

Una Introducción a la Analítica

Algunos casos de uso de Analítica Predictiva

Esta presentación describe, bajo un marco común, los conceptos fundamentales de Data Science, Analytics y Big Data y establece su similitudes y diferencias; se presentan ejemplos de casos prácticos de la aplicación de Machine Learning y Aprendizaje Estadístico.

Descargue la última versión de este documento de:
<https://github.com/jdvelasq/data-science-docs/blob/master/sena.pdf>

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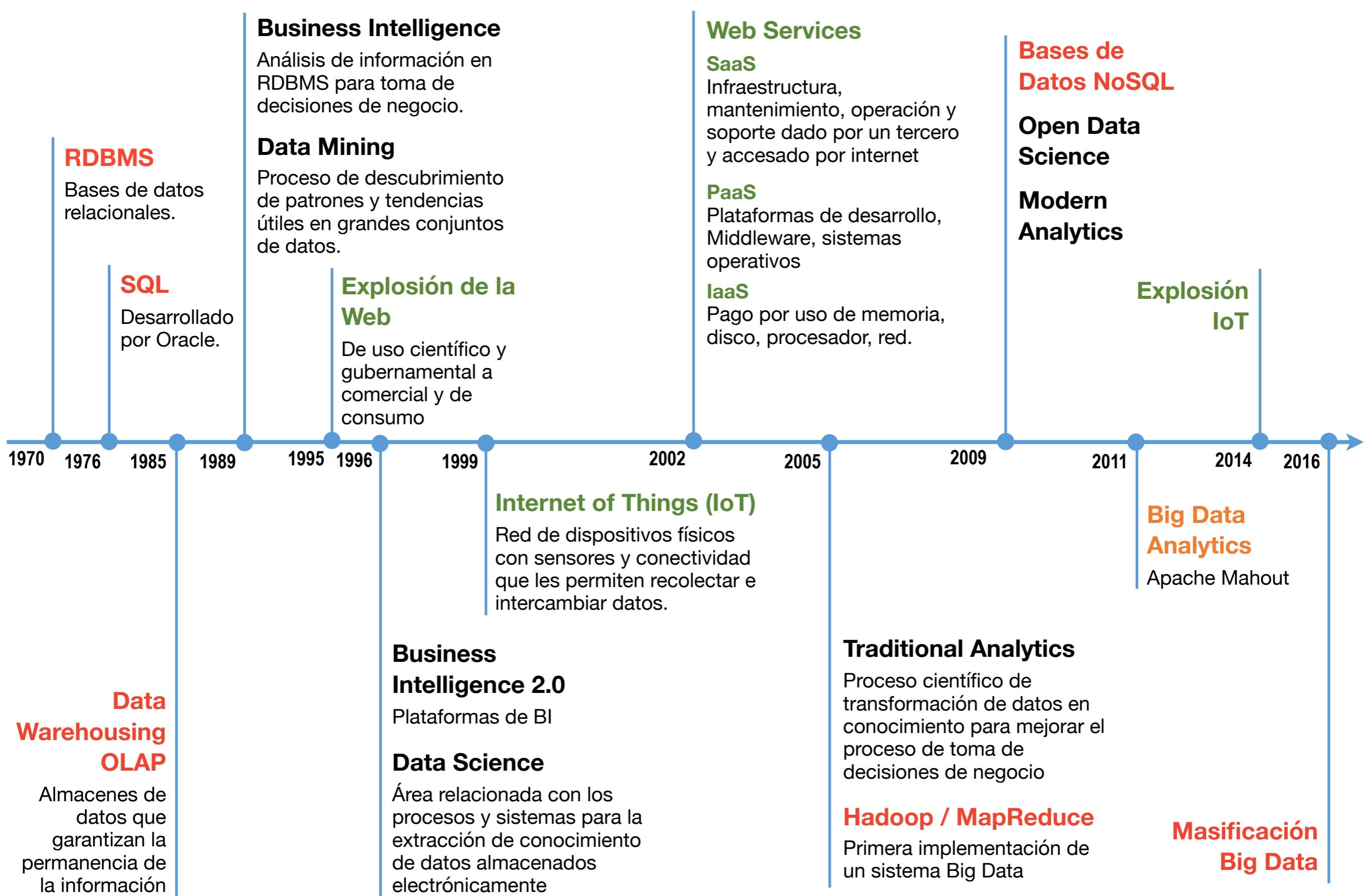
 jdvelasq@unal.edu.co

 @jdvelasquezh

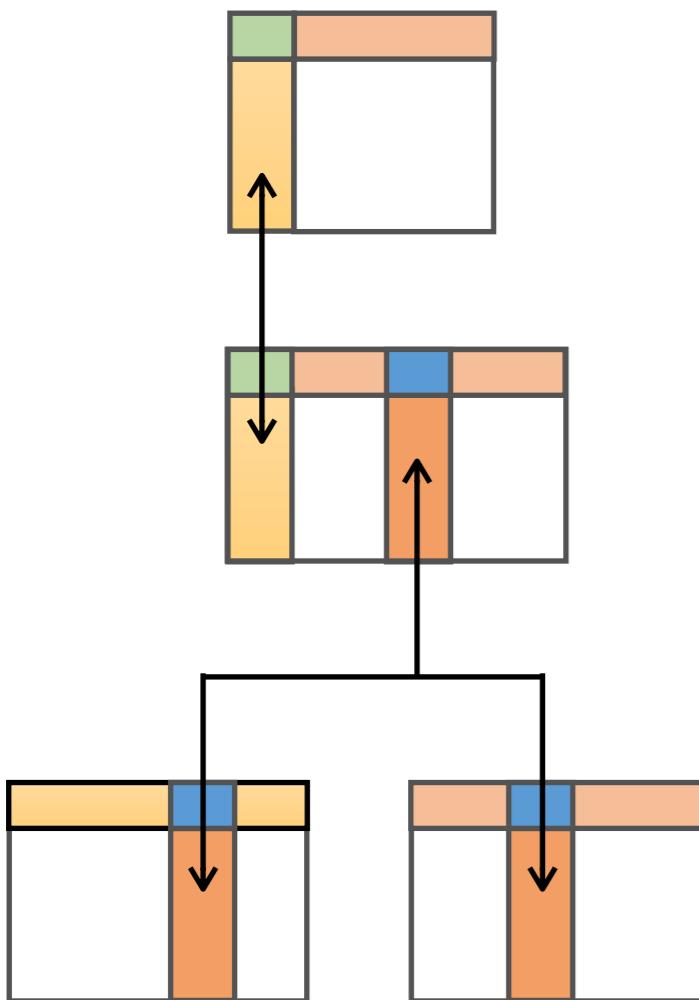
 <https://github.com/jdvelasq>

 <https://goo.gl/prkjAq>

 <https://goo.gl/vXH8jy>



RDBMS – Relational Database Management System (1970)



Componentes

- Esquemas
- Tablas
- Consultas
- Reportes
- Vistas
- Otros elementos

Esquemas

- Definición de las tablas.
- Tipos de datos.
- Relaciones (uno a uno, uno a muchos, muchos a muchos).
- Campos clave.
- Reglas de negocio.

Funciones

- Definición.
- Manipulación (inserción, borrado, actualización, ...)
- Seguridad e integridad.
- Recuperación y restauración.

Principales RDBMDS

- Oracle
- PostgreSQL
- Microsoft SQL server
- MySQL
- Microsoft Access
- DB2
- MariaDB
- Informix
- ...

SQL – Structured Query Language (1976)

Data Definition Language (DDL)

- Create
- Alter
- Truncate
- Rename
- Drop

Data Manipulation Language (DML)

- Insert
- Update
- Delete
- Select

Data Control Language (DCL)

- Grant
- Revoke

Transactions Control Language (TCL)

- Commit
- Rollback
- Savepoint

```
CREATE TABLE 'CUSTOMERS';

ALTER TABLE 'ALUMNOS' ADD EDAD INT UNSIGNED;

DROP TABLE 'ALUMNOS';

TRUNCATE TABLE 'NOMBRE_TABLA';

SELECT * FROM Coches ORDER BY marca, modelo;

SELECT DISTINCT marca, modelo FROM coches;

INSERT INTO agenda_telefonica (nombre, numero)
VALUES ('Roberto Jeldrez', 4886850);

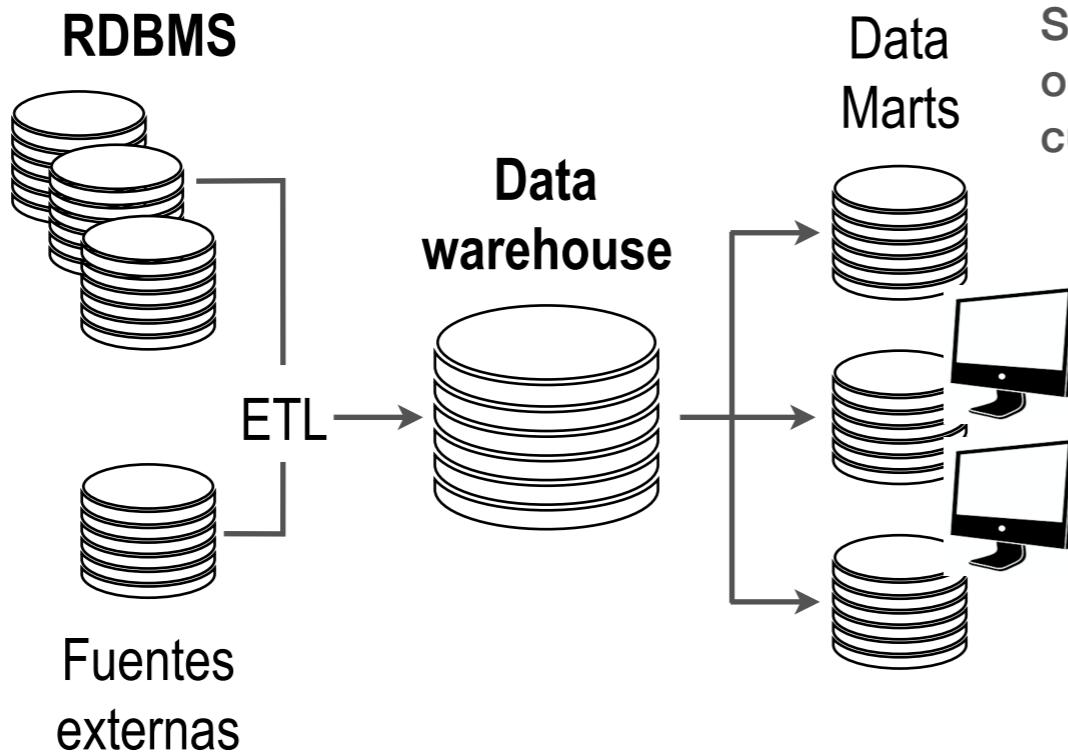
INSERT INTO phone_book2 ( [name], [phoneNumber] )
SELECT [name], [phoneNumber]
FROM phone_book
WHERE name IN ('John Doe', 'Peter Doe')

DELETE FROM tabla WHERE columnal = 'valor1';
```

Data Warehouse (1985)

ETL

- Extraction
- Transformation
- Load



Data Mart

Subconjunto de datos de un Data Warehouse orientado a la consulta. Es implementado usando cubos OLAP

Enterprise Resource Planning (ERP)
Executive information systems (EIS)

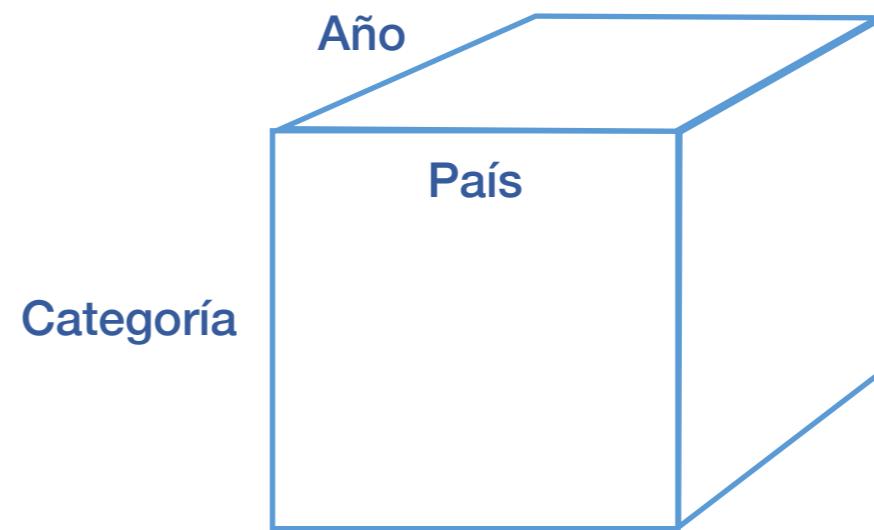
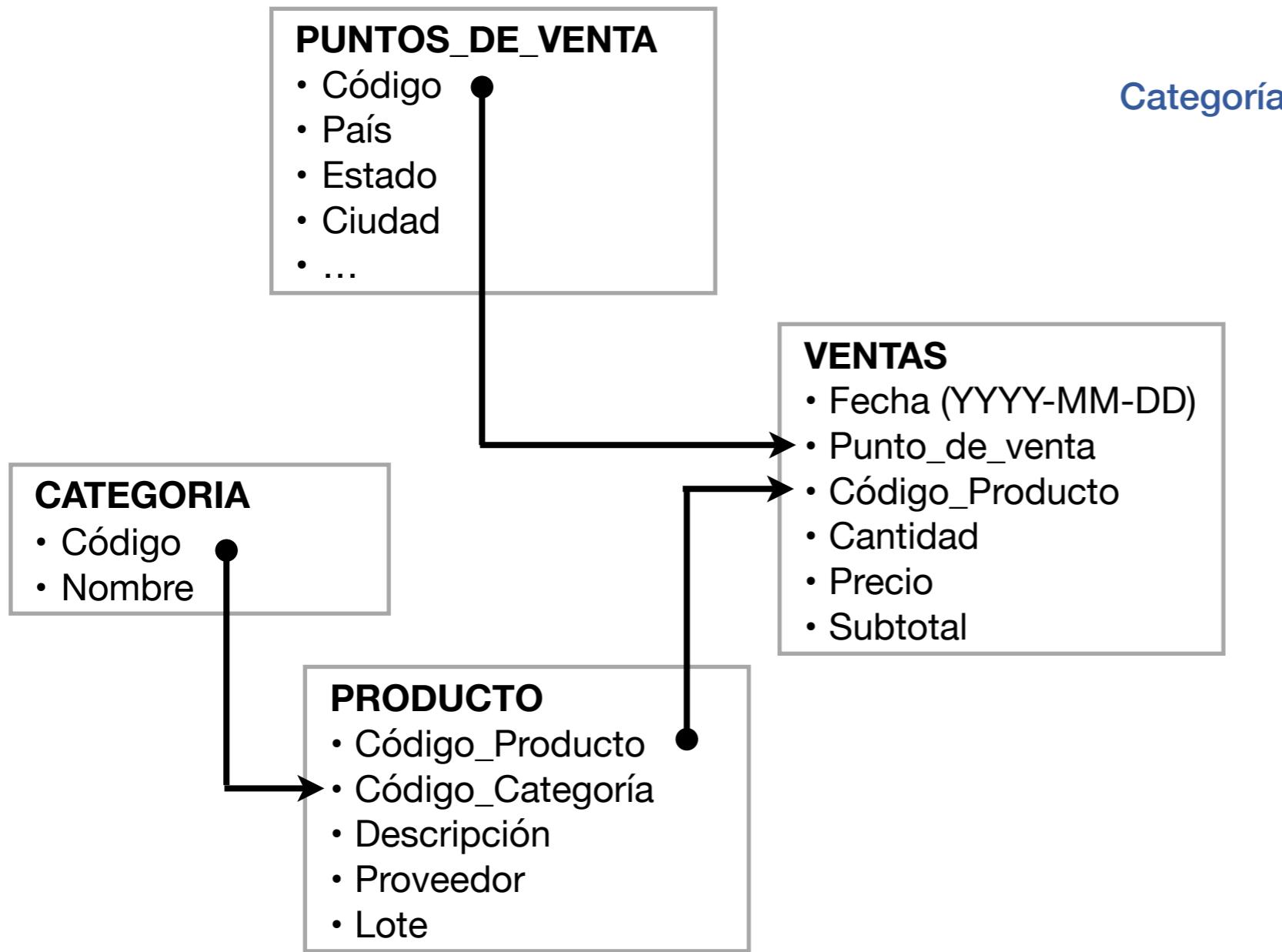
Data Warehouse

Bodegas de datos / Procesamiento analítico en línea

- Estructurado
- Orientado a temas
- Integrado (consistencia de los datos)
- No volátil (permanencia de la información, no se modifica ni se elimina)
- Variable en el tiempo
- Orientado al análisis y la divulgación de la información

OLAP – On-line Analytical Processing (1985)

Modelo para agilizar la consulta de grandes volúmenes de datos, mediante el almacenamiento de los datos en vectores multidimensionales



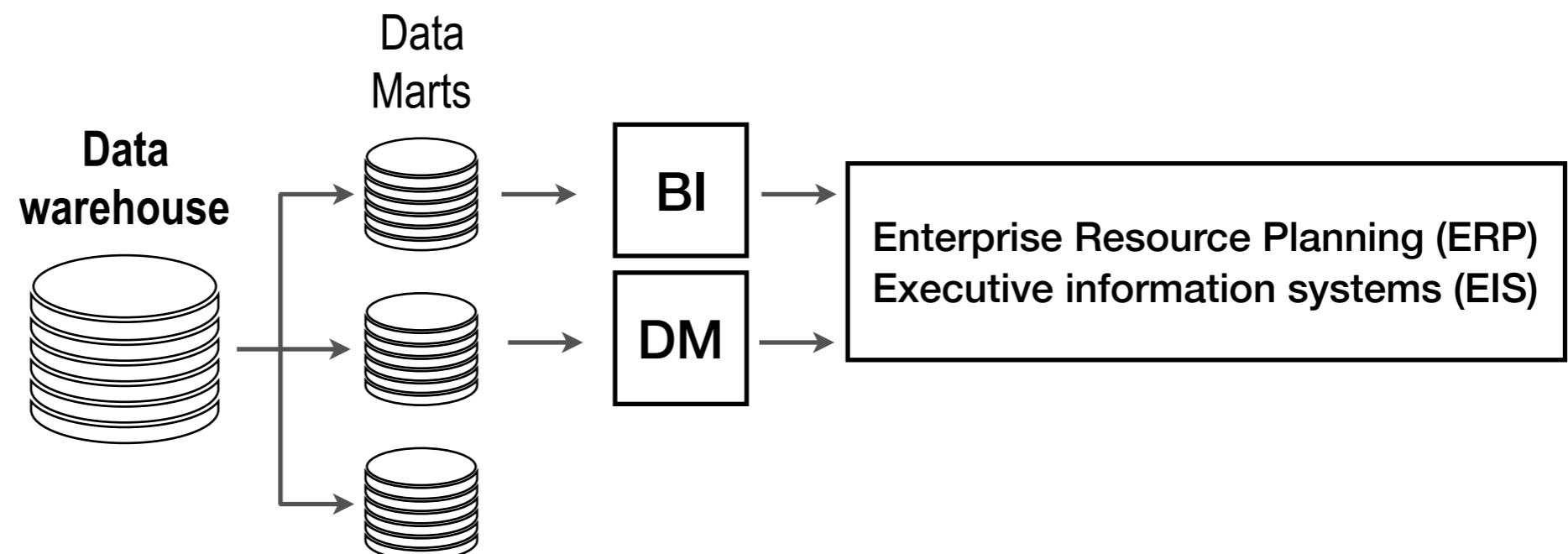
Cubo OLAP
Arreglo multidimensional para consultar información

Data Mining (1989)

Proceso computacional de descubrimiento de patrones y tendencias útiles en grandes conjuntos de datos usando métodos provenientes de la Estadística, el Aprendizaje de Máquinas y los sistemas de bases de datos.

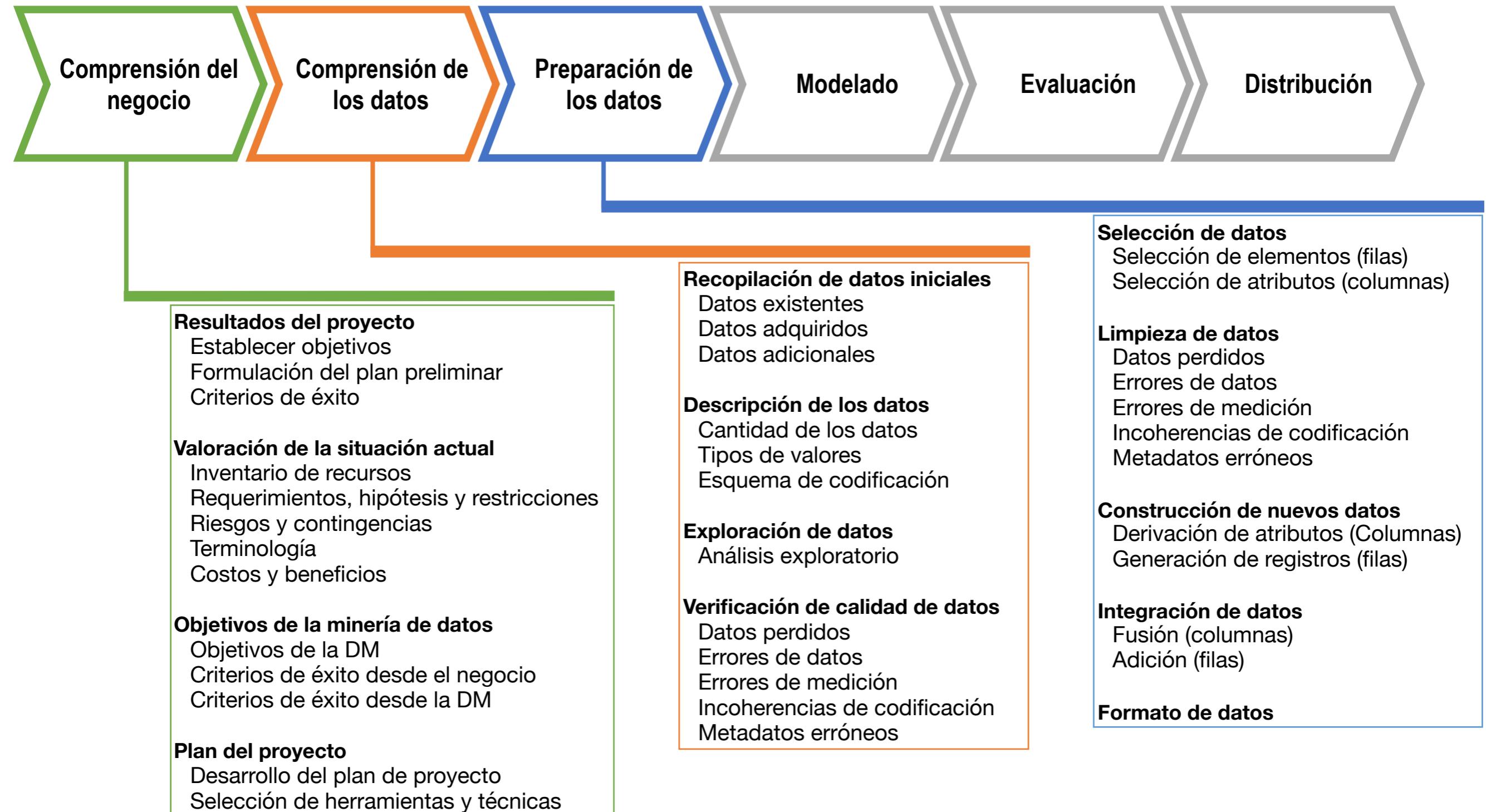
Tareas típicas:

- Detección de anomalías.
- Modelado de dependencias.
- Agrupamiento.
- Clasificación
- Regresión
- Resumen



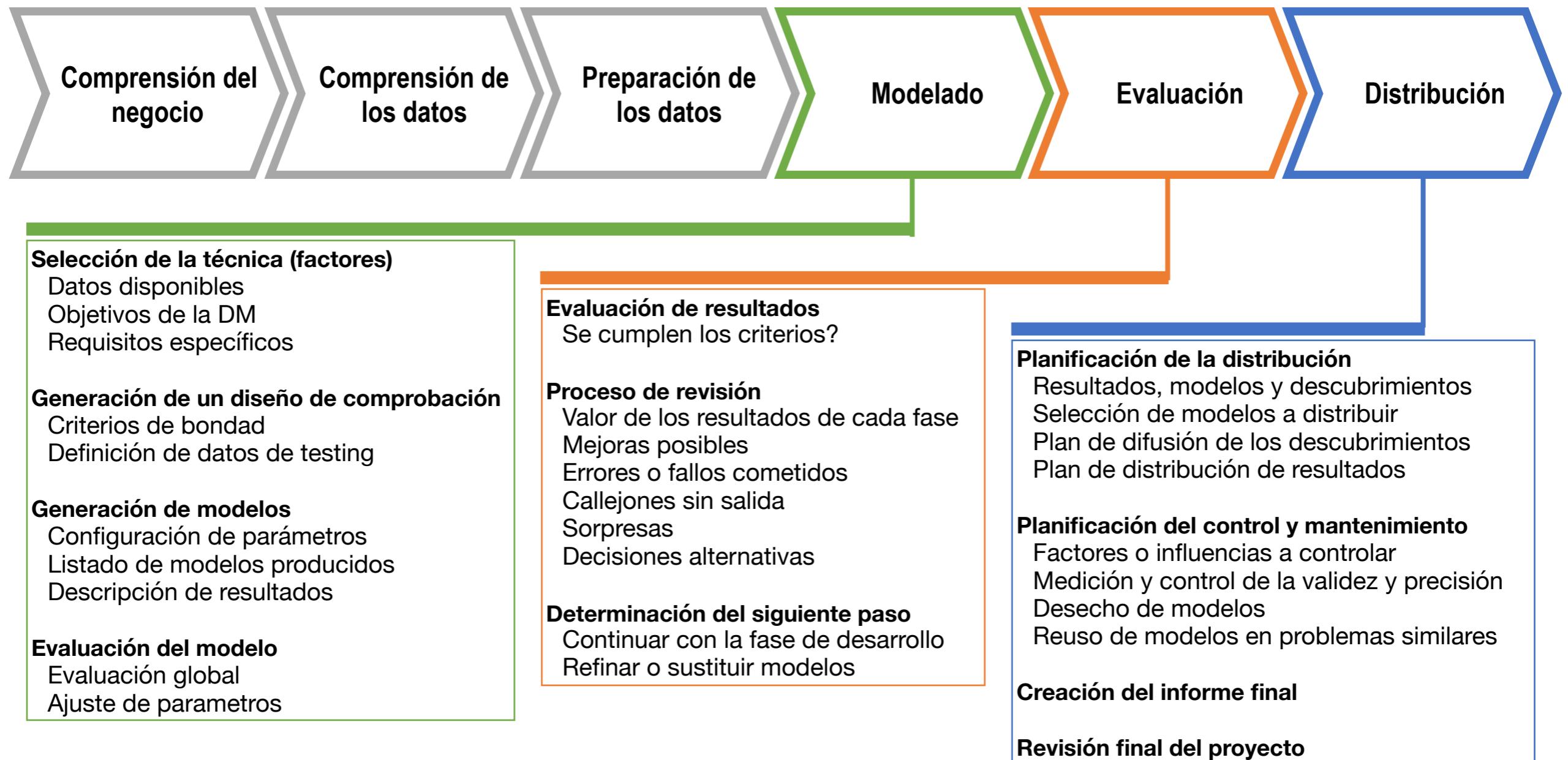
CRISP-DM (1996)

Cross-industry standard process for data mining



CRISP-DM (1996)

Cross-industry standard process for data mining



Business Intelligence 2.0 (1996)

Software y servicios para analizar conjuntos de datos transaccionales y generar conocimiento para la toma de decisiones tácticas y estratégicas en organizaciones.

La BI se considera como parte de la Analítica Descriptiva (qué ocurrió en el pasado).

Los hallazgos dan información detallada del negocio y son presentados como:

- Reportes
- Cuadros de mando
- Gráficos
- Mapas



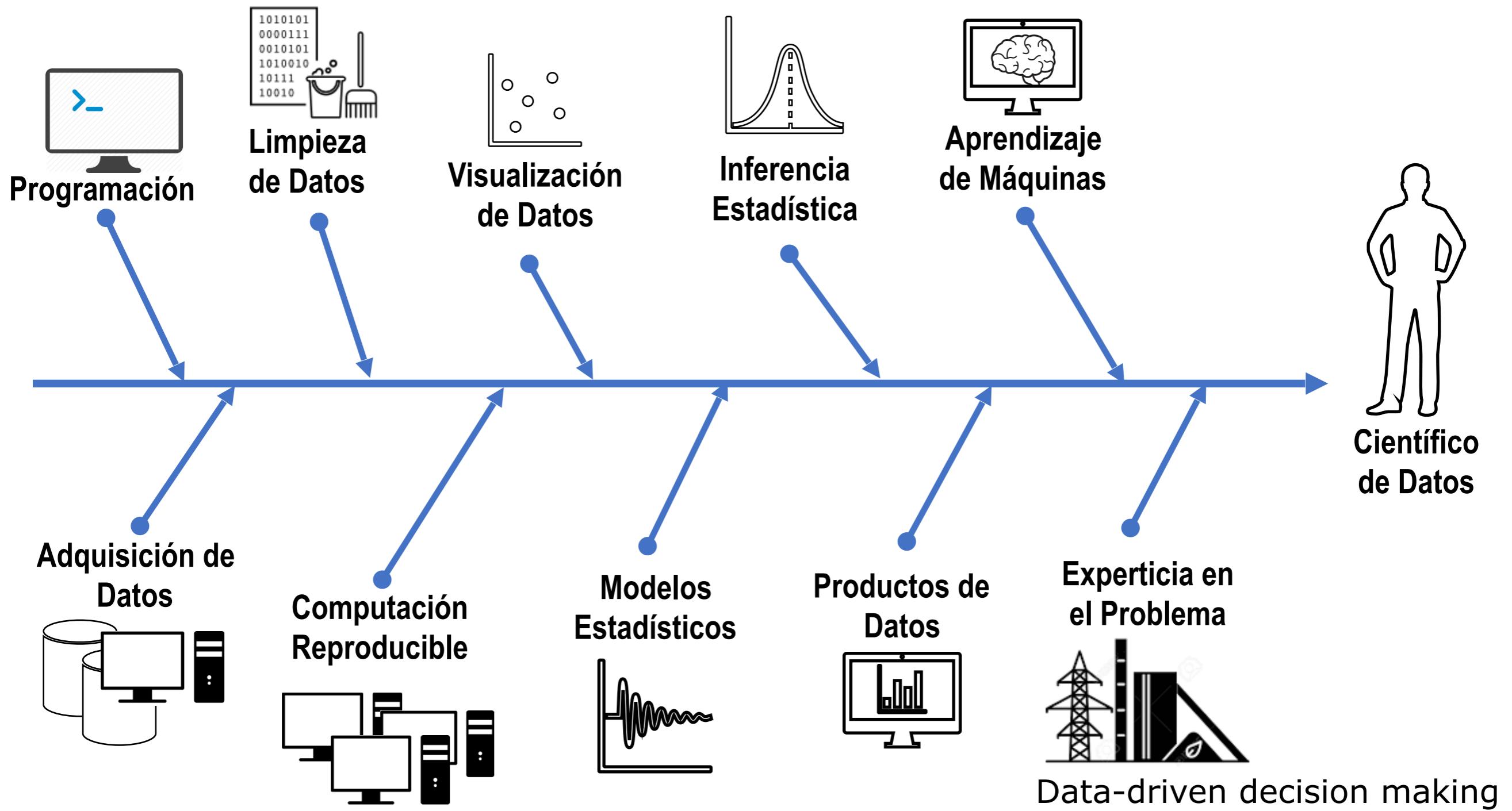
The screenshot shows the GENSCAPE website. At the top, there's a navigation bar with links for Solutions, Knowledge Center, Events, Blog, News, and About. Below this is a secondary navigation bar with buttons for Oil, Power, Natural Gas, Maritime, Agriculture & Biofuels, and Petrochemical & NGLs. The main content area is divided into two columns. The left column lists services like Overview, Daily Macro Supply & Demand Data Report, Equity Production Insight, Intrastate Storage Monitoring, and Natural Gas Analyst. The right column lists reports such as Natural Gas Daily Mexico Exports Monitor, Natural Gas Forward Supply & Demand Report, Natural Gas Infrastructure Intelligence, Natural Gas Notices & Maintenance, and Natural Gas Production Forecast.

The screenshot shows the energynone Energy Dashboard. The top navigation bar includes links for HOME, ABOUT US, MARKETS SERVED, PRODUCTS, SERVICES, INVESTORS, and CONTACT US. Below the navigation is a section titled 'FEATURES' which describes the EnergyDashboard's capabilities. It mentions that managers can see and manage key features, status, and requirements of their wholesale energy operations. The dashboard itself is a complex grid of charts, graphs, and status indicators for various energy markets across Australia (QLD, SA, NSW, VIC, TAS). The bottom right corner has a 'CONTACT US' button.

Business Intelligence 2.0 (1996)

Disciplina	Tecnología	Habilidades	Foco
Análisis de datos	<ul style="list-style-type: none">Software para modelado de datosSoftware para diagramaciónSoftware para documentaciónSQLSoftware para perfilado de datos	<ul style="list-style-type: none">Modelado de datosAnálisis del negocioManipulación de datosEstadística básica	<ul style="list-style-type: none">Reglas de negocioDefinición de datosRelaciones entre datosAtributos de datosEstructuras de datosFuentes y usos de datosCalidad de datos
Inteligencia de Negocios	<ul style="list-style-type: none">ETL/SQLRDBMSReportesVisualización	<ul style="list-style-type: none">ProgramaciónAnálisis de datosModelado de datosDesarrollo de reportesEstadística BásicaAnálisis del negocio & EstrategiaPresentación oral	<ul style="list-style-type: none">Suministro de información y reporteVisualización de datosEstadísticos descriptivosIntegración de datos y consolidación
Data Mining	<ul style="list-style-type: none">Software estadísticoHerramientas de aprendizaje de máquinasLenguajes de programación	<ul style="list-style-type: none">ProgramaciónModelado de datosEstadística AvanzadaPresentación oral	<ul style="list-style-type: none">Análisis estadístico avanzadoManejo de grandes volúmenes de datosVisualización de datosModelos de datos

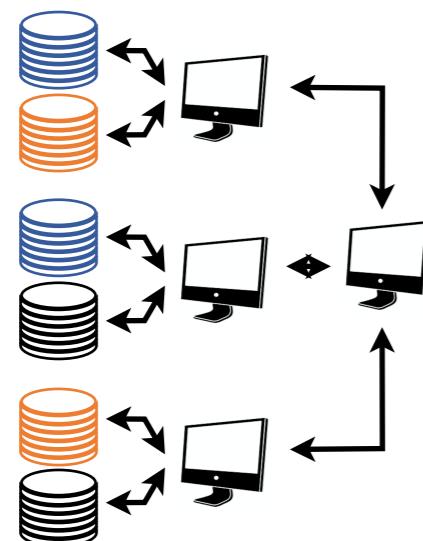
Data Science (1996)



Servicios Web (2002)

Computación local

Servidores + red + clientes



Cloud computing / utility computing

Servidores y almacenamiento en la nube + internet + clientes locales

Software as a Service (SaaS)

Software almacenado en máquinas suministradas por un tercero.

Aplicaciones accesadas vía un cliente o la Web.

Orientado a aplicaciones de usuario final.

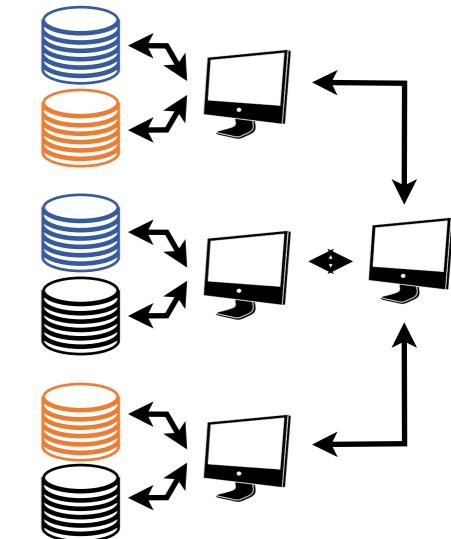
Platform as a Service (PaaS)

Orientado a desarrolladores.

Ambiente de desarrollo gestionado por un tercero.

Infrastructure as a Service (IaaS)

Bloques básicos para construcción de ambientes manejados por un tercero
Capacidad de procesamiento, almacenamiento, conectividad, seguridad, etc.



Nube

Internet



Máquina Local (Cliente)

Traditional Analytics (2005)



Traditional Analytics (2005)

- Compresión de la historia.
- Pronóstico del futuro.
- Los datos están listos.
- Sólida fundamentación matemática.

Aprendizaje Estadístico

Conjunto de herramientas fundamentadas en conceptos estadísticos para la comprensión de conjuntos de datos con el fin de modelar y predecir.

Aprendizaje de Máquinas

Área de las ciencias de la computación orientada al desarrollo de sistemas inteligentes (solución de problemas como lo haría un experto humano).

- No se quiere comprender que pasó.
- Se desea mimificar la inteligencia.
- Pronóstico del futuro.
- Los datos están listos.
- Fundamentación matemática, pero sin el rigor de la estadística.

- No se quiere comprender que pasó.
- Pronóstico del futuro.
- Los datos están listos.
- Sólida fundamentación matemática.

Modelado Predictivo

Área enfocada al uso de técnicas estadísticas utilizadas para pronosticar resultados (de un proceso).

Minería de Datos

Descubrimiento de patrones y conocimiento de grandes conjuntos de datos usando técnicas estadísticas, aprendizaje de máquinas y herramientas de bases de datos.

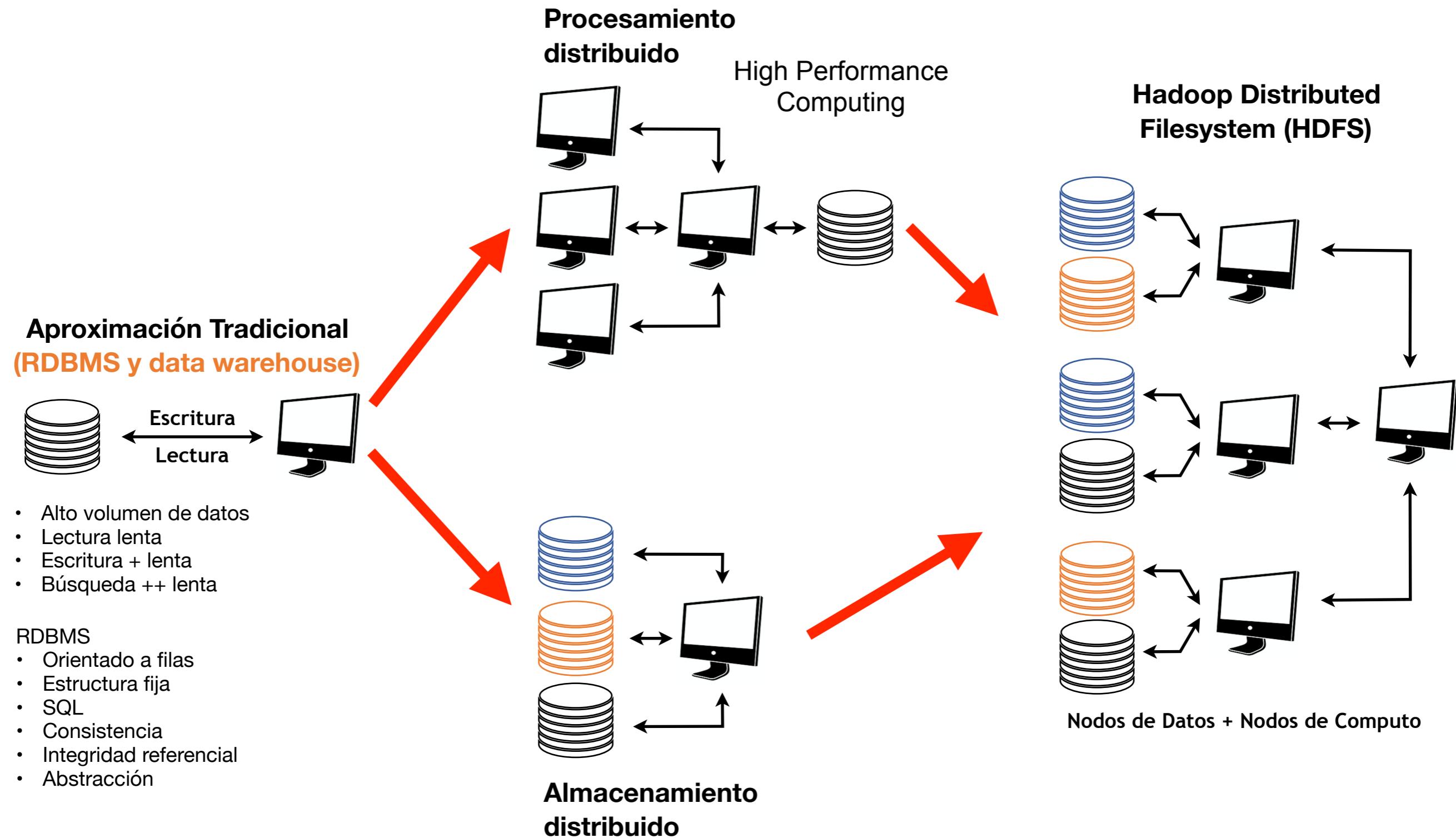
- No se quiere comprender que pasó.
- Pronóstico del futuro.
- Los datos están NO están listos.
- Sólida fundamentación matemática.

Analítica Predictiva

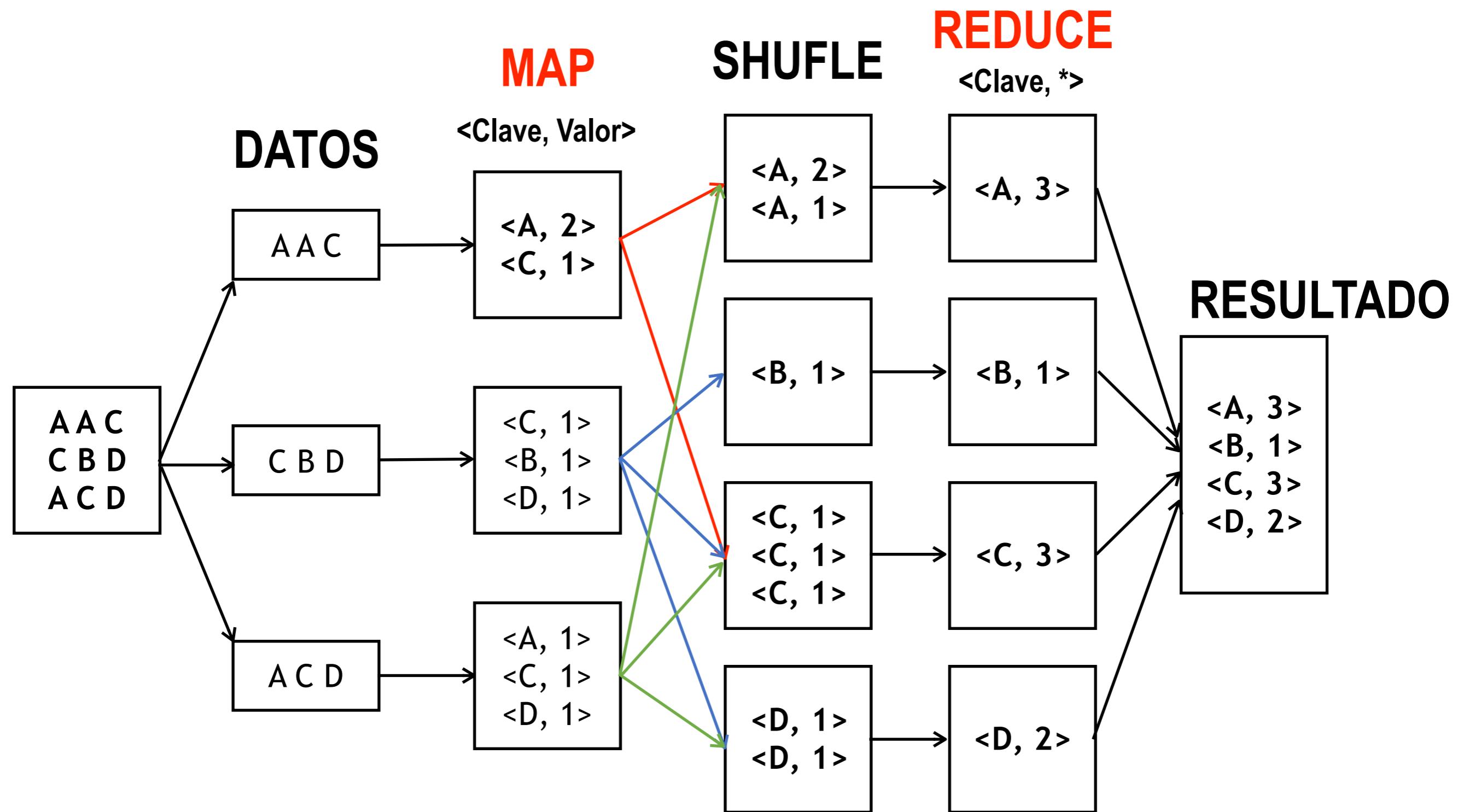
Área enfocada al uso de técnicas de modelado predictivo, aprendizaje de máquinas y minería de datos para pronosticar los resultados de un proceso en un contexto organizacional.

- Pronóstico del futuro.
- Los datos están NO están listos.
- Agrupa todas las anteriores.

Hadoop / MapReduce (2005)



Hadoop / MapReduce (2005)



NoSQL (2009)

Datos tabulares

KEY	Fecha	Planta	Generación
001	2017-10-01	Jaguas	100.2
002	2017-10-01	Playas	23.1
003	2017-10-01	Guatape	130.1

Document (JSON/XML)

```
[  
  {  
    Fecha:2017-10-01,  
    Planta:Jaguas,  
    Generación: 100.2  
  },{  
    Fecha:2017-10-01,  
    Planta:Playas,  
    Generación:23.1,  
  },{  
    Fecha:2017-10-01,  
    Planta:Guatapé,  
    Generación:130.1  
  }  
]
```

Pares <clave, valor>

Tabla001.Fecha=2017-10-01
Tabla001.Planta=Jaguas
Tabla001.Generación=100.2
Tabla002.Fecha=2017-10-01
Tabla002.Planta=Playas
Tabla002.Generación=23.1
Tabla003.Fecha=2017-10-01
Tabla003.Planta=Guatapé
Tabla003.Generación=130.1

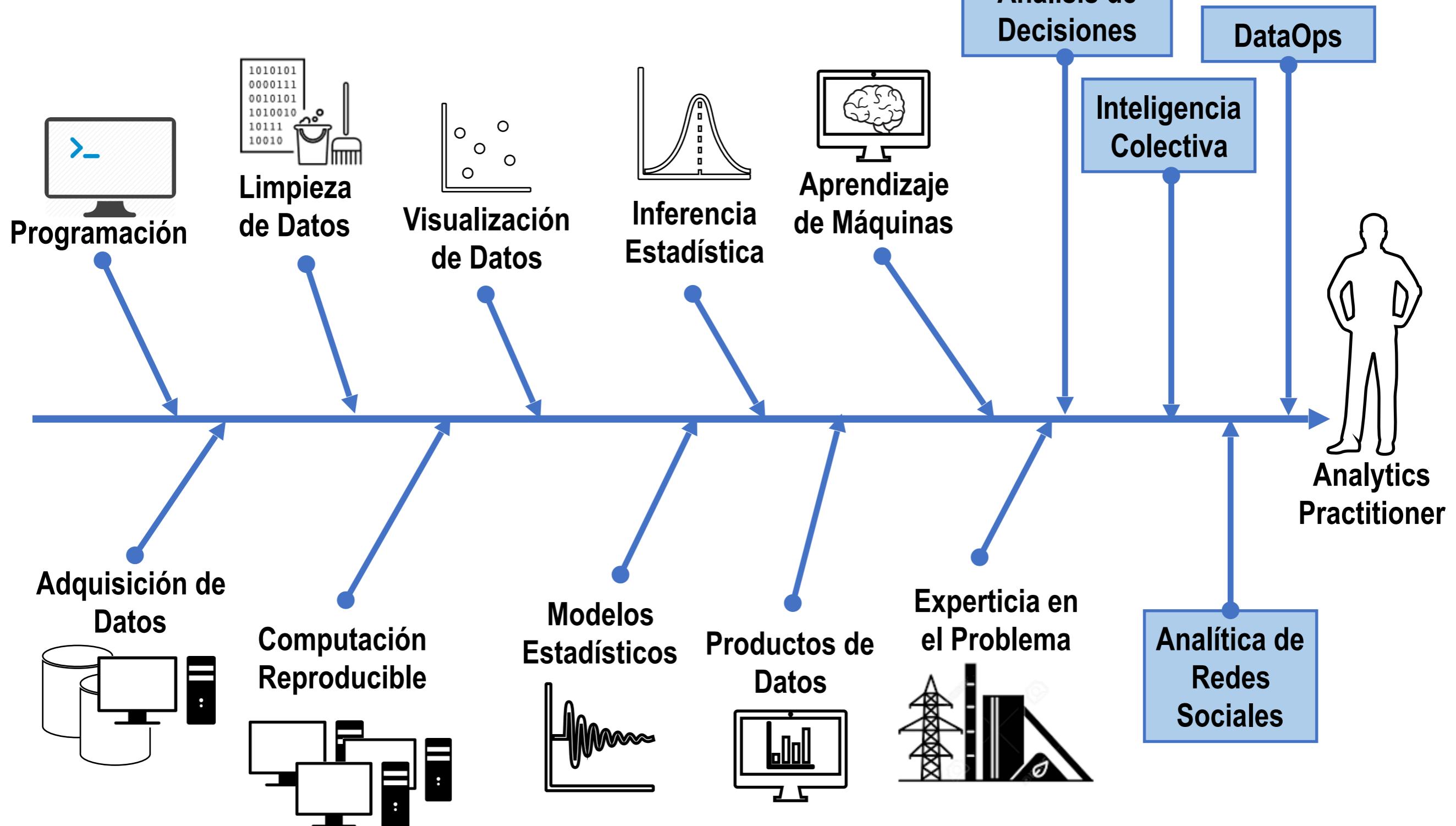
Sistema orientado a filas

001:2017-10-01,Jaguas,100.2
002:2017-10-01,Playas,23.1
003:2017-10-01,Guatape,130.1

Column family database

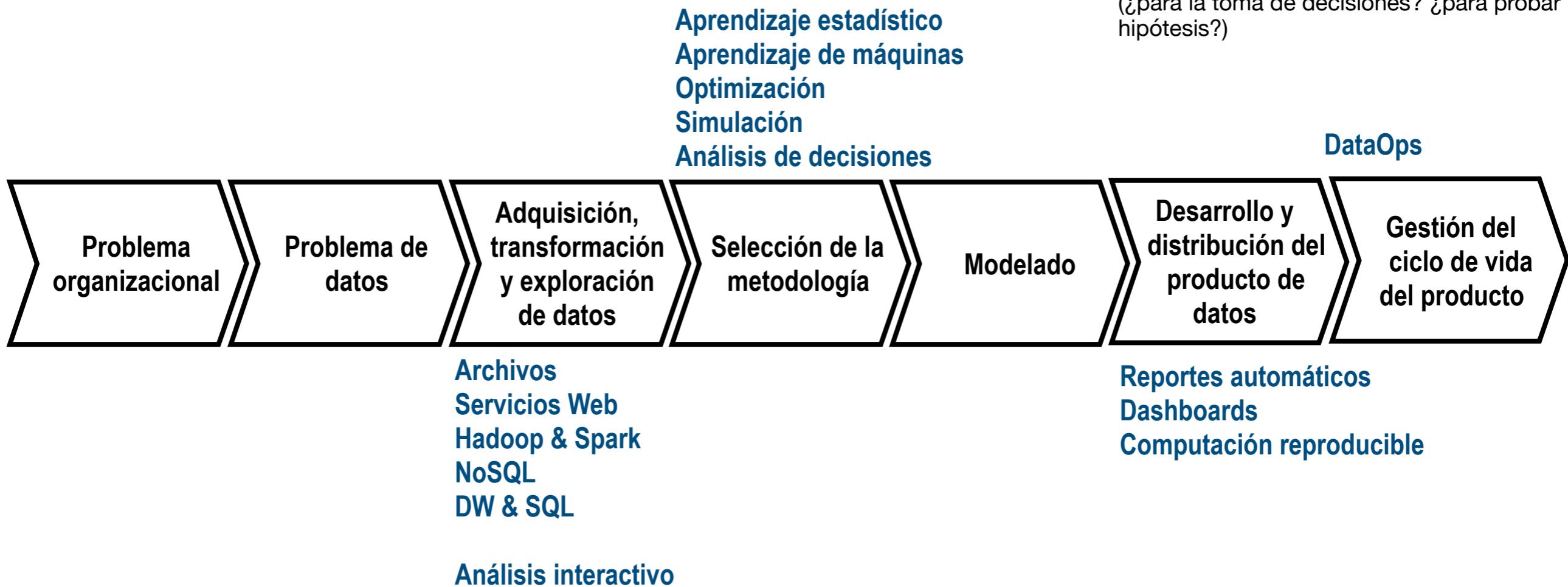
001:{Fecha:2017-10-01, Planta:Jaguas, Generación:100.2}
002:{Fecha:2017-10-01, Planta:Playas, Generación:23.1}
003:{Fecha:2017-10-01, Planta:Guatapé, Generación:130.1}

Open Data Science & Modern Analytics (2009)



Open Data Science & Modern Analytics (2009)

Proceso científico de transformación de datos en conocimiento para mejorar el proceso de toma de decisiones [Informs].

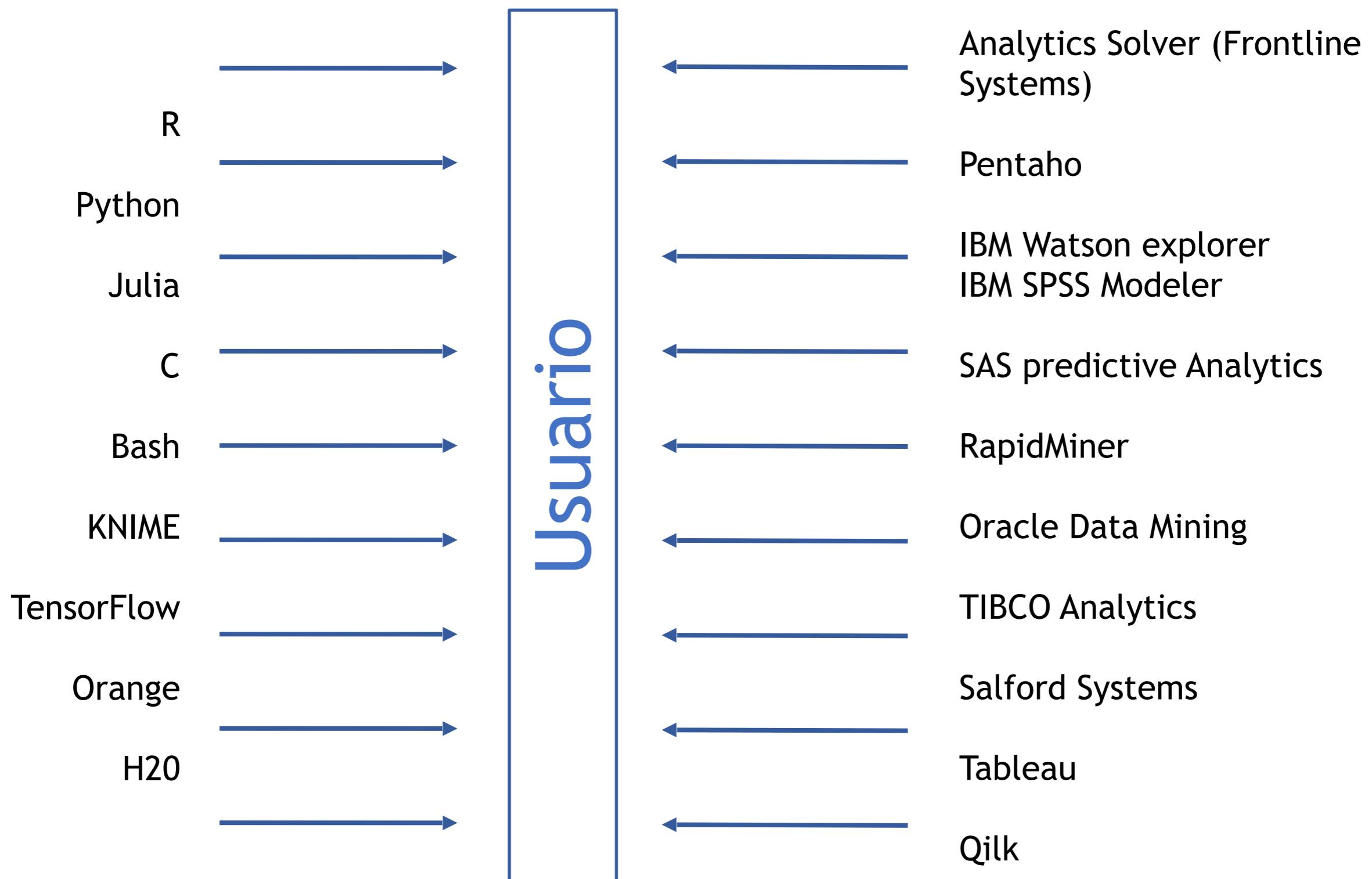


Infraestructura computacional

{ Un procesador
Muchos procesadores

{ Computación en máquinas locales
Computación en la nube

Open Data Science & Modern Analytics (2009)



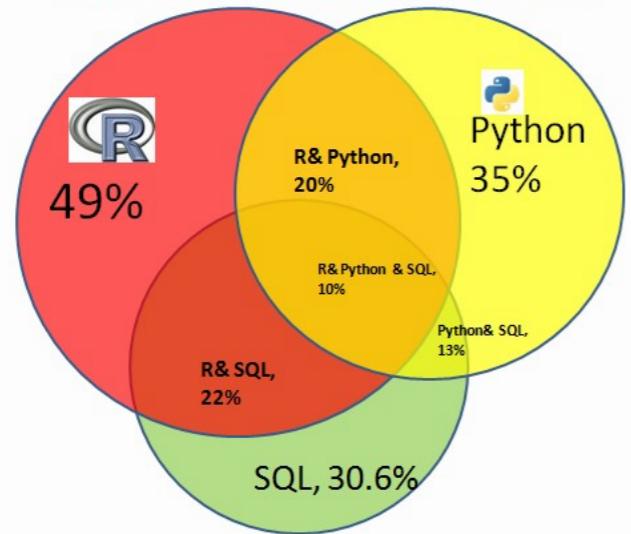
Open Data Science & Modern Analytics (2009)

The Top Ten Programming Languages
(IEEE Spectrum)

2015

Language Rank	Types	Spectrum Ranking	Spectrum Ranking
1. Java	🌐📱💻	100.0	100.0
2. C	📱💻⚙️	99.9	99.3
3. C++	📱💻⚙️	99.4	95.5
4. Python	🌐💻	96.5	93.5
5. C#	🌐📱💻	91.3	92.4
6. R	💻	84.8	84.8
7. PHP	🌐	84.5	84.5
8. JavaScript	🌐📱	83.0	78.9
9. Ruby	🌐💻	76.2	74.3
10. Matlab	💻	72.4	72.8

KDNuggets 2014 Poll: Languages used for Analytics/Data Mining



2016

Language Rank	Types	Spectrum Ranking
1. C	📱💻⚙️	100.0
2. Java	🌐📱💻	98.1
3. Python	🌐💻	98.0
4. C++	📱💻⚙️	95.9
5. R	💻	87.9
6. C#	🌐📱💻	86.7
7. PHP	🌐	82.8
8. JavaScript	🌐📱	82.2
9. Ruby	🌐💻	74.5
10. Go	🌐💻	71.9

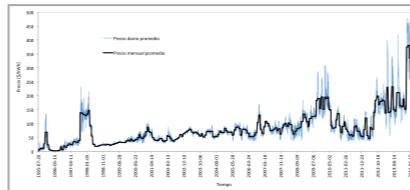
2017

Language Rank	Types	Spectrum Ranking
1. Python	🌐💻	100.0
2. C	📱💻⚙️	99.7
3. Java	🌐📱💻	99.5
4. C++	📱💻⚙️	97.1
5. C#	🌐📱💻	87.7
6. R	💻	87.7
7. JavaScript	🌐📱	85.6
8. PHP	🌐	81.2
9. Go	🌐💻	75.1
10. Swift	📱💻	73.7

Open Data Science & Modern Analytics (2009)

Estadística y
aprendizaje de
máquinas

Los datos
están listos



Modelado de
datos

Inteligencia
de Negocios

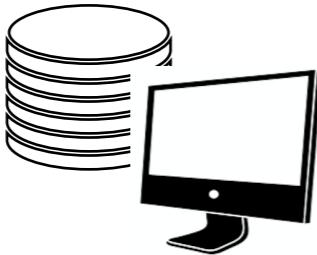
DW / OLAP



Generación,
agregación, análisis
y visualización de
datos del negocio

Minería de
Datos

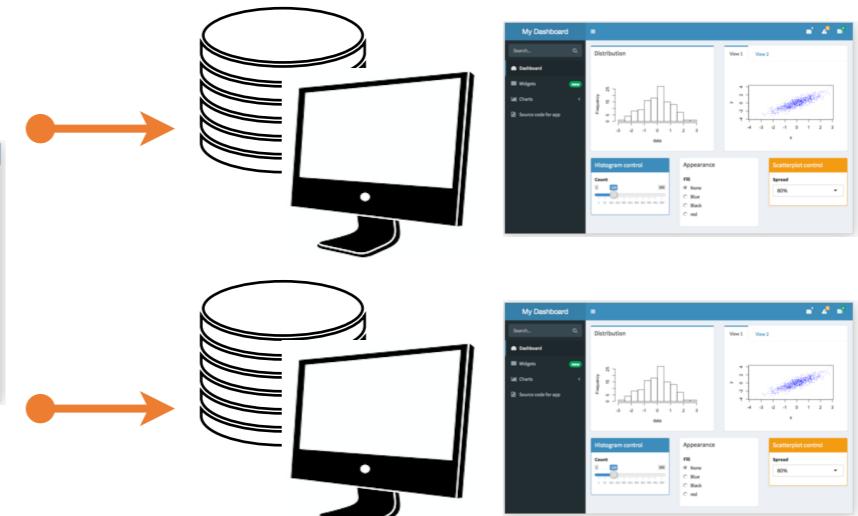
DW / OLAP



Descubrimiento de
patrones y tendencias
claves

Analytics

DW / OLAP
Hadoop & Spark
NoSQL ...

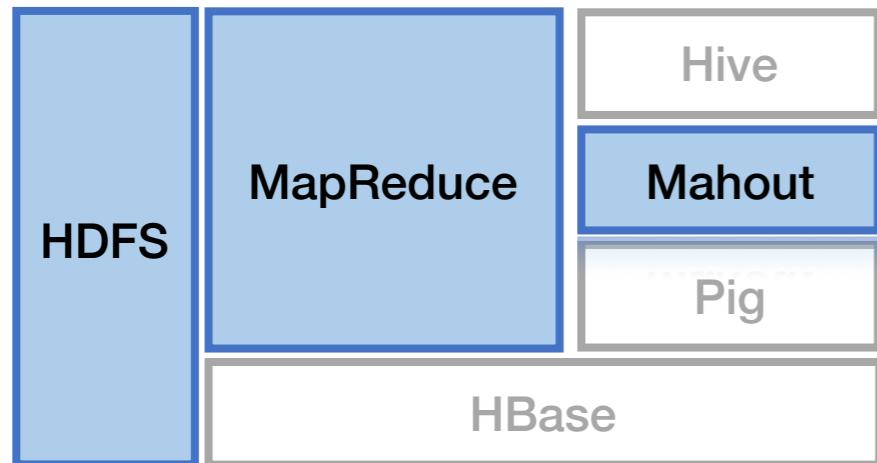


Producto de Datos

Aplicación que combina datos con algoritmos para inferencia, predicción u optimización para generar más datos e información valiosa.

- Aprendizaje a partir de los datos.
- Auto-adaptación
- Ampliamente aplicable.

Big Data Analytics (2011)



Apache Mahout

Implementación en Map/Reduce (Java y otros) de los algoritmos de aprendizaje estadístico y aprendizaje de máquinas



Spark's MLlib

Implementación en Spark de los algoritmos de aprendizaje estadístico y aprendizaje de máquinas

Estadística básica

Clasificación y regresión

Filtrado colaborativo

Agrupamiento

Reducción de dimensiones

Extracción de características

Minería de patrones frecuentes

Métricas de evaluación

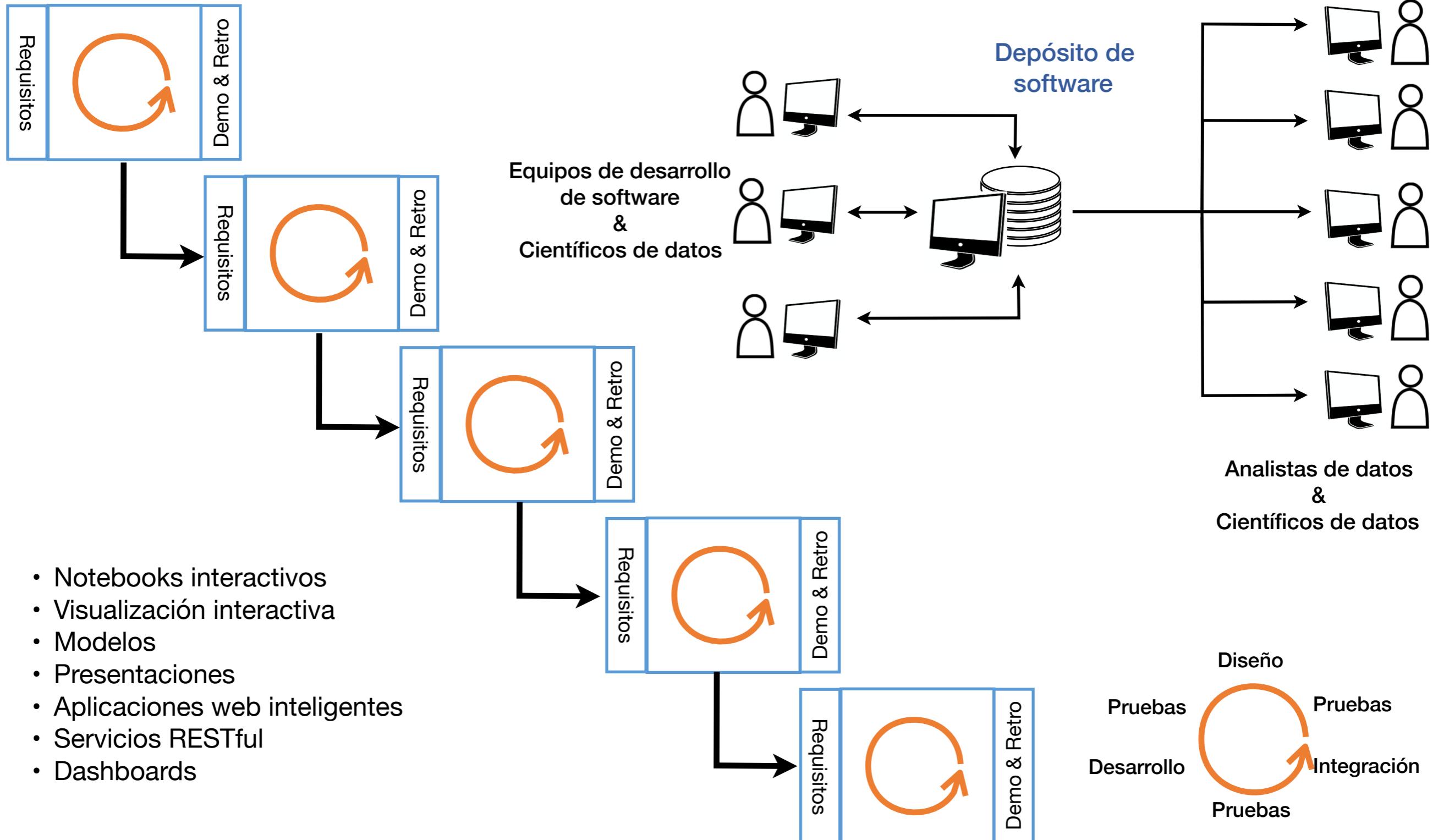
Exportación de modelos

Optimización

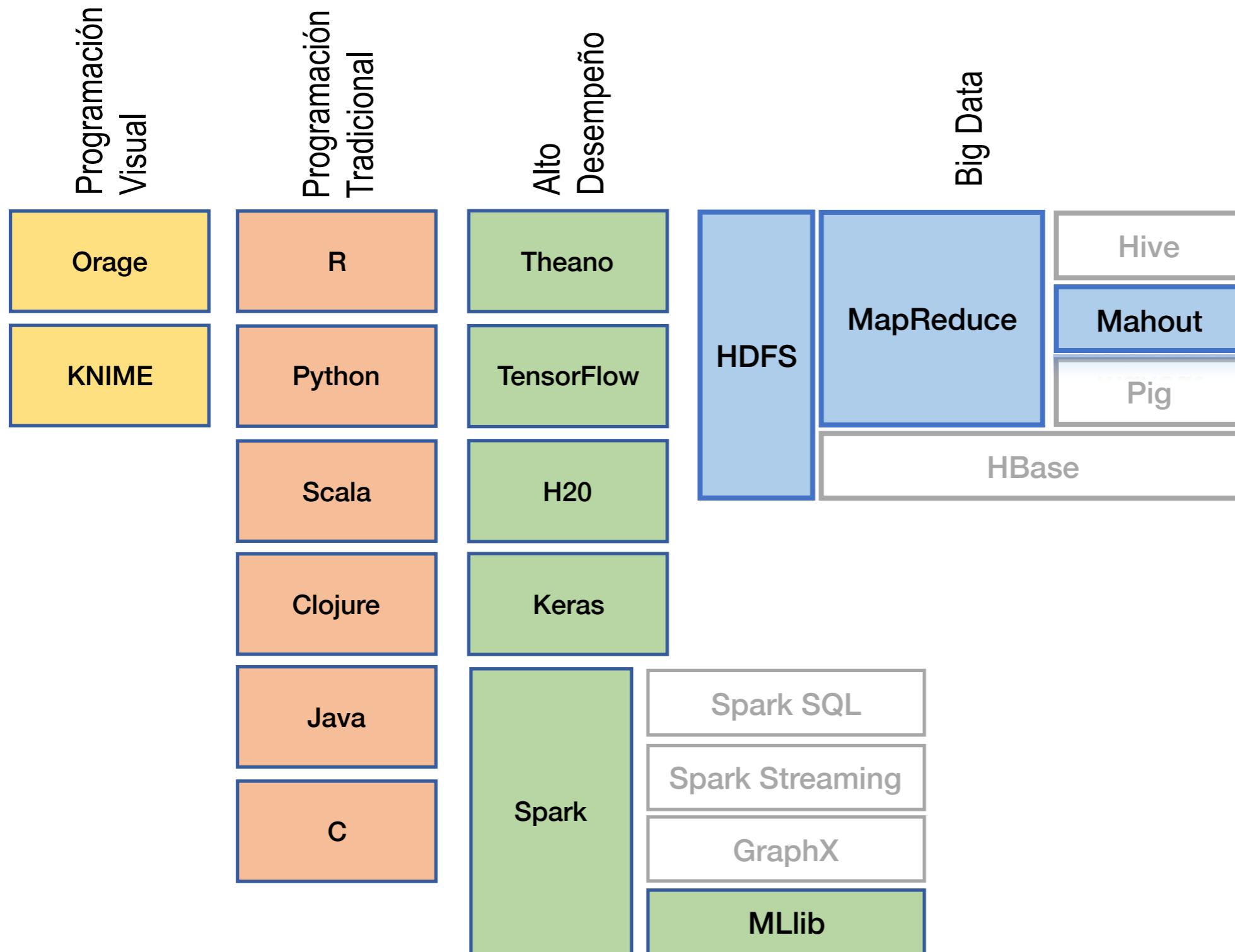


{ Computación de alto desempeño
Deep Learning

DataOps (2015)



Machine Learning & Predictive Analytics



Agrupamiento

K-means
k-NN
Canopy clustering
Fuzzy K-means
Streaming K-means
Text clustering

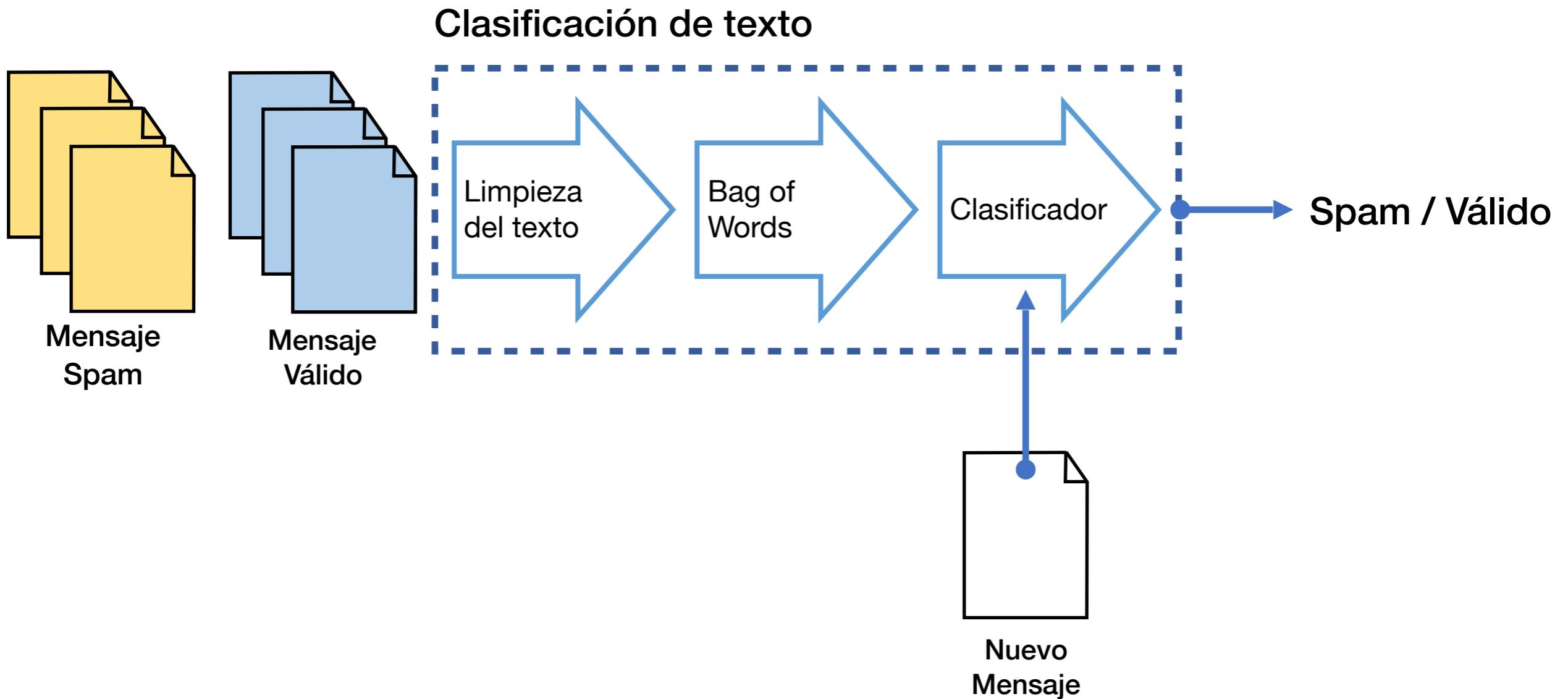
Regresión

Regresión lineal y extensiones (ridge, LASSO, ElasticNet)
Regresión no lineal
Redes neuronales artificiales
Aprendizaje Profundo

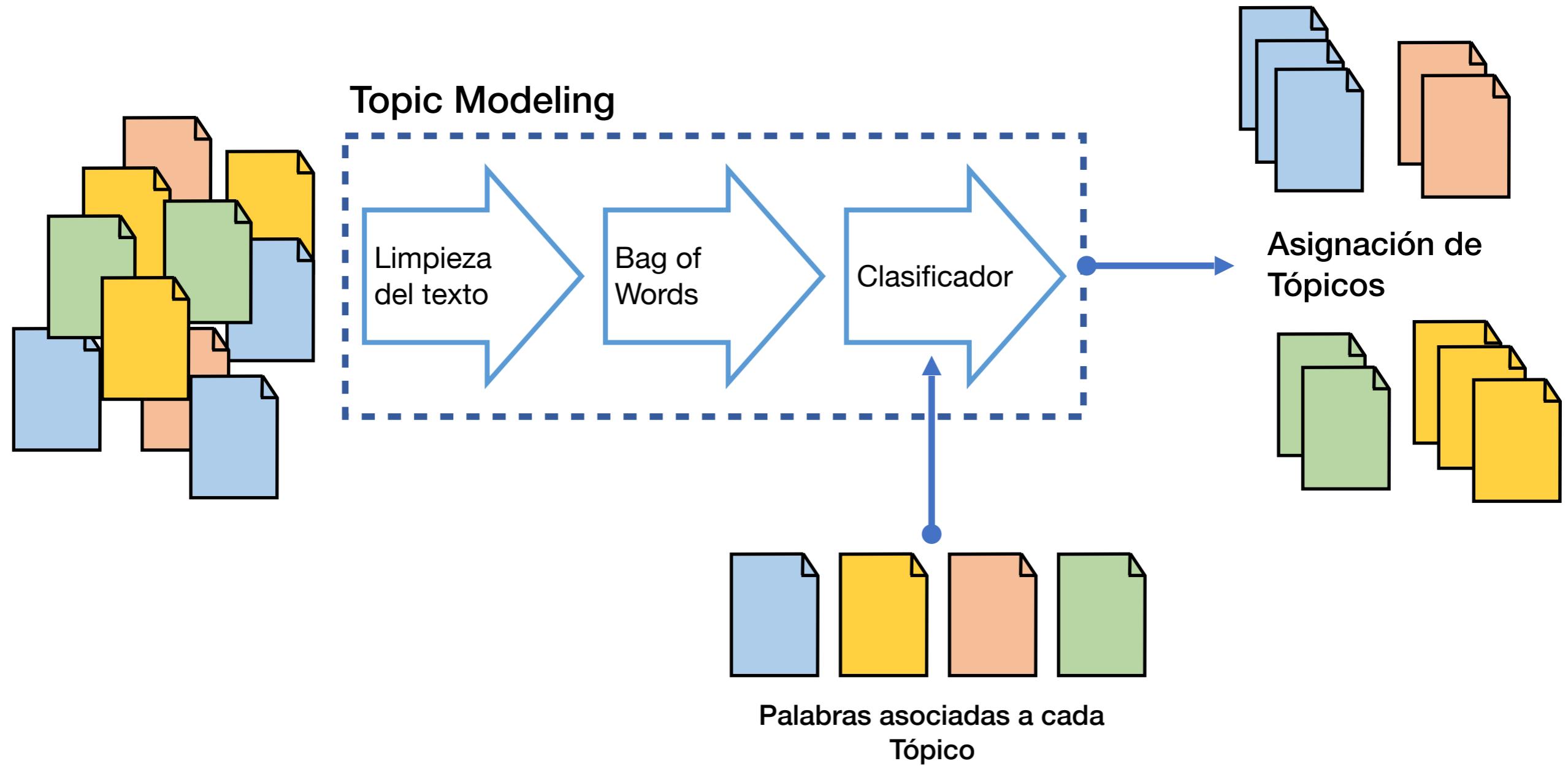
Clasificación

K nearest neighbors
Naive Bayes
Rule-based systems
Tree-based classification
Logistic & Logit regression
Ensembles

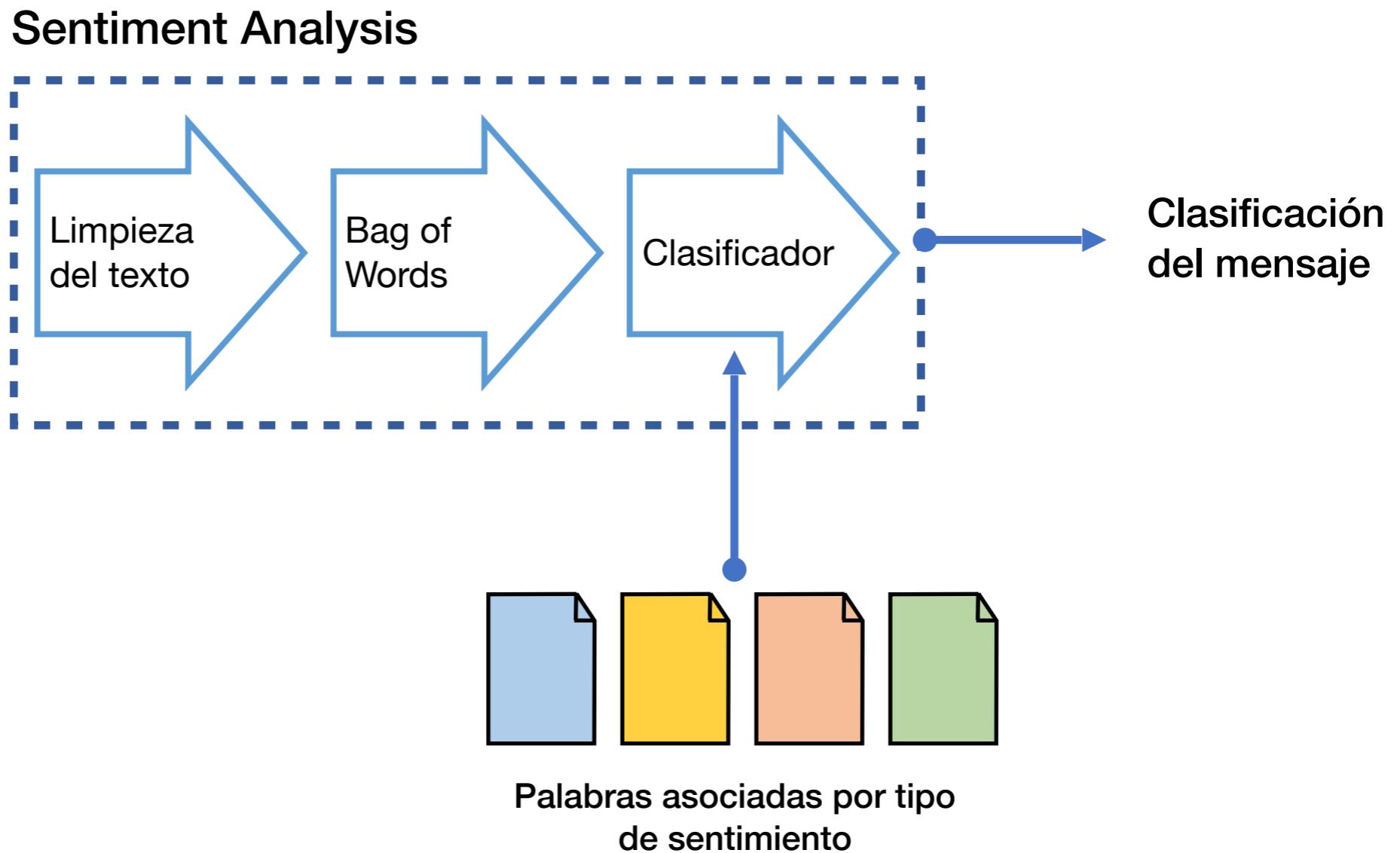
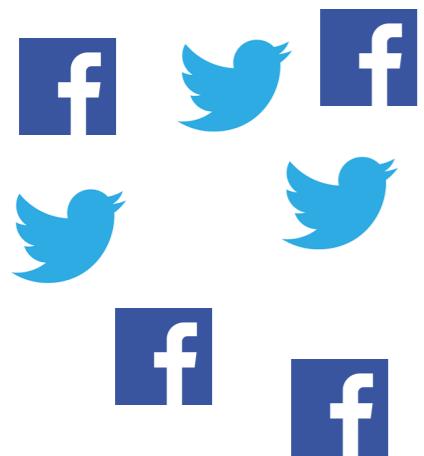
Machine Learning & Predictive Analytics



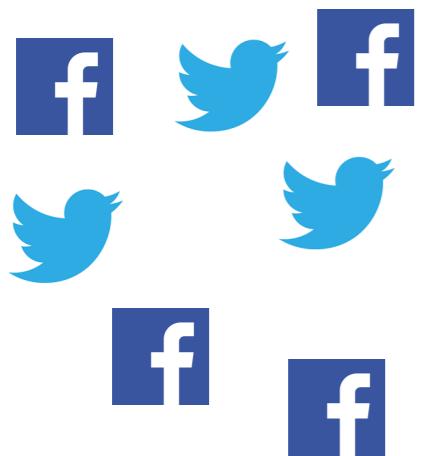
Machine Learning & Predictive Analytics



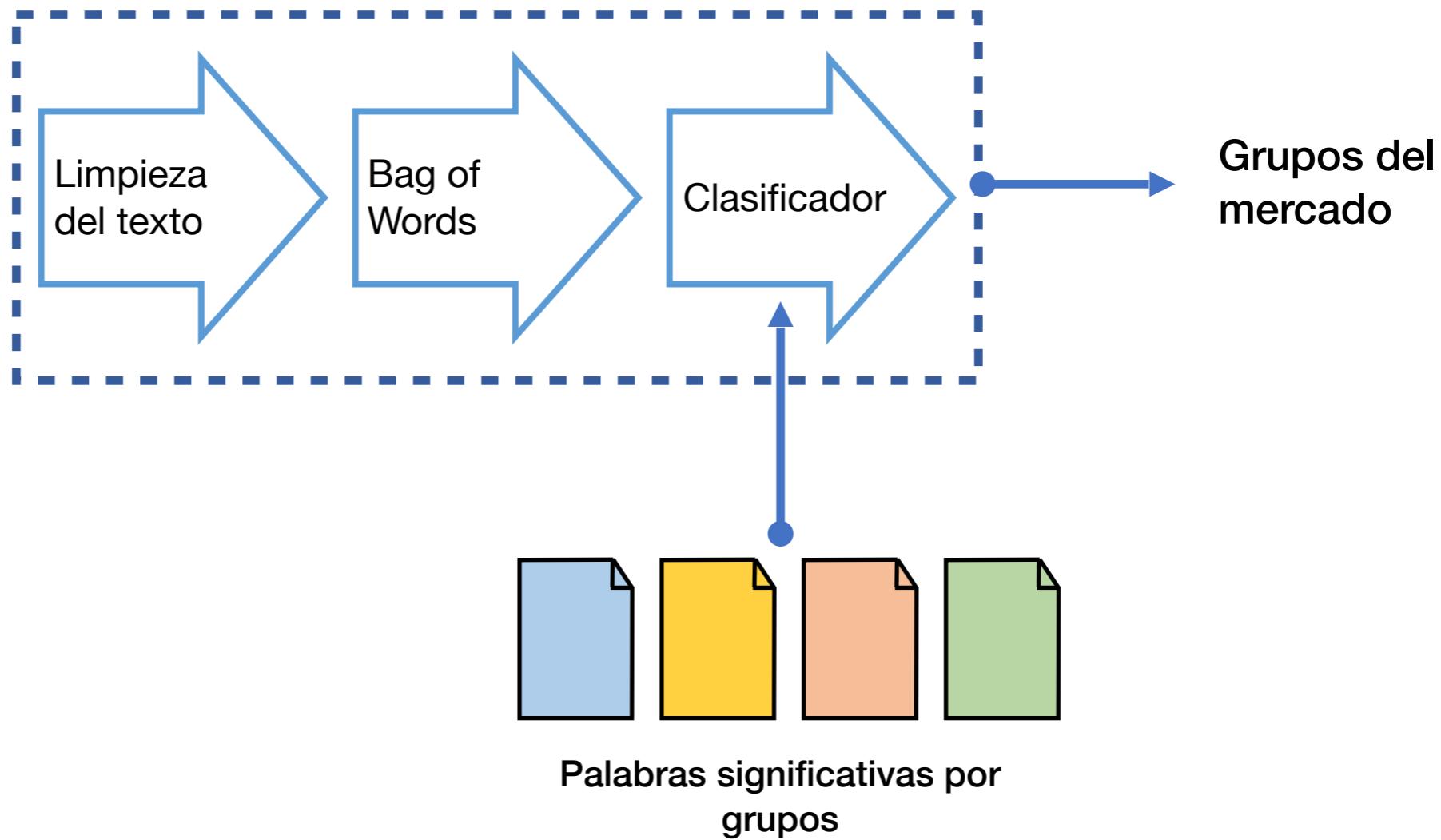
Machine Learning & Predictive Analytics



Machine Learning & Predictive Analytics

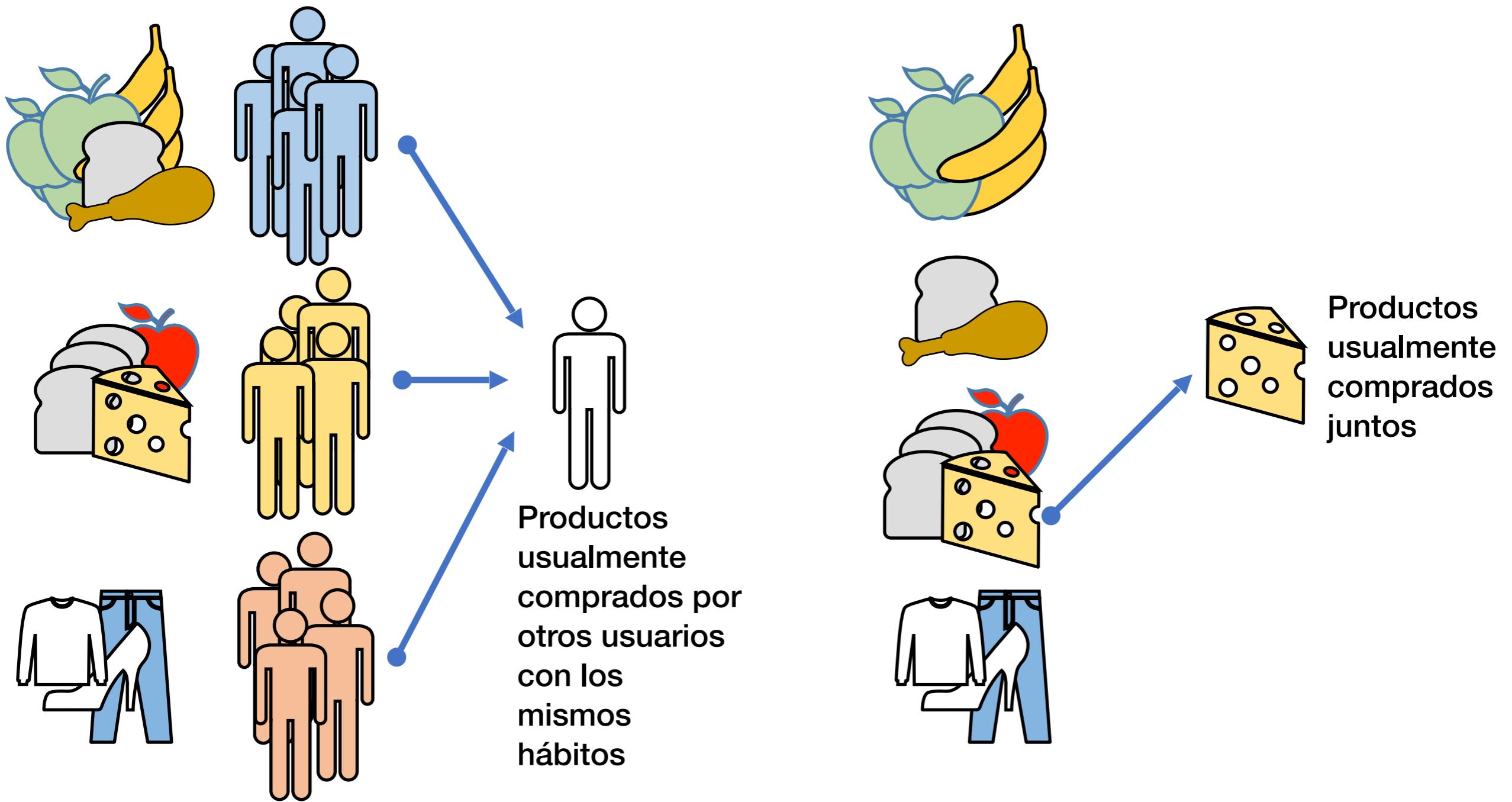


Clasificación del mercado

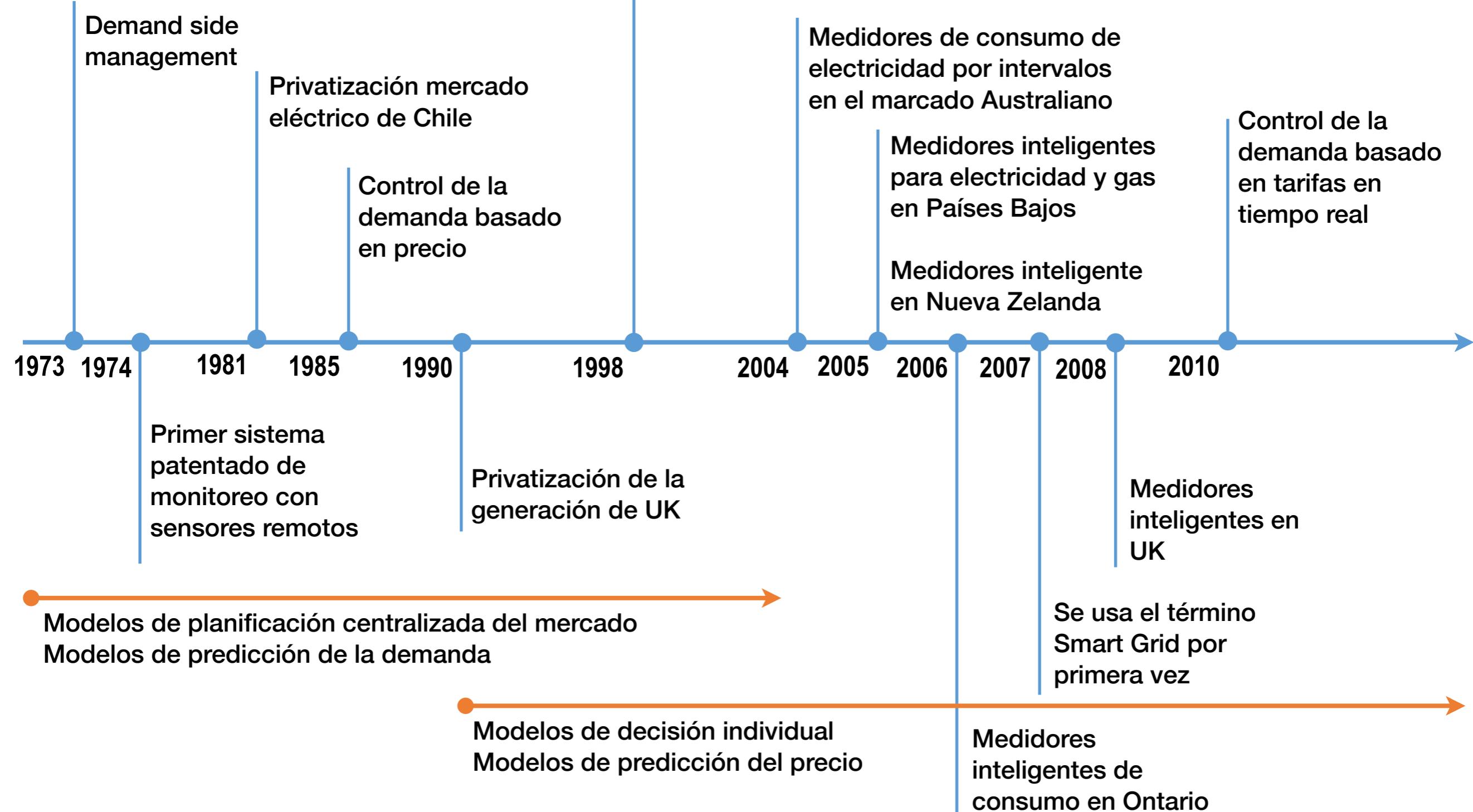


Machine Learning & Predictive Analytics

Association Rules & Recommender Systems



Industria de la Energía Eléctrica



Open Data Science & Modern Analytics

Data Science and Data Scientists: What's in a Name?

Business Intelligence Practitioner

Combinación de negocios + tecnología con el fin de proveer información a las unidades de negocios para toma de decisiones

Data Scientist

Habilidades en la programación de computadores para manejo de datos y modelado predictivo (estadística, aprendizaje de máquinas, minería de datos, etc.).

Analytics Practitioner

Data Science + Inteligencia de Negocios + Optimización + Simulación + Toma de Decisiones

Open Data Science & Modern Analytics (2009)

Explotación de HW

moderno

- Servidores
- Clusters
- GPUs & Workstations

Storyboards

- Notebooks
- Exploración interactiva
- Programación visual
- Data IDE

Analytics

- Preparación de datos
- Estadística
- ML & Ensambles
- Deep learning
- Simulación y optimización
- Datos geoespaciales
- Texto y NLP
- Gráficos y redes
- Minería de audio, video e imágenes

SciPy
PyMC
StatsModels
Theano
Scikit-learn
NLTK
NetworkX
Theano
pycaffe
Pylearn2
R caret
R glmnet
R randomForest

SimPy
PyJMI
PyFMI
PyMC
Pyomo
CVXOPT
CVXPY
tao4py
pyopt
Pylpopt
PyGMO

Fuentes de datos

modernas

- Big Data
- Spark
- NoSQL
- DW & SQL
- Archivos y servicios

Pandas

Blaze

GeoPandas

R plyr

R dplyr,

R tidyR

R reshape2

R sparklyr

R readr

R readXL

R lubridate

R stringr

R feather

R Tibble

R ggpairs

Visualización

- Gráficos
- Visualización interactiva
- Big data
- Mapas & GIS
- 3D
- Streaming

Bokeh

Plot.ly

Seaborn

Geopandas

ggplot2

Aplicaciones

modernas

- Notebooks
- Dashboards
- Aplicaciones visuales
- Servicios de datos



Open Data Science & Modern Analytics (2009)

Jupyter Notebook

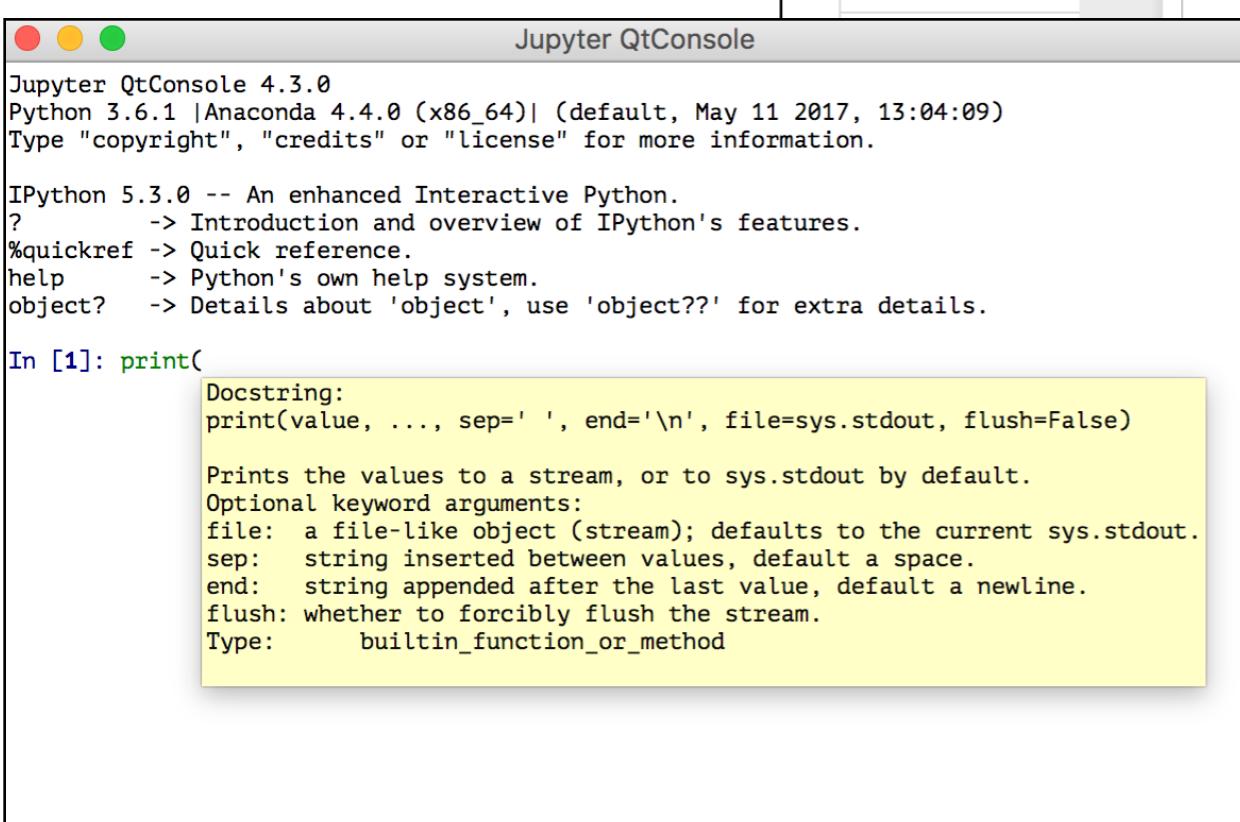
Storyboards

- Notebooks
- Exploración interactiva
- Programación visual
- Data IDE

Aplicaciones modernas

- Notebooks
- Dashboards
- Aplicaciones visuales
- Servicios de datos

Jupyter QtConsole

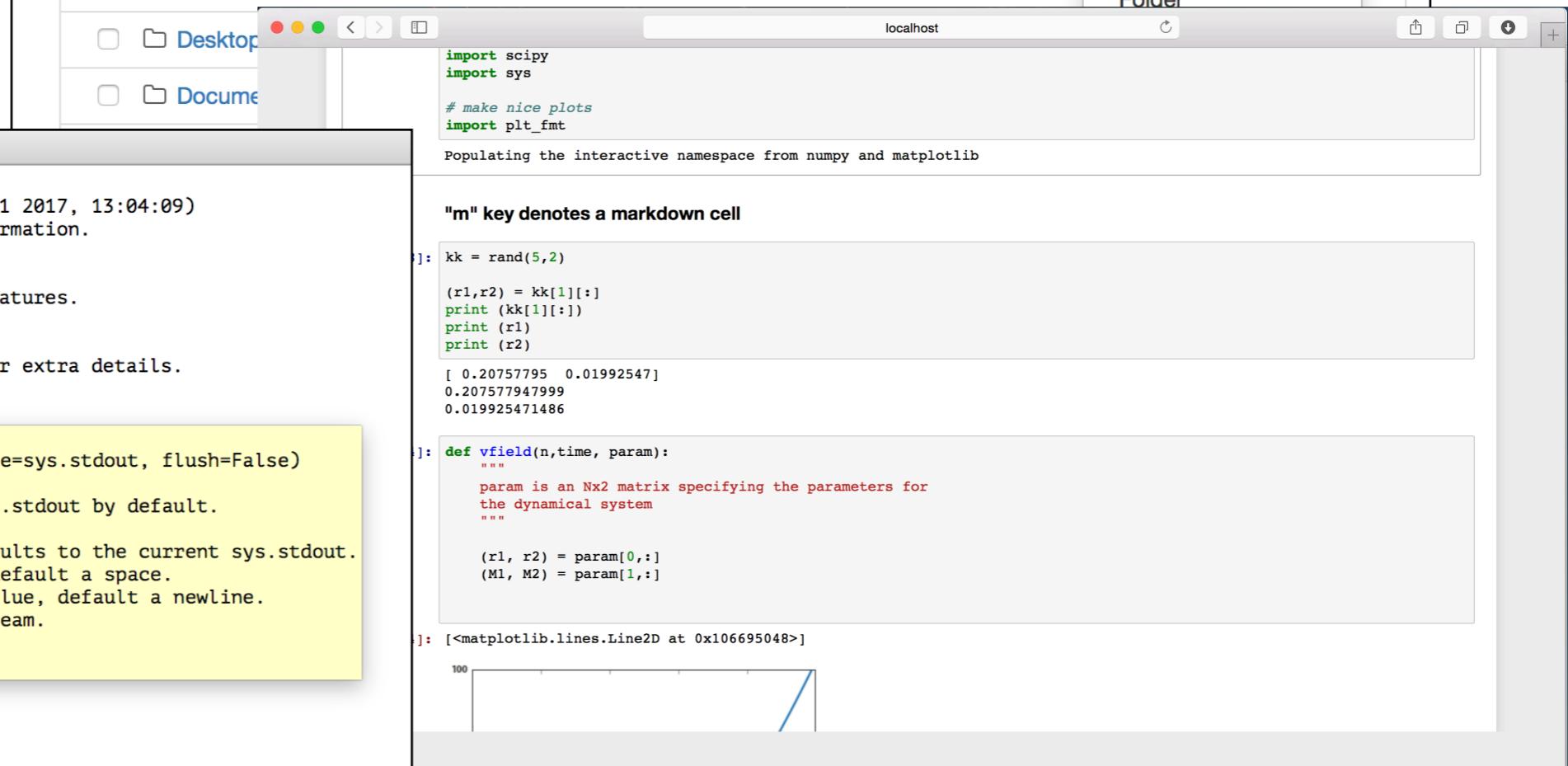
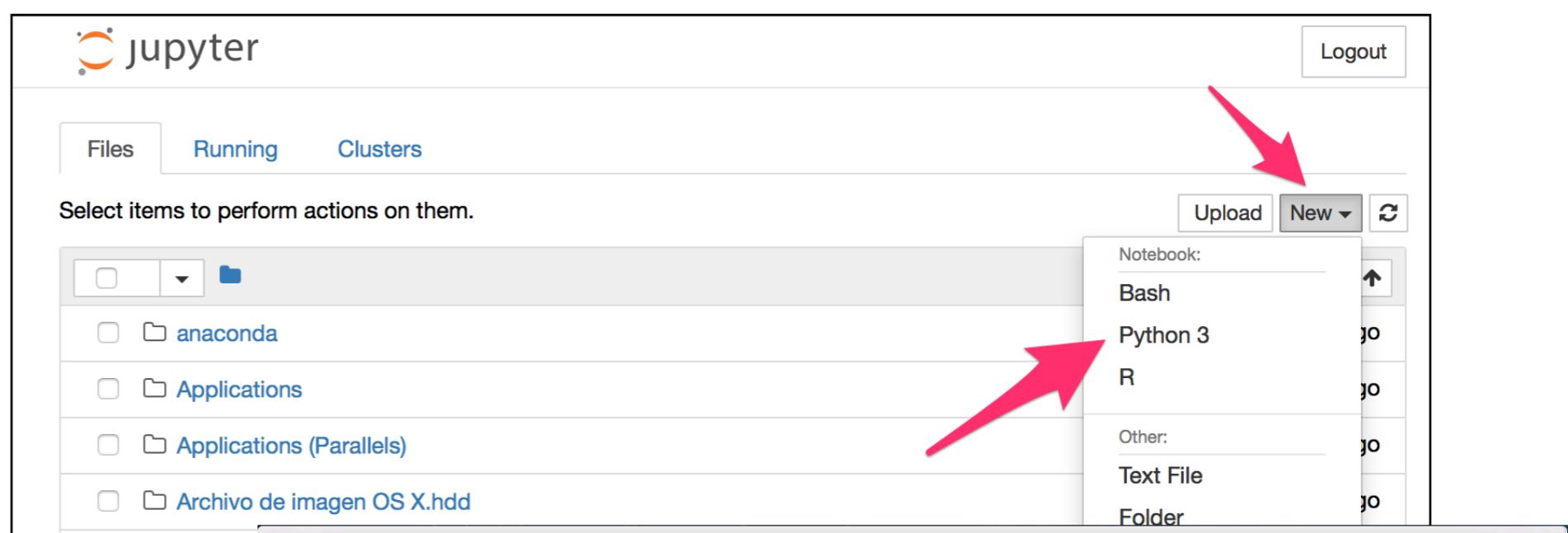


```
Jupyter QtConsole 4.3.0
Python 3.6.1 |Anaconda 4.4.0 (x86_64)| (default, May 11 2017, 13:04:09)
Type "copyright", "credits" or "license" for more information.

IPython 5.3.0 -- An enhanced Interactive Python.
?          -> Introduction and overview of IPython's features.
%quickref -> Quick reference.
help       -> Python's own help system.
object?    -> Details about 'object', use 'object??' for extra details.

In [1]: print(
Docstring:
print(value, ..., sep=' ', end='\n', file=sys.stdout, flush=False)

Prints the values to a stream, or to sys.stdout by default.
Optional keyword arguments:
file: a file-like object (stream); defaults to the current sys.stdout.
sep: string inserted between values, default a space.
end: string appended after the last value, default a newline.
flush: whether to forcibly flush the stream.
Type: builtin_function_or_method
```



```
import scipy
import sys

# make nice plots
import plt_fmt

Populating the interactive namespace from numpy and matplotlib

"m" key denotes a markdown cell

]: kk = rand(5,2)
(r1,r2) = kk[1][:]
print (kk[1][:])
print (r1)
print (r2)
[ 0.20757795  0.01992547]
0.207577947999
0.019925471486

]: def vfield(n,time,param):
    """
    param is an Nx2 matrix specifying the parameters for
    the dynamical system
    """

    (r1, r2) = param[0,:]
    (M1, M2) = param[1,:]

]: [
```

Open Data Science & Modern Analytics (2009)

KNIME

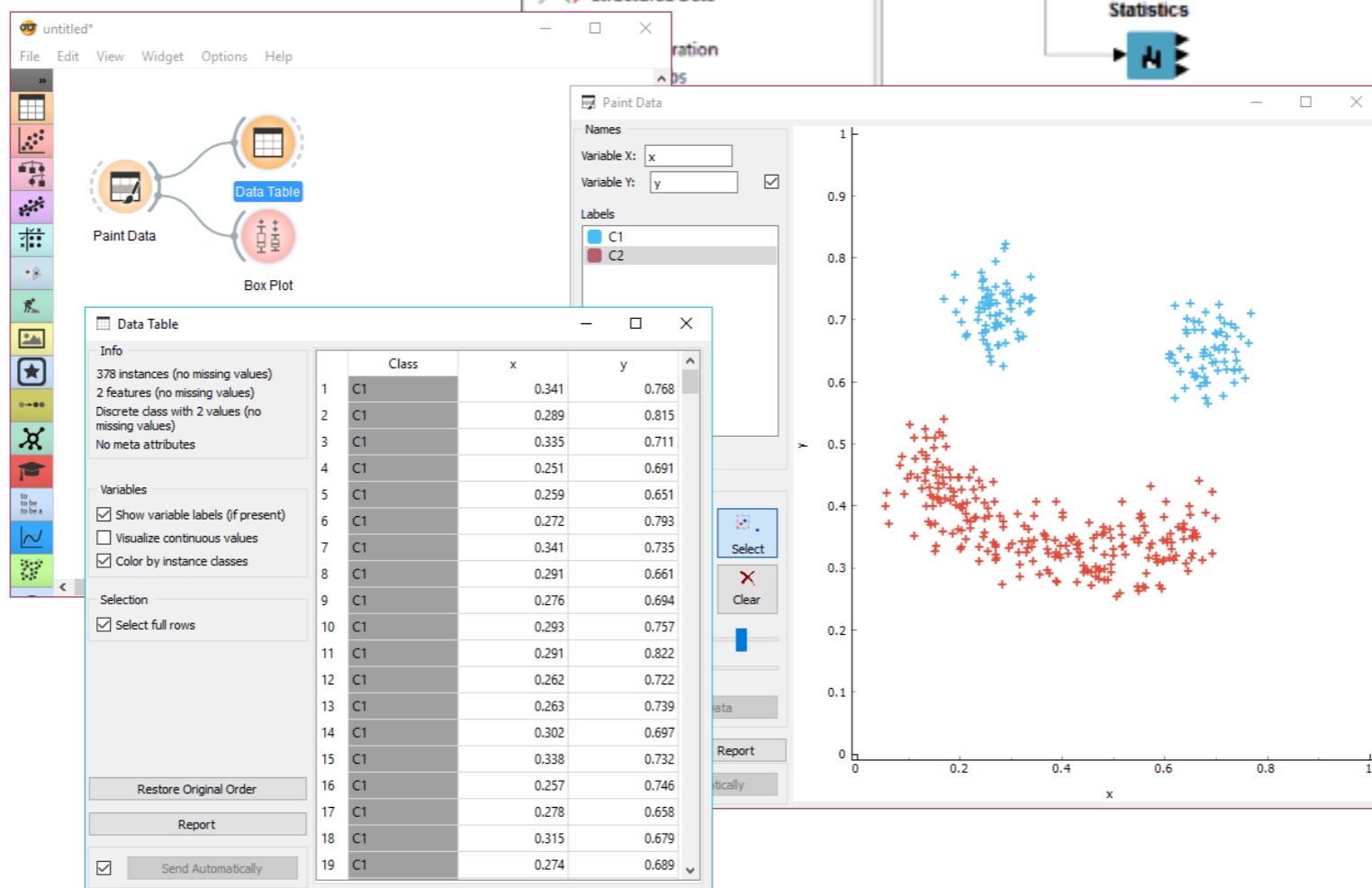
Storyboards

- Notebooks
- Exploración interactiva
- Programación visual
- Data IDE

Aplicaciones modernas

- Notebooks
- Dashboards embebibles
- Aplicaciones visuales
- Servicios de datos

Orange



Open Data Science & Modern Analytics (2009)

Aplicaciones modernas

- Notebooks
- Dashboards
- Aplicaciones visuales
- Servicios de datos

R Dashboards

R Markdown

The screenshot shows the RStudio interface. On the left, the code editor displays R Markdown code for generating a plot of flight residuals. The code includes imports for `nycflights13`, `lubridate`, and `dplyr`, and uses `ggplot2` to create a line plot of daily flight counts over time. Two line plots are shown side-by-side, illustrating the seasonal pattern of flights.

```
53
54 ## Residuals
55
56 To motivate the use of models we're going to start with an
57 interesting pattern from the NYC flights dataset -- the
58 number of flights per day.
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
76
77
78
79
80
```

```
library(nycflights13)
library(lubridate)
library(dplyr)

daily <- flights %>%
  mutate(date = make_datetime(year, month, day)) %>%
  group_by(date) %>%
  summarise(n = n())

ggplot(daily, aes(date, n)) +
  geom_line()
```

A screenshot of a dashboard titled "My Dashboard". It features a search bar, a sidebar with "Dashboard" and "Widgets" options, and two main panels. The left panel contains a histogram titled "Distribution" with the x-axis labeled "data" ranging from -3 to 3 and the y-axis ranging from 0 to 20. The right panel contains a scatter plot titled "View 1" with the x-axis labeled "X" ranging from -4 to 3 and the y-axis ranging from -1 to 1, showing a positive linear trend.

A screenshot of a dashboard titled "Twin Cities Buses". It features a map of Minneapolis-St. Paul showing bus routes. A legend indicates route colors: Northbound (pink), Southbound (dark blue), Eastbound (green), and Westbound (red). A table below the map lists the number of vehicles for each direction:

Color	Direction	Number of vehicles
Pink	Northbound	0
Dark Blue	Southbound	0
Green	Eastbound	5
Red	Westbound	4
	Total	9

Other dashboard elements include a "Route" dropdown set to 2, a "Show" checkbox group for directions, and a note about route paths. Refresh interval and source data update settings are also visible.

Open Data Science & Modern Analytics (2009)

Aplicaciones modernas

- Notebooks
- Dashboards
- Aplicaciones visuales
- Servicios de datos

R Shiny

Movie explorer

Filter

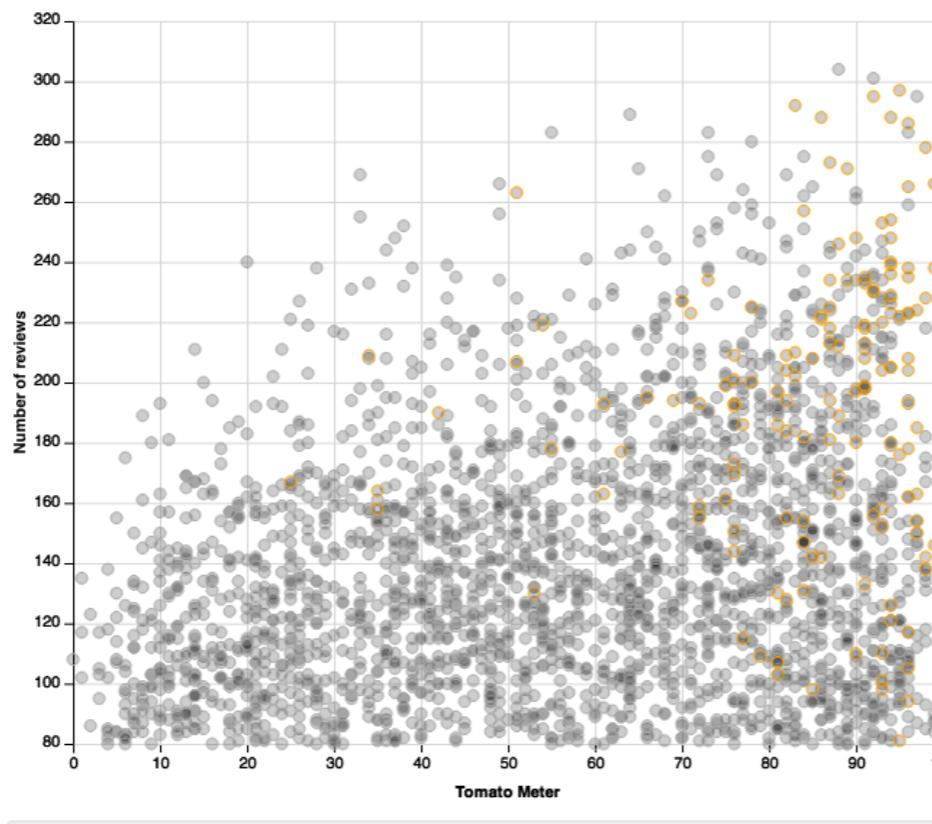
Minimum number of reviews on Rotten Tomatoes
10 80 300

Year released
1,940 1,970 2,014

Minimum number of Oscar wins (all categories)
0 1 2 3 4

Dollars at Box Office (millions)
0 800

Genre (a movie can have multiple genres)
All



Pilot Police Demand Planning Tool | Introduction | Crime Analysis | Impact on Resources

Police Supply & Demand Tool

This is a Pilot version of the Police Supply & Demand simulation tool.

Please note: the data contained in this demo version is either artificial data or data already publicly available (e.g. through <http://data.police.uk/>)

Methodology & Instructions

- Analyse current crime patterns, detection & trends (including formal requests for specialist services):
 - Seasonality
 - Events
 - What is needed for the current simulation run, adjust demand (forecast) to evaluate the impact of specific crime trends
- Evaluate impact on resources
 - Historical analysis
 - Forecast-based
 - Adjusted forecast
- Adjust Supply parameters to fit Demand
 - Iterate
 - Analyse Outcomes
 - Identify potential shortages / surpluses
 - Identify areas of analysis

Pilot Developed by Enzo Martaglio - enzo at smartlightsfromdata.com
for soprasteria - www.soprasteria.com

OMIM® Explorer: Rapid integration of phenotype with genotype to aid in differential diagnosis of genetic disease, molecular variant prioritization, and novel gene-phenotype association discovery.

1. Describe case | 2. Input phenotypes | 3. Generate differential | 4. Input variant genes | 5. Explore differential | 6. Improve differential | 7. Discover associations | Load Klotho | Case Summary | Visualization | Tabulation | Discovery | Variants | Differential update complete.

Baylor College of Medicine

2 phenotypes and 0 genes selected.

Select a disease class to highlight its constituent diseases below:

HON (Human Disease Network) | OMIM Phenotypic Series | Disease Class to Highlight: Bone

Query Similarity to Classes | HON Class Compositions | OMIM Phenotypic Series Compositions

Approximate disease map

Estimated Campaign Values

Philadelphia School Community Resource Mapper

KITAMBA DATA SOCIETY™

For best performance, use Mozilla as your browser.

The Philadelphia School Community Resources Mapper is an online, interactive mapping tool that provides information on community resources and school outcomes for all public schools in Philadelphia. To learn more please e-mail mapper@datasociety.co. We look forward to hearing from you!

How To Use This Tool

- The map feature allows individuals to zoom in on a specific school, identify community resources near a school and identify gaps across the city where additional resources might be needed.
- The school comparison feature allows school leaders to identify differences on school performance across schools with similar characteristics in order to facilitate best practice sharing and collaboration across schools.

What types of schools would you like to see on the map?
High School
Middle School
Elementary School
Elementary and Middle School

Which school would you like to zoom in on?
Select the school you want to learn more about:
none

Median Household Income
\$0K - \$10K
\$10K - \$20K
\$20K - \$30K
\$30K - \$40K
\$40K - \$50K
\$50K - \$100K

What community resources would you like to see on the map?
Libraries

Label: observedSuccessRate observedValuePerAction paboveTargetValue
Campaign_1: 0.81485149 0.81485149 0.81485149
Campaign_2: 0.81485149 0.81485149 0.81485149
51%
PC1 + C2

51 %

IGC FANCIETIC CANCER (DUCTAL ADENOCARCINOMA) - GENOME VIEWER

Cohort Tap CleVar Gene Summary

Gene	Chr Start	Pos To	Consequence	Count	
SMN1	19	13349847	C	T missense_variant	38
TP53	17	7679497	G	A stop_gained	38
KRAS	12	2359504	C	T missense_variant	32
TP53	17	7679497	G	A stop_gained	38
SMN1	19	13349847	C	T missense_variant	38
TP53	17	7679521	G	A stop_gained	38
KRAS	12	2359504	C	G missense_variant	4
SMN1	19	13349847	C	T downstream_gene_variant	4
TP53	17	7679497	G	A downstream_gene_variant	4

Please select a donor ID: DC04184

Race Factor: 0

Estimated Bayesian posterior distribution of true value per action

Label: observedSuccessRate observedValuePerAction paboveTargetValue

Campaign_1: 0.81485149 0.81485149 0.81485149
Campaign_2: 0.81485149 0.81485149 0.81485149
51%
PC1 + C2

Open Data Science & Modern Analytics (2009)

Visualización

- Gráficos
- Visualización interactiva
- Big data
- Mapas & GIS
- 3D
- Streaming

BeakerX

BeakerX: Beaker extensions for Jupyter

build passing chat on gitter JitPack 0.1.1 npm package 0.0.6 pypi package 0.2.4.dev0

BeakerX is a collection of JVM kernels with widgets, plotting, tables, autotranslation, and other extensions to the Jupyter Notebook and changes with

The document

BeakerX is th
are hiring.

Groovy with Interactive Plotting and Tables:

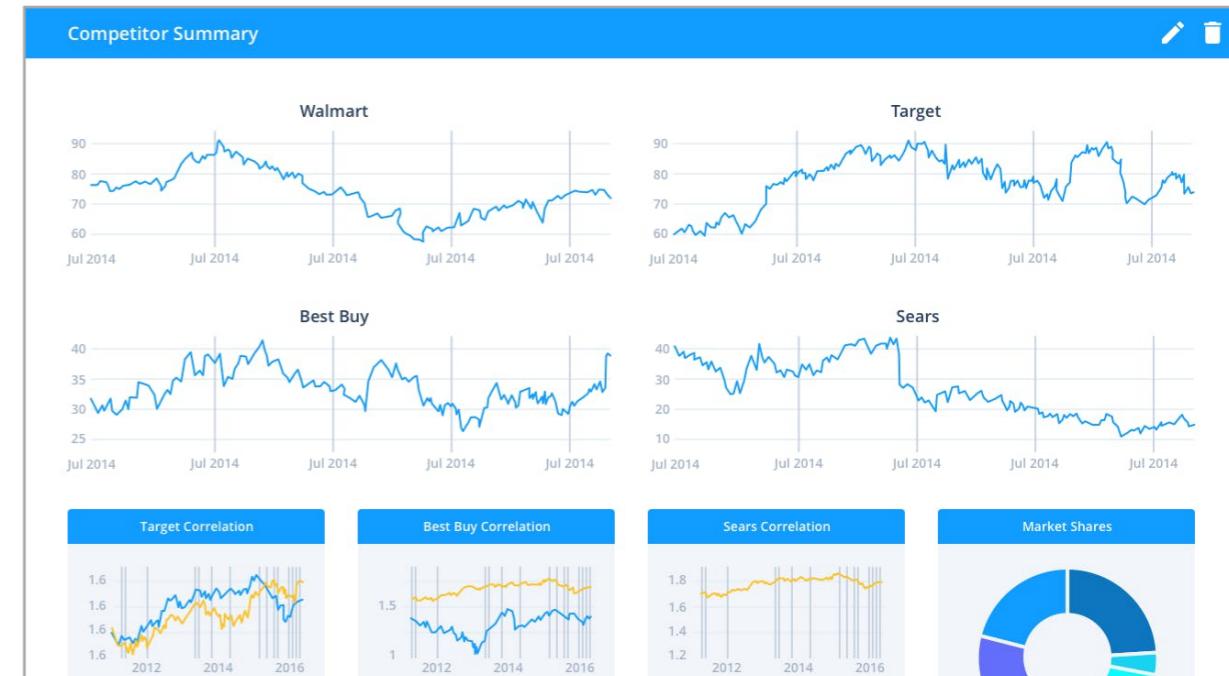
```
// Then use a CombinedPlot to get stacked plots with linked X axis.  
def c = new CombinedPlot(title: "US Treasuries", initWidth: 1000)  
  
// add both plots to the combined plot, and including their relative heights.  
c.add(p1, 3)  
c.add(p2, 1)
```



Bokeh



plot.ly



Open Data Science & Modern Analytics (2009)

Analytics

- Preparación de datos
- Estadística
- ML & Ensambles
- Deep learning
- Simulación y optimización
- Datos geoespaciales
- Texto y NLP
- Gráficos y redes
- Minería de audio, video e imágenes

Theano

TensorFlow™

Install Develop API r1.4

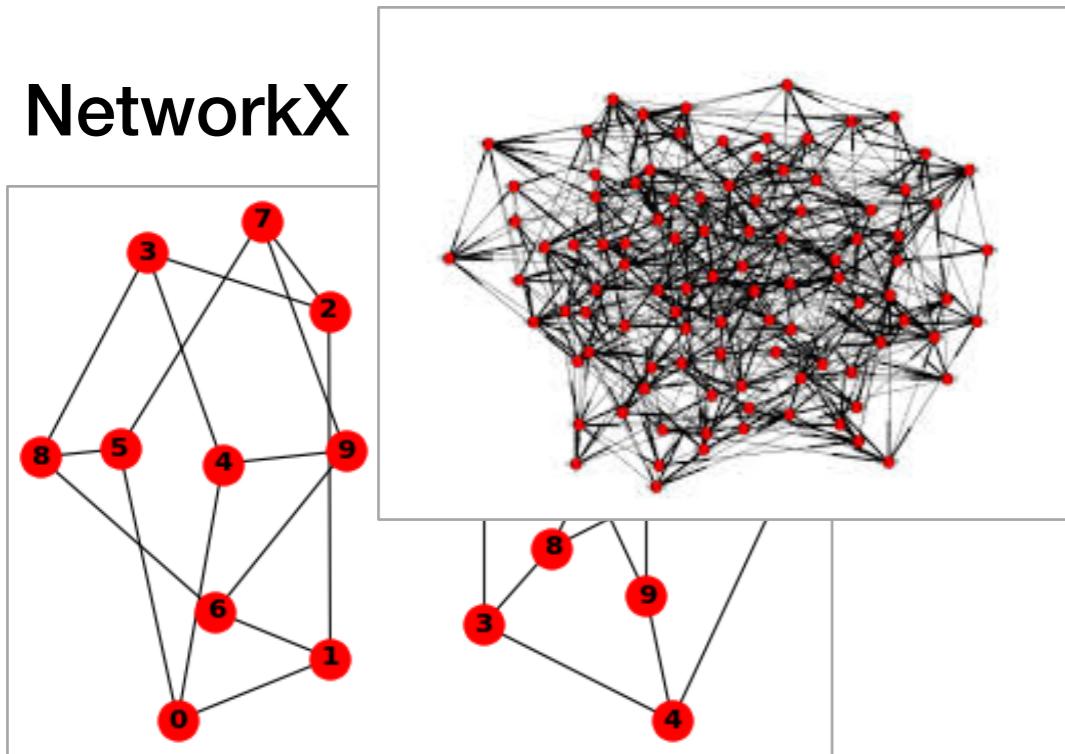
An open-source software library for Machine Intelligence

GET STARTED

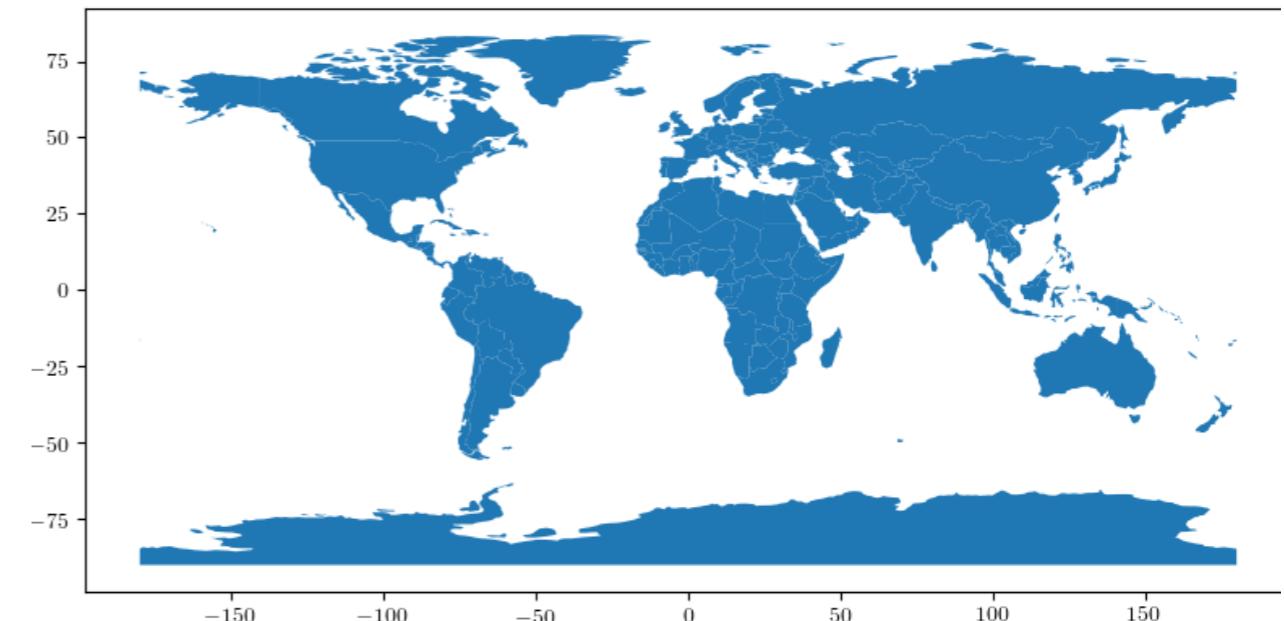
0.9 release ▾

ch docs

NetworkX



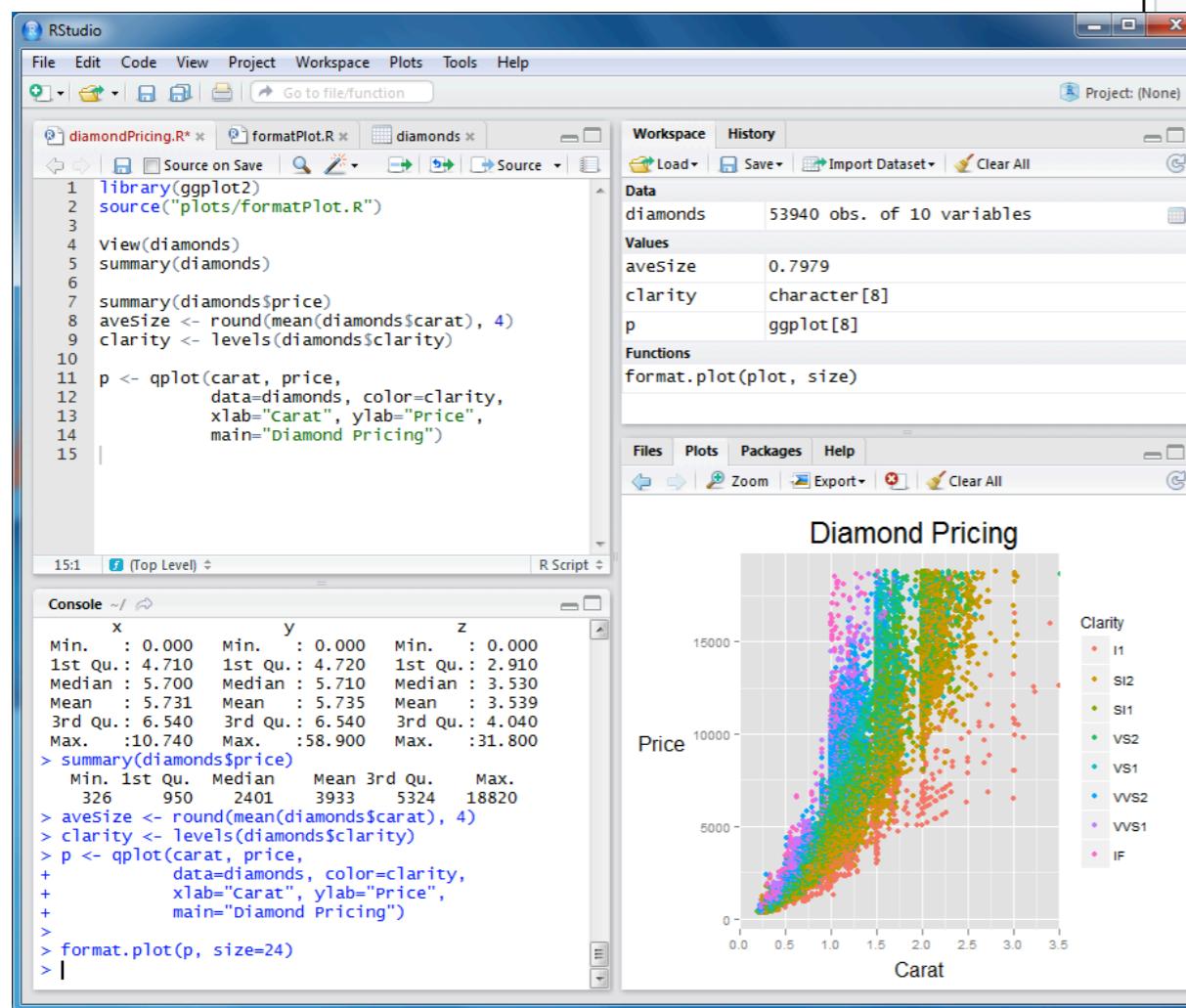
GeoPandas



Open Data Science & Modern Analytics (2009)

Analytics

- Preparación de datos
- Estadística
- ML & Ensambles
- Deep learning
- Simulación y optimización
- Datos geoespaciales
- Texto y NLP
- Gráficos y redes
- Minería de audio, video e imágenes



Python StatsModels

```
In [1]: import numpy as np
In [2]: import statsmodels.api as sm
In [3]: import statsmodels.formula.api as smf
# Load data
In [4]: dat = sm.datasets.get_rdataset("Guerry", "HistData").data

# Fit regression model (using the natural log of one of the regressors)
In [5]: results = smf.ols('Lottery ~ Literacy + np.log(Pop1831)', data=dat).fit()

# Inspect the results
In [6]: print(results.summary())
OLS Regression Results
```

Dep. Variable:	Lottery	R-squared:	0.348
Model:	OLS	Adj. R-squared:	0.333
Method:	Least Squares	F-statistic:	22.20
Date:	Tue, 28 Feb 2017	Prob (F-statistic):	1.90e-08
Time:	21:38:05	Log-Likelihood:	-379.82
N Observations:	86	AIC:	765.6
Residuals:	83	BIC:	773.0
Model:	2		
Variance Type:	nonrobust		

RStudio

Open Data Science & Modern Analytics (2009)

Fuentes de datos

modernas

- Big Data
- Spark
- NoSQL
- DW & SQL
- Archivos y servicios Web

Blaze / Odo

Sponsored by:
CONTINUUM[®]
ANALYTICS

HOME OVERVIEW PROJECTS TALKS BLOG

The Blaze Ecosystem

The Blaze ecosystem is a set of libraries that help users store, describe, query and process data. It is composed of the following core projects:

- [Blaze](#): An interface to query data on different storage systems
- [Dask](#): Parallel computing through task scheduling and blocked algorithms
- [Datashape](#): A data description language

Combining separate, gzipped csv files.

```
>>> from blaze import odo
>>> from pandas import DataFrame
>>> odo(example('accounts_*csv.gz'), DataFrame)
   id      name  amount
0   1      Alice     100
1   2        Bob     200
2   3    Charlie     300
3   4        Dan     400
4   5     Edith     500
```

Open Data Science & Modern Analytics (2009)

Fuentes de datos

modernas

- Big Data
- Spark
- NoSQL
- DW & SQL
- Archivos y servicios Web

SQLite

```
1 import sqlite3
2 conn = sqlite3.connect('example.db')
3
4 c = conn.cursor()
5 c.execute('''
6     CREATE TABLE person
7         (id INTEGER PRIMARY KEY ASC, name varchar(250) NOT NULL)
8     ''')
9 c.execute('''
10    CREATE TABLE address
11        (id INTEGER PRIMARY KEY ASC, street_name varchar(250), street_number varchar(
12            250),
13             post_code varchar(250) NOT NULL, person_id INTEGER NOT NULL,
14             FOREIGN KEY(person_id) REFERENCES person(id))
15     ''')
16 c.execute('''
17     INSERT INTO person VALUES(1, 'pythoncentral')
18     ''')
19 c.execute('''
20     INSERT INTO address VALUES(1, 'python road', '1', '00000', 1)
21     ''')
22 conn.commit()
```

```
1 import sqlite3
2 conn = sqlite3.connect('example.db')
3
4 c = conn.cursor()
5 c.execute('SELECT * FROM person')
6 print c.fetchall()
7 c.execute('SELECT * FROM address')
8 print c.fetchall()
9 conn.close()
```

Open Data Science & Modern Analytics (2009)

Explotación de HW moderno

- Servidores
- Clusters
- GPUs & Workstations

Numba – <https://numba.pydata.org>

ipyparallel – <https://github.com/ipython/ipyparallel>

mpi4py – <http://pythonhosted.org/mpi4py/>

Theano – <http://deeplearning.net/software/theano/>

pyCUDA – <https://mathematician.de/software/pycuda/>

```
from numba import jit
from numpy import arange

# jit decorator tells Numba to compile this function.
# The argument types will be inferred by Numba when function is called.
@jit
def sum2d(arr):
    M, N = arr.shape
    result = 0.0
    for i in range(M):
        for j in range(N):
            result += arr[i,j]
    return result

a = arange(9).reshape(3,3)
print(sum2d(a))
```

Open Data Science & Modern Analytics (2009)

```
echo "ESTACION;FECHA;ANO;MES;DIA;HORA;HHMMSS;DIRECCION;VELOCIDAD" > datos
tail +2 AQUITANIA.csv >> datos

## Elimina lineas vacias
sed -e '/^$/d' datos > out.1

## borra lineas en blanco
sed -e '/;;;;;/d' out.1 > datos

## llena las horas vacias
sed -e 's/;;;;;00:00:00;/g' datos > out.1

## etcetera ...

## promedio para cada hora
csvsql --query "select ESTACION, FECHA, ANO, MES,
  DIA, HORA, DIRECCION, avg(VELOCIDAD) as VELOCIDAD from 'out'
  group by ESTACION, FECHA, HORA" out.5 > out.6
```

ESTACION;FECHA;HORA;DIRECCION;VELOCIDAD
AQUITANIA;2005-04-16;11:10:00;135;6,3
AQUITANIA;2005-04-16;11:20:00;135;5,1
AQUITANIA;2005-04-16;11:30:00;135;6,3
AQUITANIA;2005-04-16;11:40:00;113;6,1
AQUITANIA;2005-04-16;11:50:00;135;4,1
AQUITANIA;2005-04-16;12:00:00;135;5,5
AQUITANIA;2005-04-16;12:10:00;135;5,4
AQUITANIA;2005-04-16;12:20:00;135;5,5
AQUITANIA;2005-04-16;12:30:00;90;4,6
AQUITANIA;2005-04-16;12:40:00;90;6,7

ESTACION,FECHA,ANO,MES,DIA,HORA,DIRECCION,VELOCIDAD
AQUITANIA,2005-04-16,2005,4,16,11,135,5.58
AQUITANIA,2005-04-16,2005,4,16,12,90,5.45
AQUITANIA,2005-04-16,2005,4,16,13,135,4.8666666666666667
AQUITANIA,2005-04-16,2005,4,16,14,135,3.6666666666666665
AQUITANIA,2005-04-16,2005,4,16,15,135,3.4666666666666667
AQUITANIA,2005-04-16,2005,4,16,16,135,3.6999999999999993
AQUITANIA,2005-04-16,2005,4,16,17,135,4.8333333333333333
AQUITANIA,2005-04-16,2005,4,16,18,135,4.7666666666666667
AQUITANIA,2005-04-16,2005,4,16,19,135,4.3500000000000005
AQUITANIA,2005-04-16,2005,4,16,20,135,2.6833333333333333
AQUITANIA,2005-04-16,2005,4,16,21,135,3.1999999999999997

Modern Analytics (2009)

Analytics

- Preparación de datos
- Estadística
- ML & Ensambles
- Deep learning
- Simulación y optimización
- Datos geoespaciales
- Texto y NLP
- Gráficos y redes
- Minería de audio, video e imágenes


HOME / ABOUT / DOWNLOAD / DOCUMENTATION / BLOG

Documentation

Online Documentation

Pyomo Online Documentation ([html](#), [pdf](#), [epub](#))
PySP Online Documentation ([pdf](#))
Pyomo Wikipedia Page ([html](#))

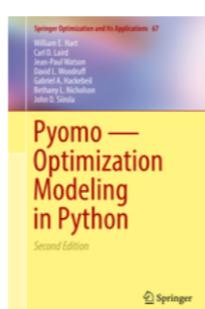
Examples

Pyomo Gallery ([browse](#))
Online examples from the Pyomo software repository: ([browse](#)) ([zipfile](#))

Citation

If you use Pyomo for your work, please cite the Pyomo book ([bibtex](#)) and the Pyomo paper ([bibtex](#)).
If you use PySP for your work, please cite the PySP paper ([bibtex](#)).

The Pyomo Book



Hart, William E., Carl D. Laird, Jean-Paul Watson, David L. Woodruff, Gabriel A. Hackebeil, Bethany L. Nicholson, and John D. Siirola. *Pyomo – Optimization Modeling in Python*. Second Edition. Vol. 67. Springer, 2017.

The Second Edition of the book describes capabilities in the Pyomo 5.x series. The First Edition (2012) describes the capabilities from the Coopr 3.1 release. Some changes beginning in the Pyomo 4.0 release are not backwards compatible with the First Edition.

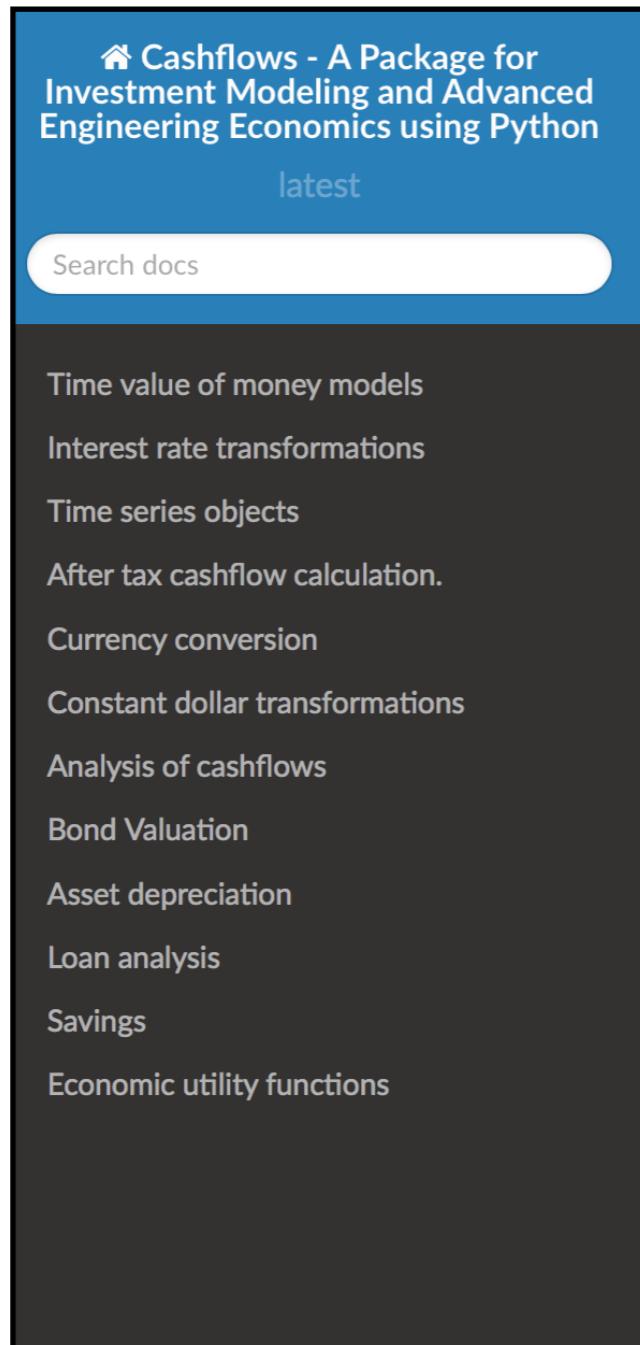
Cashflows

Programación en la máquina local

Testing automático usando unittests y doctests

Control de versiones en GitHub

Documentación automática con Sphinx



Docs »

Cashflows: A Package for Investment Modeling and Advanced Engineering Economics using Python

Edit on GitHub

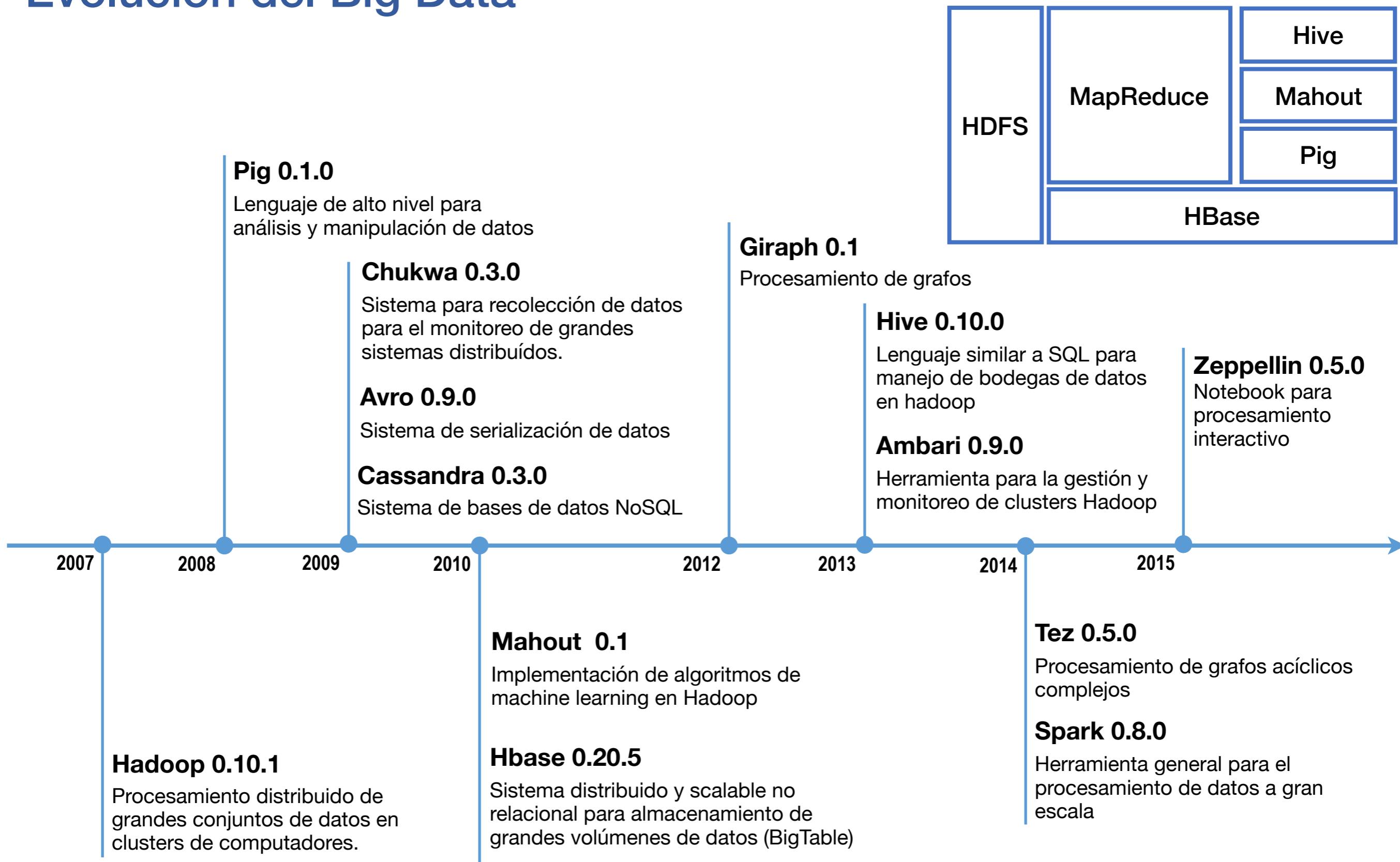
Cashflows: A Package for Investment Modeling and Advanced Engineering Economics using Python

Contents:

- [Time value of money models](#)
- [Interest rate transformations](#)
- [Time series objects](#)
- [After tax cashflow calculation.](#)
- [Currency conversion](#)
- [Constant dollar transformations](#)
- [Analysis of cashflows](#)
- [Bond Valuation](#)
- [Asset depreciation](#)
- [Loan analysis](#)
- [Savings](#)
- [Economic utility functions](#)

Big Data Analytics

Evolución del Big Data



Pig Latin (2008)

```
CROSS  
EXPLAIN  
FILTER  
FOREACH  
GENERATE  
GROUP  
ILLUSTRATE  
JOIN  
LIMIT  
LOAD  
ORDER  
STREAM  
SPLIT  
STORE  
SET  
QUIT
```

Lenguaje similar al SQL para el análisis de grandes volúmenes de datos en Hadoop representados como flujos de datos.

Ejemplo de Pig

```
records = LOAD 'sample.txt' AS (year:chararray, temperature:int, quality:int);  
filtered_records = FILTER records BY temperature;  
grouped_records = GROUP filtered_records BY year;  
max_temp = FOREACH grouped_records GENERATE group, MAX(filtered_records.temperature);  
DUMP max_temp;
```

Apache Hive (2013)

Ejemplo de Hive

```
CREATE TABLE records (year STRING, temperature INT, quality INT)
ROW FORMAT DELIMITED FIELDS TERMINATED BY '\t';
LOAD DATA LOCAL INPATH 'sample.txt' OVERWRITE INTO TABLE records;
SELECT year, MAX(temperature) FROM records GROUP BY year;
```

Apache Zeppelin (2015)

Multi-purpose Notebook

The Notebook is the place for all your needs

- >Data Ingestion
- Data Discovery
- Data Analytics
- Data Visualization & Collaboration

The screenshot shows the Apache Zeppelin web interface with three open notebooks:

- Bank**: A pie chart titled "maxAge" with values: 35, 34, 33, 32, 31, 30, 29, 28, 27, 26, 25, 24, 23, 22, 21, 20, 19.
- Under age < 35**: A bar chart titled "maxAge" with values: 0, 22, 24, 26, 28, 30, 103.
- marital**: A line chart titled "value" with values: 1, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, 100, 105.

The interface includes a top navigation bar with the Zeppelin logo, a search bar, and user authentication information. The notebook tabs are labeled "Bank", "Under age < 35", and "marital".

Una Introducción a la Analítica

Algunos casos de uso de Machine Learning

Esta presentación describe, bajo un marco común, los conceptos fundamentales de Data Science, Analytics y Big Data y establece su similitudes y diferencias; se presentan ejemplos de casos prácticos de la aplicación de Machine Learning y Aprendizaje Estadístico.

Descargue la última versión de este documento de:
<https://github.com/jdvelasq/data-science-docs/blob/master/sena.pdf>