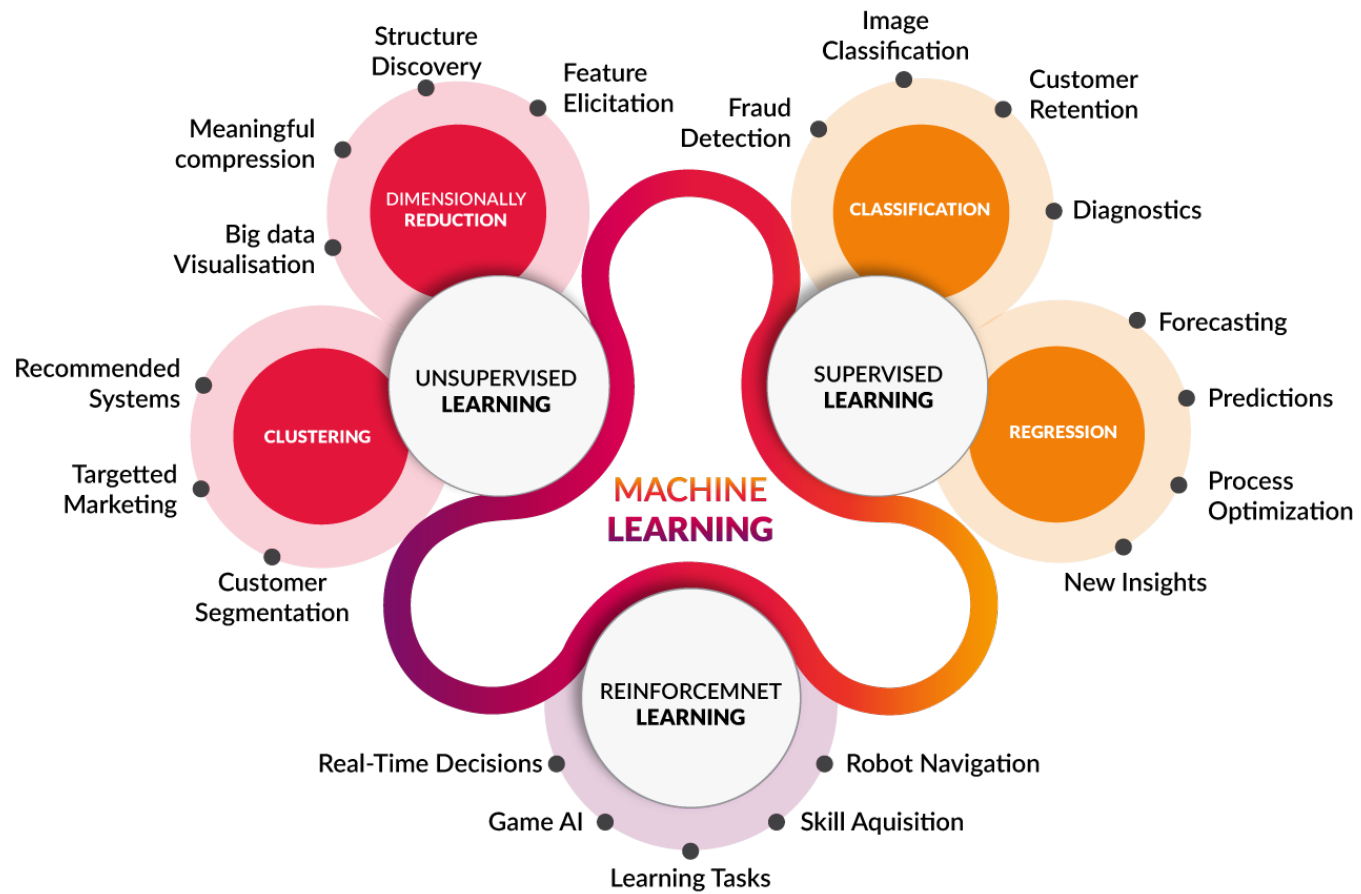
Staff Consulting Architect

VMware PSO

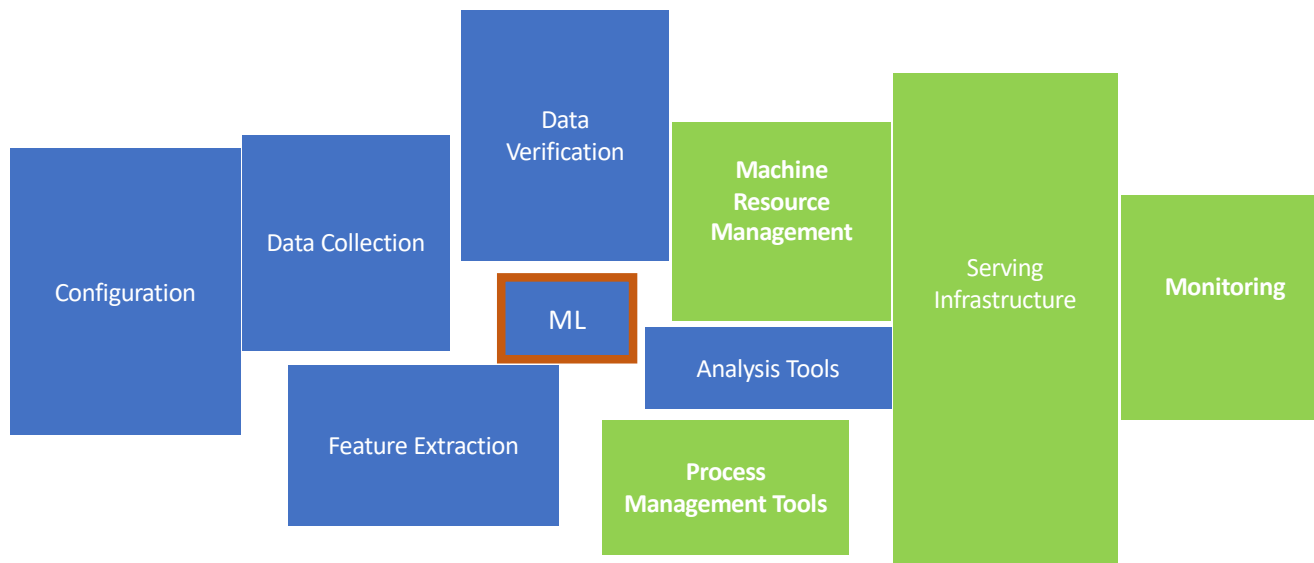
 @elnemesisdivina

vmware®

 Ambassador  
OFFICE OF THE CTO




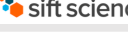
















































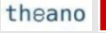
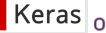

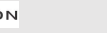
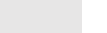

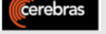






















# Definition

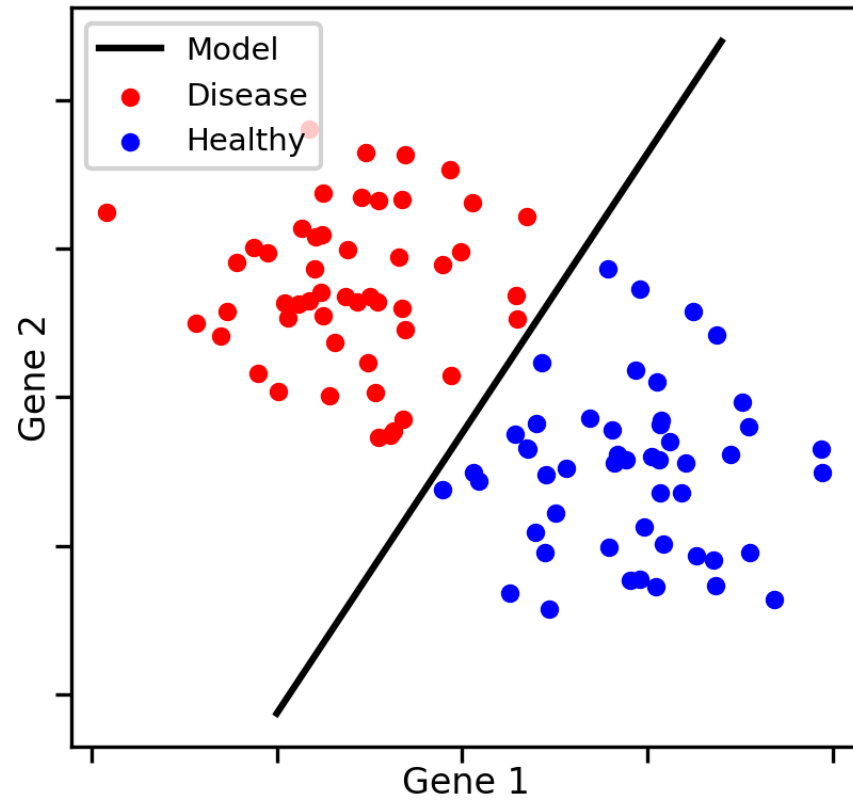


Source: Hidden Technical Debt in Machine Learning Systems, Scully, D., et al (Google)

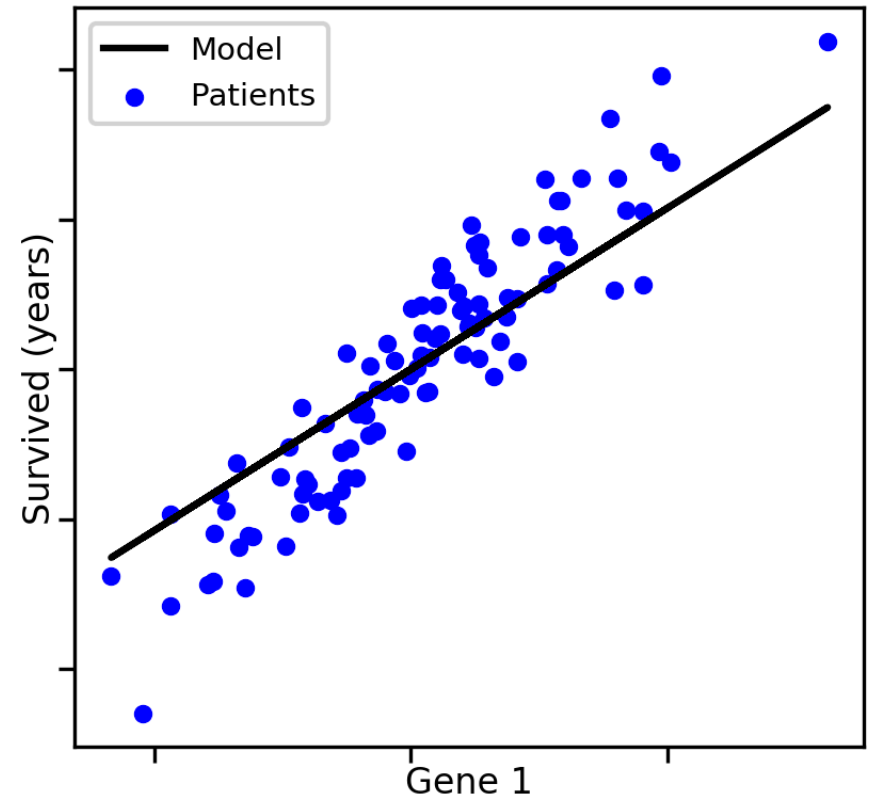
# Landscape

Category	Sub-category	Vendors <sup>1</sup>
Solutions	VMware adjacencies	<div>Finance</div> <div>   </div> <div>   </div> <div>IT Management</div> <div>    </div> <div>Healthcare</div> <div>   </div> <div>   </div> <div>Security</div> <div>   </div> <div>   </div>
Managed Services	Services	    
Operations (MLOps)	Deploy, Automate, Monitor	  
Data Science & ML Platforms	Domain specific	     
	Horizontal	        
		        
Middleware	Frameworks	         
Hardware	Accelerators for training	<div>ML Optimized</div> <div>      </div> <div>      </div> <div>      </div>
		<div>Traditional CPU, GPU, FPGA</div> <div>     </div> <div>    </div>

Classification

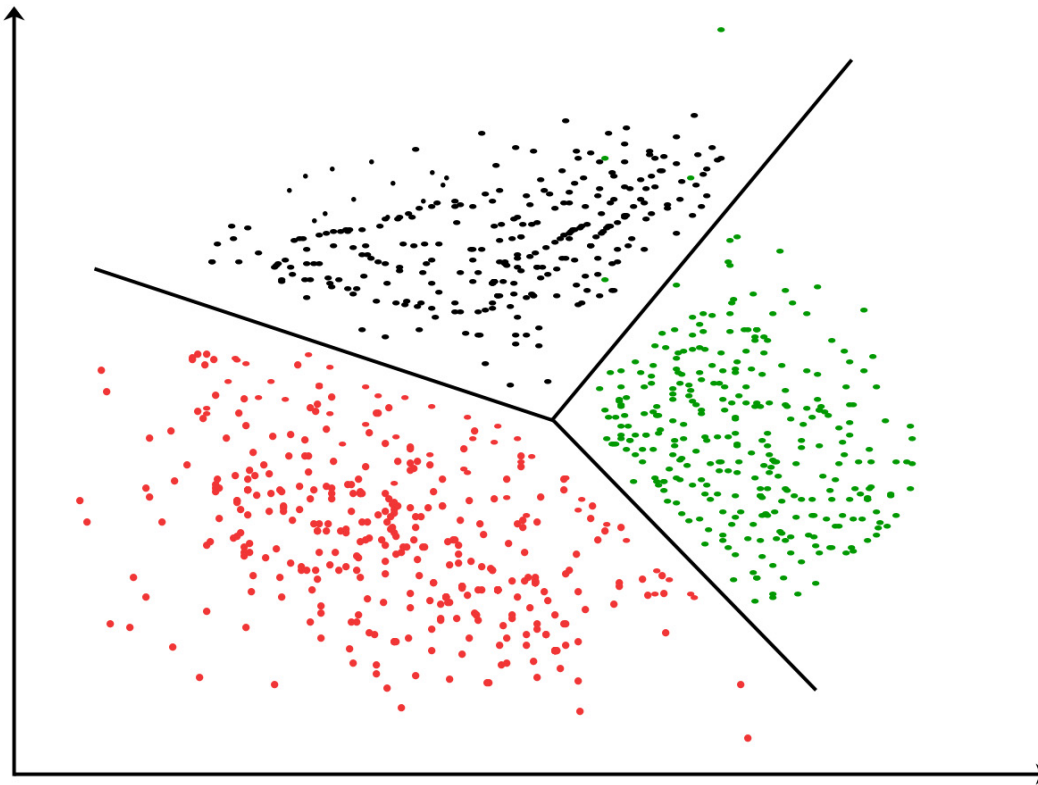


Regression



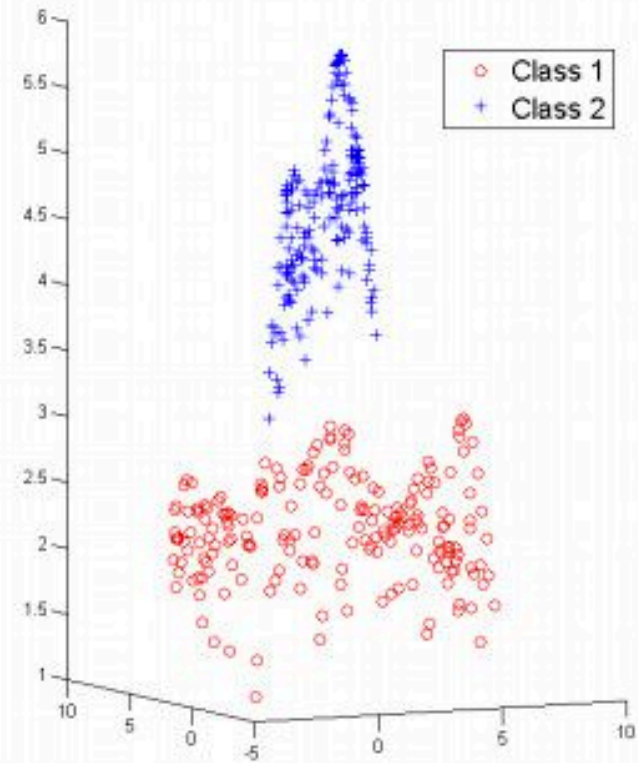
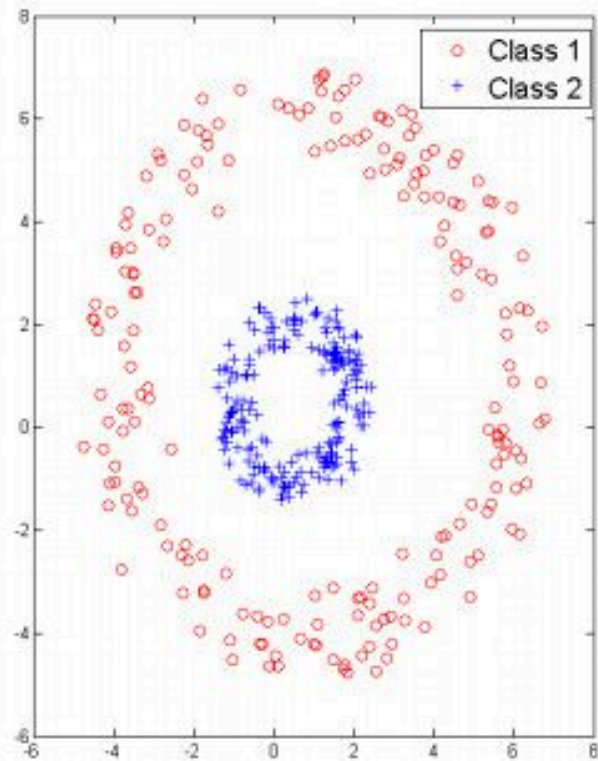
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$$\arg \min_{\mathbf{S}} \sum_{i=1}^k \sum_{\mathbf{x} \in S_i} \|\mathbf{x} - \boldsymbol{\mu}_i\|^2 = \arg \min_{\mathbf{S}} \sum_{i=1}^k |S_i| \text{Var } S_i$$

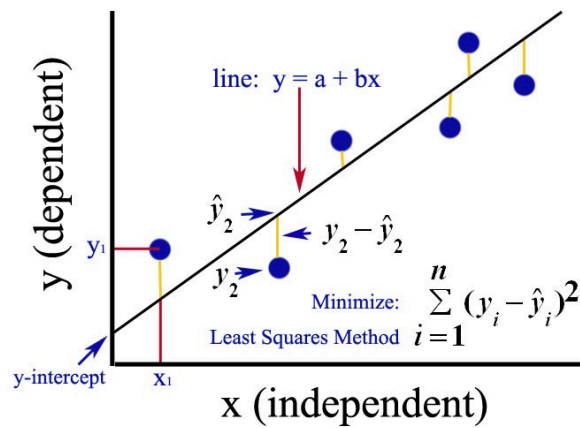


## SVM using Gaussian Kernel

WhiteBoarding\*



$$\text{MSE} = \frac{1}{n} \sum_{i=1}^n (Y_i - \hat{Y}_i)^2.$$



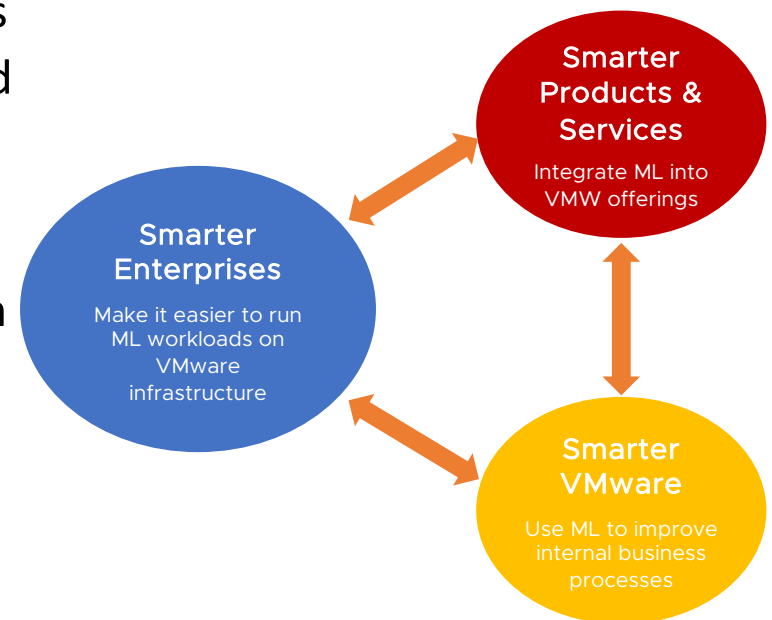
# Linear Regression





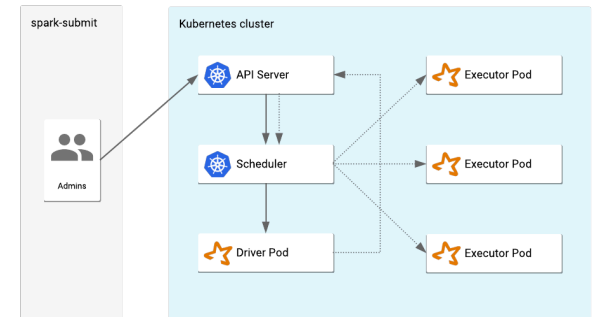
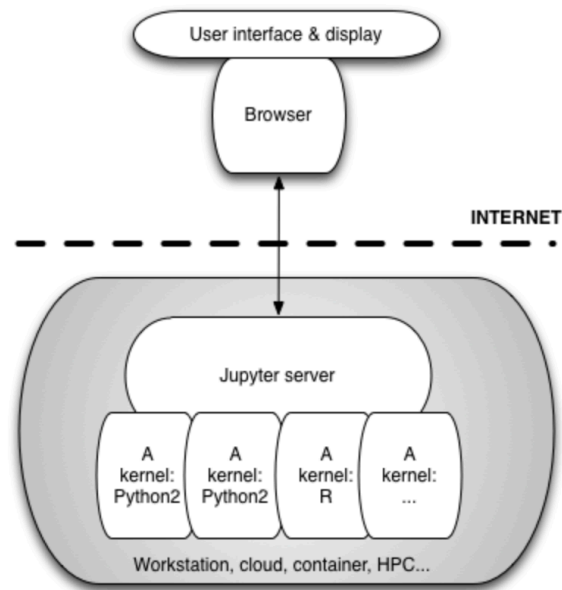
# VMware Perspective

- VMware invests in use of ML in three broad areas
  - Enabling customers to provision, manage, and monitor agile IT infrastructure to support all their ML requirements
  - Incorporating ML techniques into VMware products and services to enhance automation and predictive analytics at scale
  - Using a broad array of ML techniques internally to increase operational efficiency
- VMware also advances the state of the art in analytics and ML through a variety internal research projects, and through support and collaboration with top academic research teams





# Kubeflow



vmware  
Essential PKS



# Stocks value VMW Prediction

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Raymundo Escobar



¿Cual es la prediccion de valor  
del stock en el futuro?



Específicamente para el codigo  
VMW

A	B	C	D	E	F	G	H
date	symbol	volume	open	close	high	low	adjclose
3/1/19	A	1625900	80	81.2399979	81.4400024	80	81.23999
2/28/19	A	1759100	79.1800003	79.4400024	79.75	78.8899994	79.44000
2/27/19	A	1254400	78.25	79.4199982	79.5500031	78.25	79.41999
2/26/19	A	1992600	79.2099991	78.5500031	79.2699966	78.4199982	78.55000
2/25/19	A	1878000	78.9000015	79.3399963	79.8399963	78.8499985	79.33999
2/22/19	A	2797700	78.1600037	78.4199982	78.4599991	77.8300018	78.41999
2/21/19	A	3570800	77.6699982	77.8899994	78.5800018	76.5	77.88999
2/20/19	A	2076500	77.5299988	78.5599976	78.8000031	77.3300018	78.55999
2/19/19	A	2968000	78	77.5199966	78.3199997	77.4100037	77.51999
2/15/19	A	1919700	77.6299973	78.3000031	78.3099976	77.4700012	78.30000
2/14/19	A	1618100	77	77.0199966	77.2799988	76.5199966	77.01999
2/13/19	A	1376400	77.3700027	77.25	77.4899979	76.7399979	77.
2/12/19	A	2045500	76.8000031	77.0699997	77.25	76.4300003	77.06999
2/11/19	A	1018000	76	76.0800018	76.3899994	75.75	76.08000
2/8/19	A	1318100	75.0699997	75.8000031	75.8099976	74.7600021	75.80000

## Dataset

- 21 years (1995-2015) of S&P 500 Stock Index data at a monthly frequency (a total of 252 observations) from Yahoo Finance
- Focus on **VMW** stocks from 2, 3, 5, 10 years?

### CATEGORIES

- **date** - year-month-day, 2018-08-08
- **volume** - int, volume of the day
- **open** - float, opening price of the day
- **close** - float, closing price of the day
- **high** - float, highest price of the day
- **low** - float, lowest price of the day
- **adjclose** - float, adjusted closing price of the day

Cuando sepa la tendencia  
podria predecir cuando  
vender mas caros los  
restricted stocks!

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# Historico de Precios de VMW

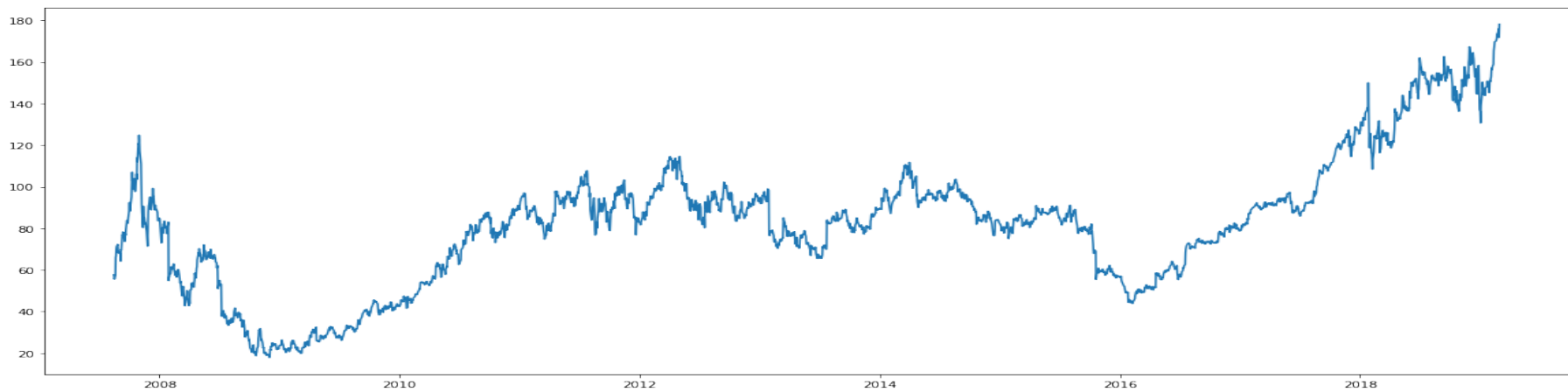
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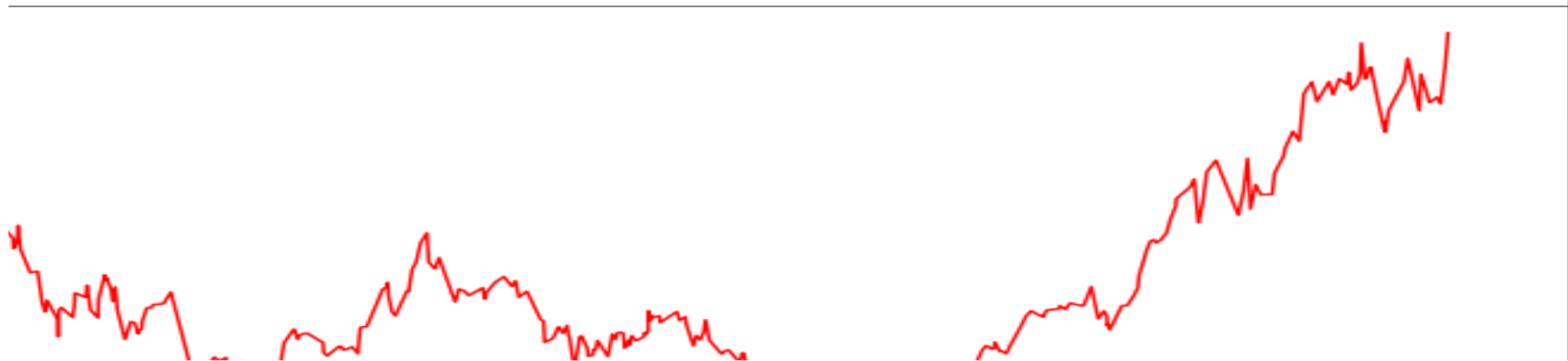
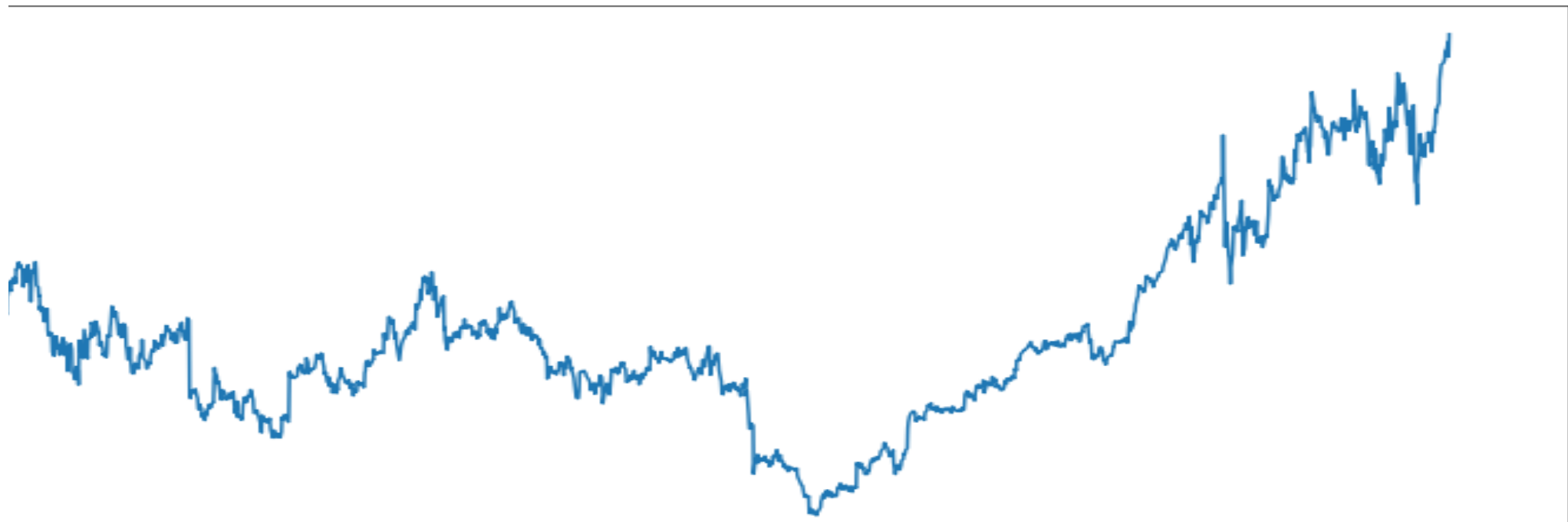




# Precios Pedichos

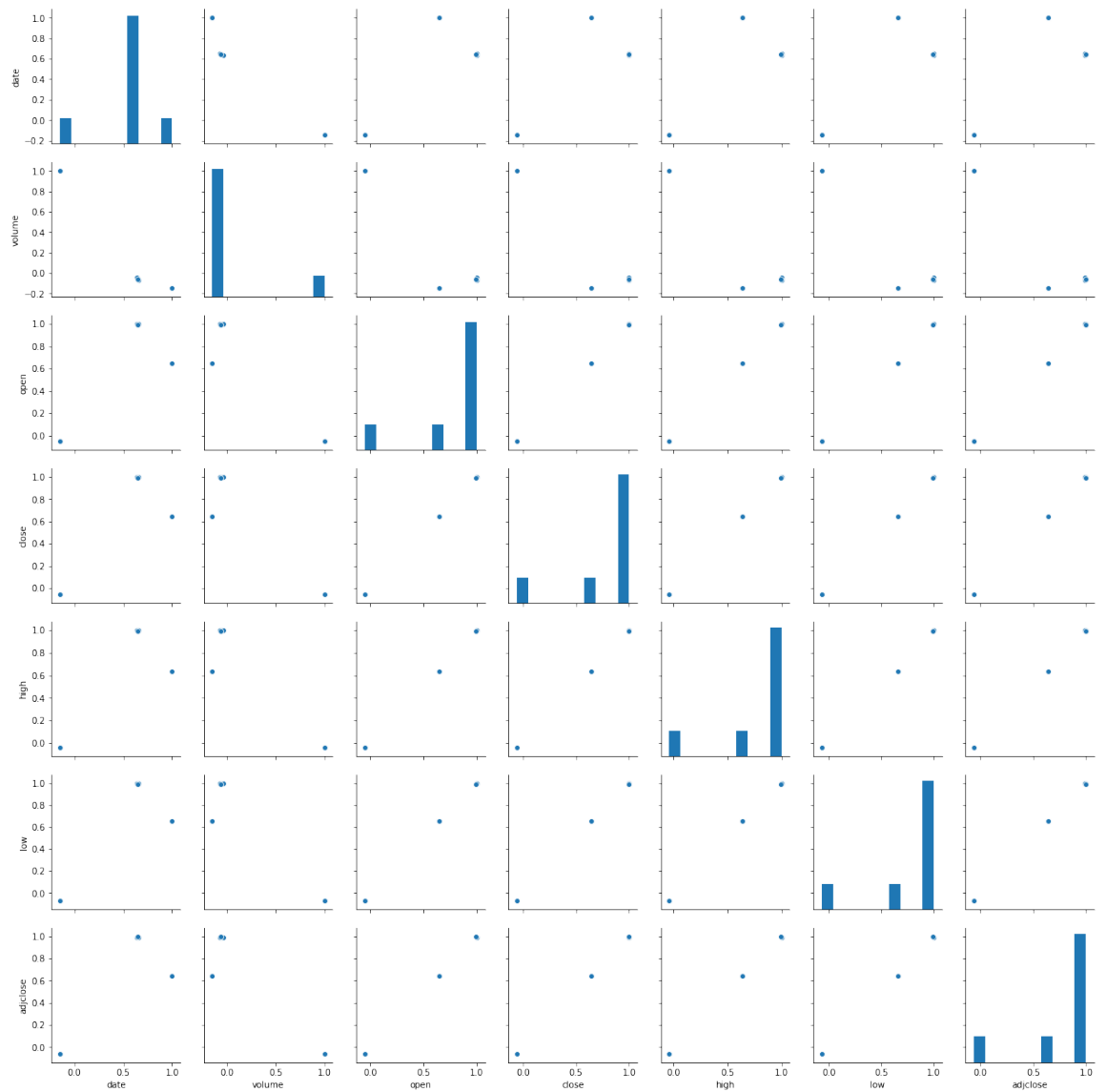






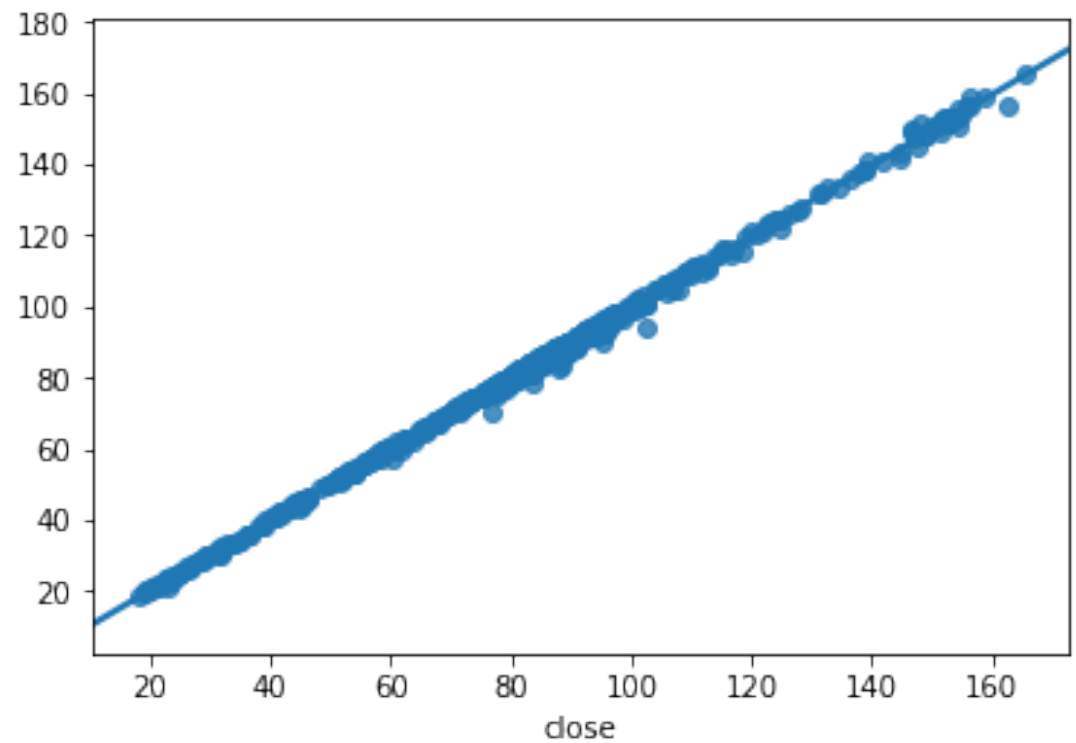
# Co-relacion entre variables

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Valores del historico  
VS. Valores de la  
prediccion en  
Regrsion Lineal como  
Modelo.

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FIN



There ain't no such  
thing as a free lunch.

Robert A. Heinlein

“quotezany”