The role of Python in the data science lifecycle

Katinka Gereb, PhD

pyladies amsterdam

presents

Careers with python

Multi-series talks about career paths
as a Pythonista

24 Feb 2021

Nice to meet you

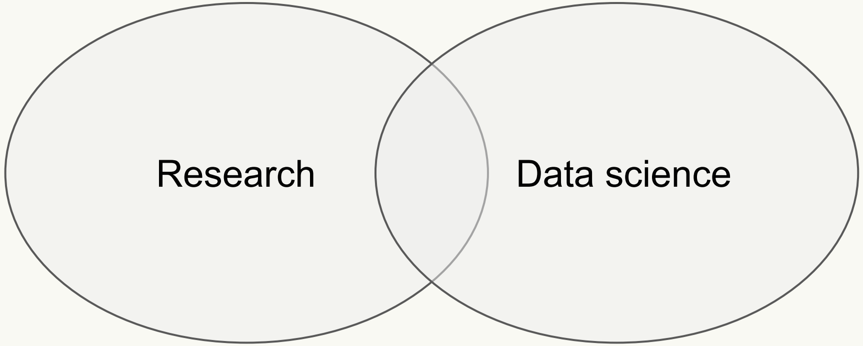
- Data scientist in Melbourne

Nice to meet you

- Data scientist in Melbourne

- PhD in astrophysics at the University of Groningen

How did I become a data scientist?



Research

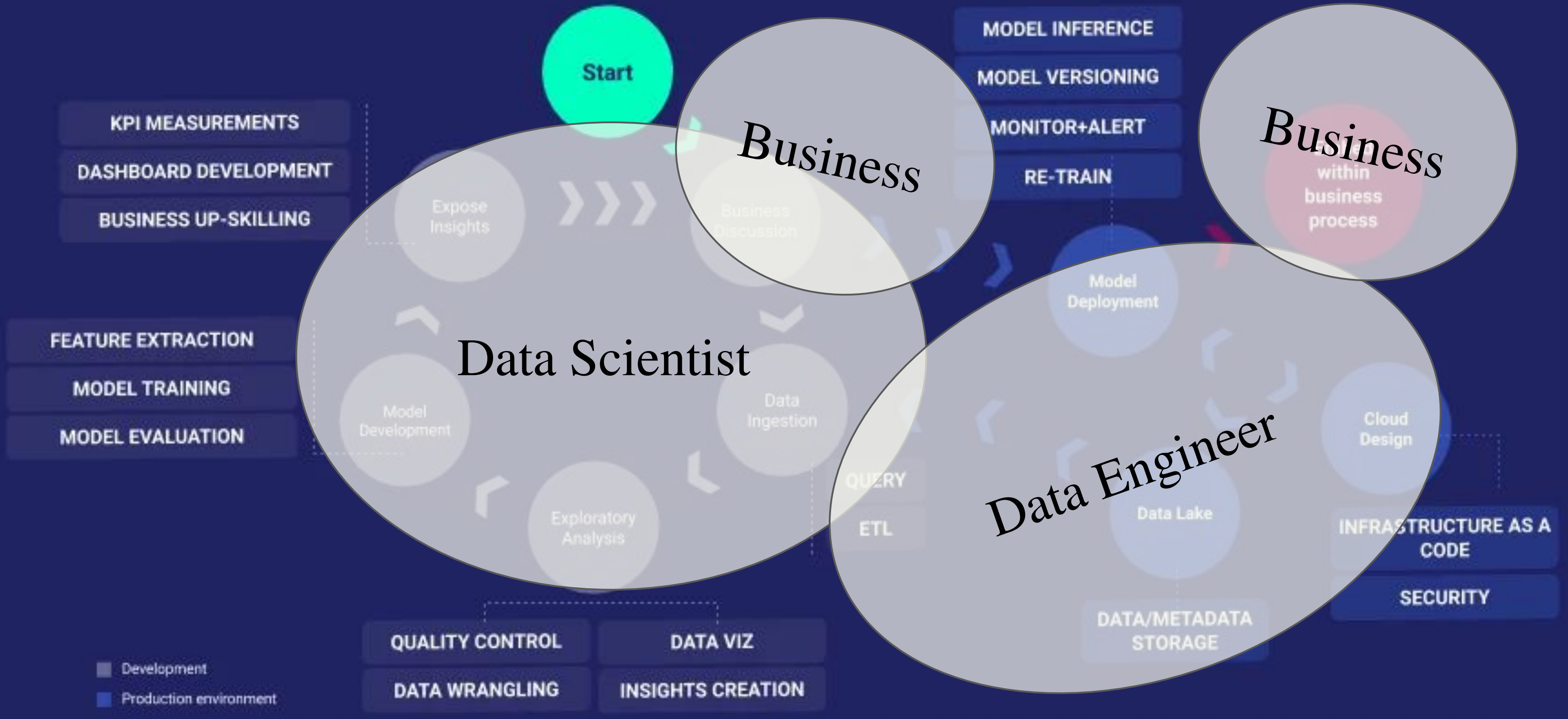
Data science

Why does a data scientist use Python?

Python can support the entire data science lifecycle!

- Data wrangling
- Statistical analysis
- Visualisations
- ML models
- Deployment

Data Science Cycle



Start

Business

Business

Data Scientist

Data Engineer

KPI MEASUREMENTS

DASHBOARD DEVELOPMENT

BUSINESS UP-SKILLING

Expose Insights

Business Discussion

Data Ingestion

Exploratory Analysis

Model Development

FEATURE EXTRACTION

MODEL TRAINING

MODEL EVALUATION

QUALITY CONTROL

DATA VIZ

DATA WRANGLING

INSIGHTS CREATION

MODEL INFERENCE

MODEL VERSIONING

MONITOR+ALERT

RE-TRAIN

Model Deployment

Embed within business process

Cloud Design

Data Lake

QUERY

ETL

DATA/METADATA STORAGE

INFRASTRUCTURE AS A CODE

SECURITY

▨ Development

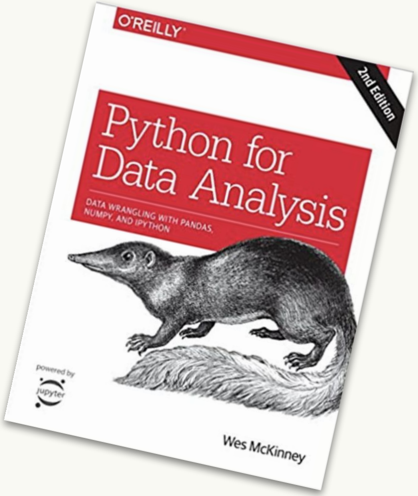
■ Production environment

Tools

Data cleaning and feature extraction

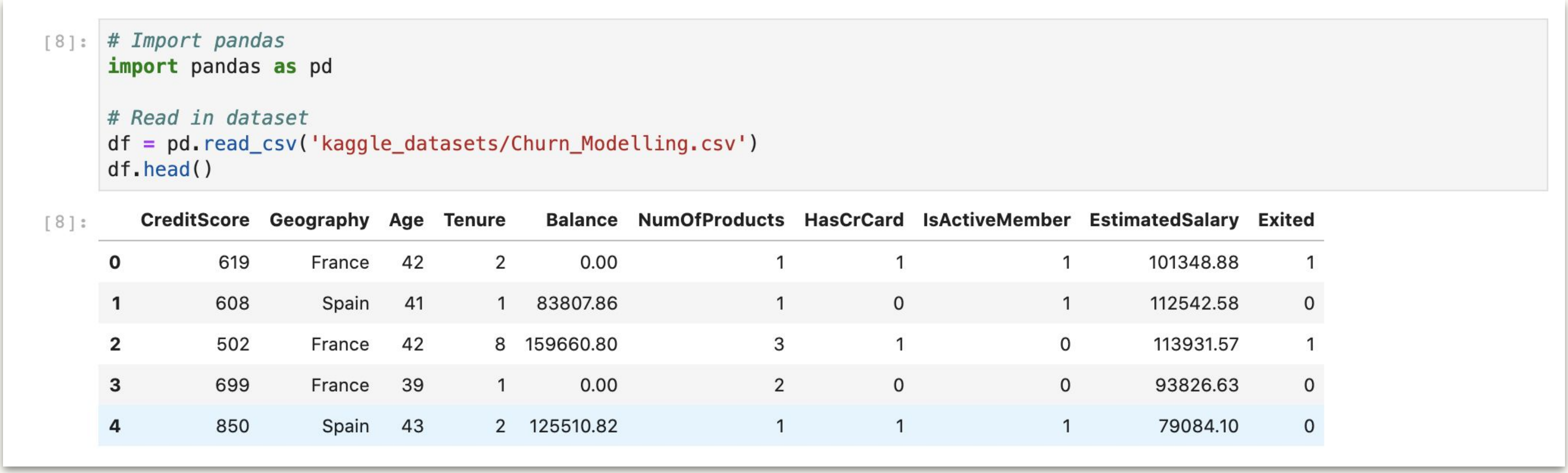
pandas

- DataFrame object for data manipulation
- Reading and writing
- Label-based computations
- Missing data, reshaping
- Group by, merge, concat
- Time-series functionality



Data cleaning and feature extraction

pandas



```
[8]: # Import pandas
     import pandas as pd

     # Read in dataset
     df = pd.read_csv('kaggle_datasets/Churn_Modelling.csv')
     df.head()
```

```
[8]:    CreditScore  Geography  Age  Tenure    Balance  NumOfProducts  HasCrCard  IsActiveMember  EstimatedSalary  Exited
     0          619     France   42       2       0.00              1          1               1        101348.88       1
     1          608      Spain   41       1   83807.86              1          0               1        112542.58       0
     2          502     France   42       8  159660.80              3          1               0        113931.57       1
     3          699     France   39       1       0.00              2          0               0         93826.63       0
     4          850      Spain   43       2  125510.82              1          1               1         79084.10       0
```

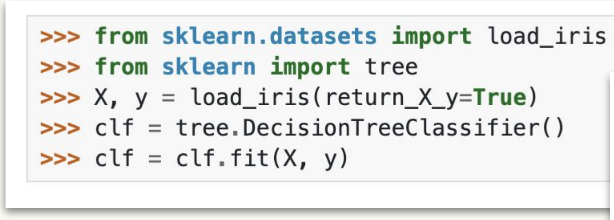
Machine learning

- Simple and efficient tools for predictive data analysis
- Built on NumPy, SciPy, and matplotlib
- Open source, commercially usable

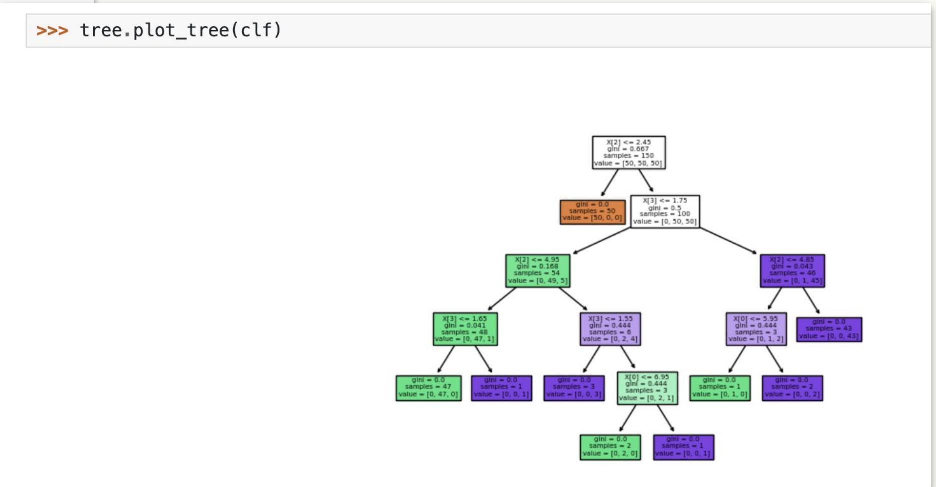
Machine learning

scikits learn

machine learning in Python



```
>>> from sklearn.datasets import load_iris
>>> from sklearn import tree
>>> X, y = load_iris(return_X_y=True)
>>> clf = tree.DecisionTreeClassifier()
>>> clf = clf.fit(X, y)
```



```
>>> tree.plot_tree(clf)
```

X[2] <= 2.45 gini = 0.667 samples = 150 value = [50, 50, 50]
gini = 0.0 samples = 50 value = [50, 0, 0]
X[3] <= 1.75 gini = 0.5 samples = 100 value = [0, 50, 50]
X[2] <= 4.95 gini = 0.168 samples = 54 value = [0, 49, 5]
X[2] <= 4.85 gini = 0.043 samples = 46 value = [0, 1, 45]
X[3] <= 1.65 gini = 0.041 samples = 48 value = [0, 47, 1]
X[3] <= 1.55 gini = 0.444 samples = 6 value = [0, 2, 4]
X[0] <= 5.95 gini = 0.444 samples = 3 value = [0, 1, 2]
gini = 0.0 samples = 43 value = [0, 0, 43]
gini = 0.0 samples = 47 value = [0, 47, 0]
gini = 0.0 samples = 1 value = [0, 0, 1]
gini = 0.0 samples = 3 value = [0, 0, 3]
X[0] <= 6.95 gini = 0.444 samples = 3 value = [0, 2, 1]
gini = 0.0 samples = 1 value = [0, 1, 0]
gini = 0.0 samples = 2 value = [0, 0, 2]
gini = 0.0 samples = 2 value = [0, 2, 0]
gini = 0.0 samples = 1 value = [0, 0, 1]

Data visualisation

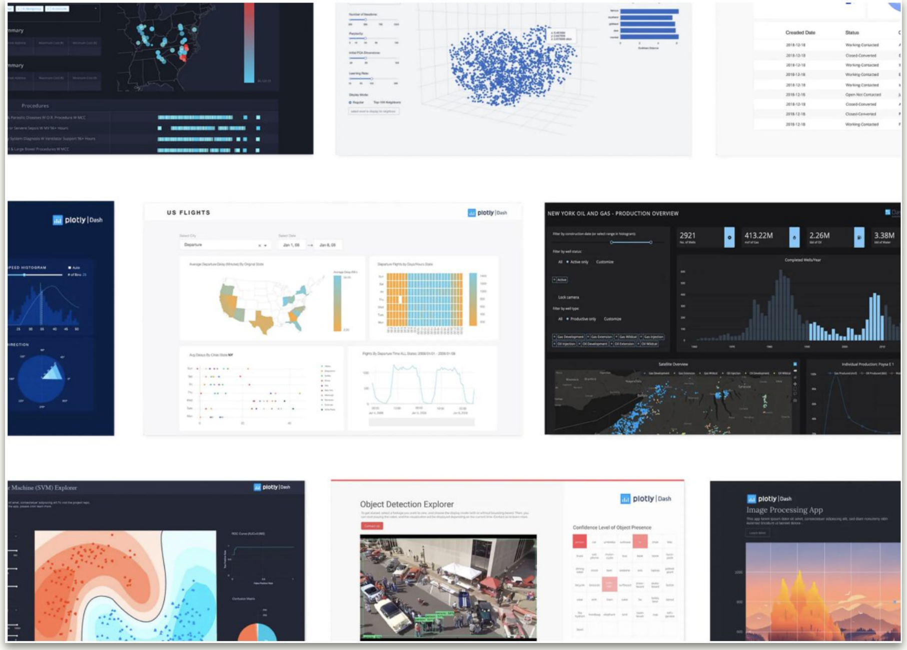
plotly

- Interactive visualisations

Web apps

plotly

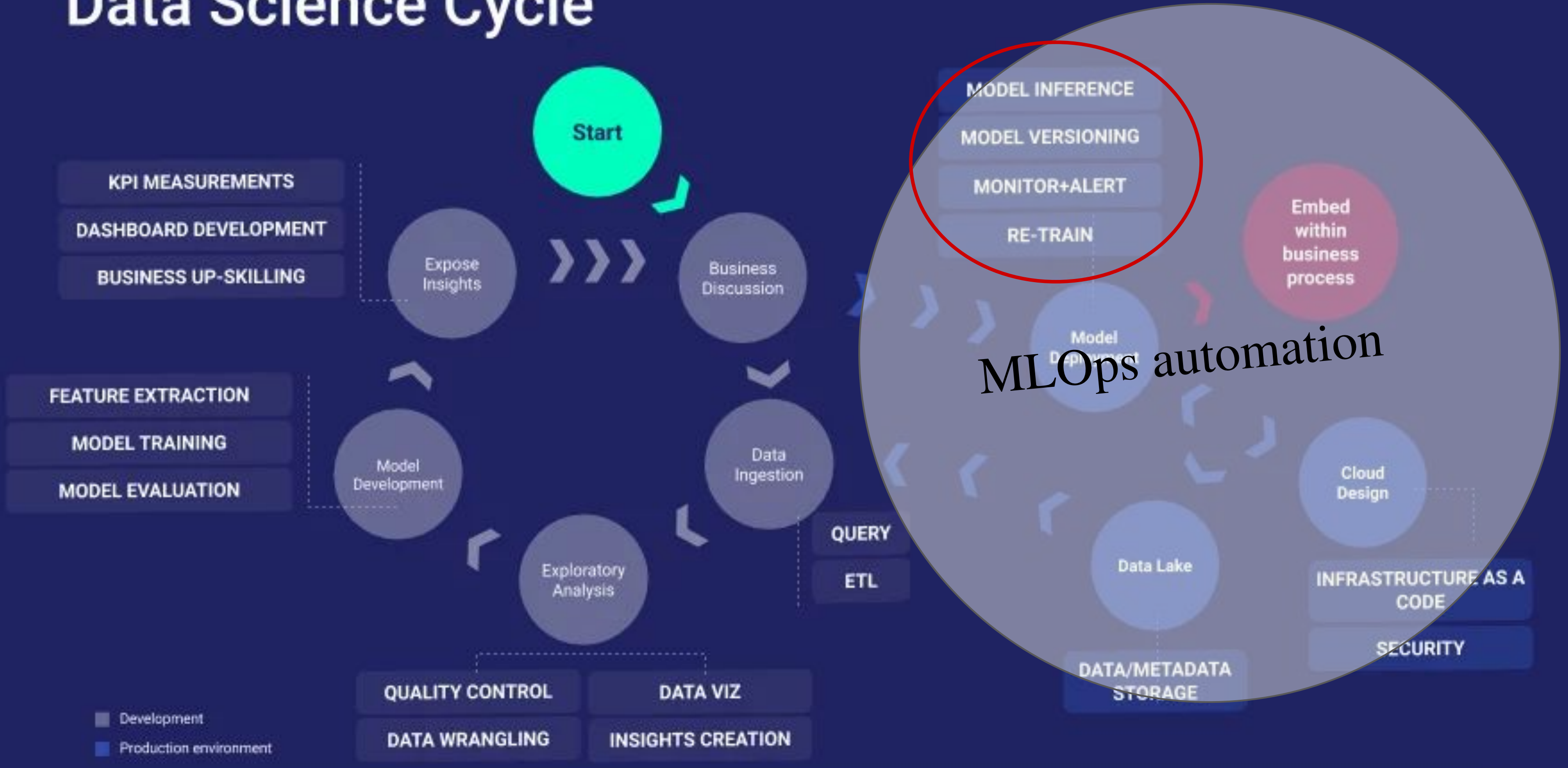
- Build and deploy apps



US FLIGHTS
plotly | Dash
NEW YORK OIL AND GAS - PRODUCTION OVERVIEW
2921
413.22M
2.26M
3.38M
Machine (SVM) Explorer
Object Detection Explorer
Confidence Level of Object Presence
Image Processing App

Towards machine learning automation

Data Science Cycle



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▨ Production environment

MLOps

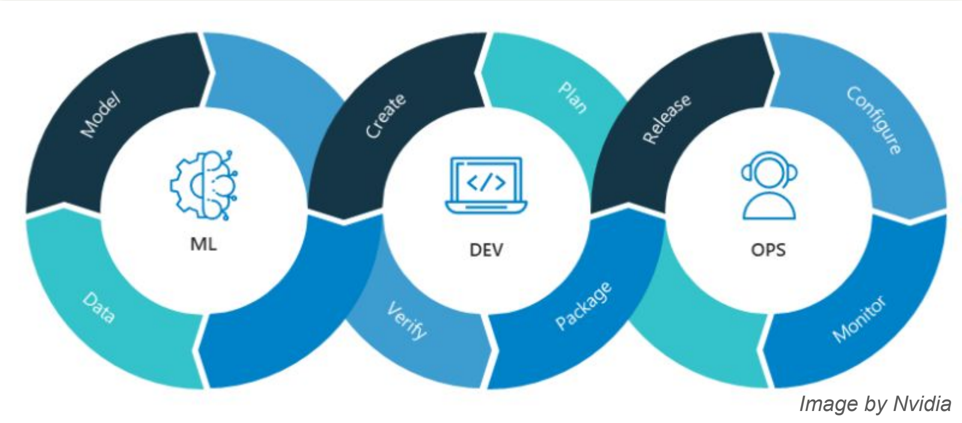


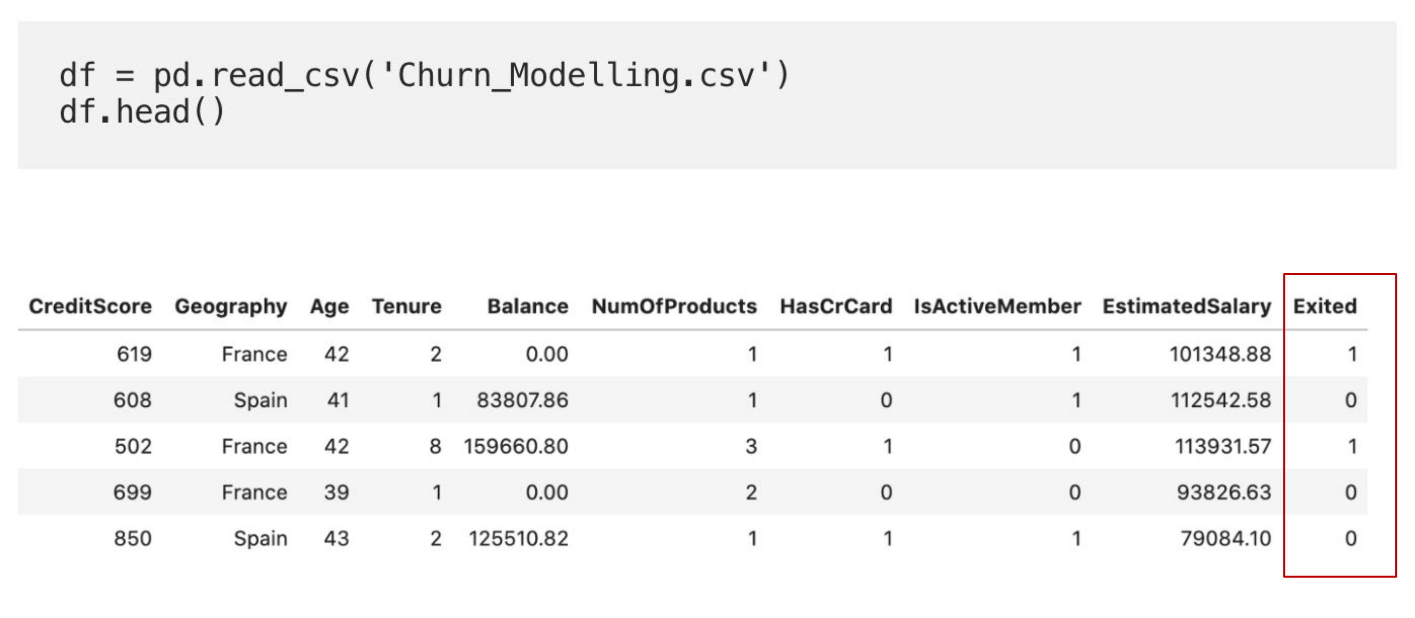
Image by Nvidia

- Trackable
- Reproducible
- Self-sustaining
- Automated

MLOps in the cloud

Use cases

Churn Prediction



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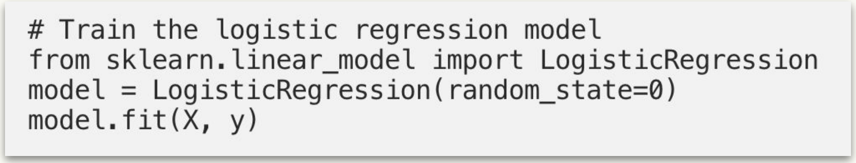
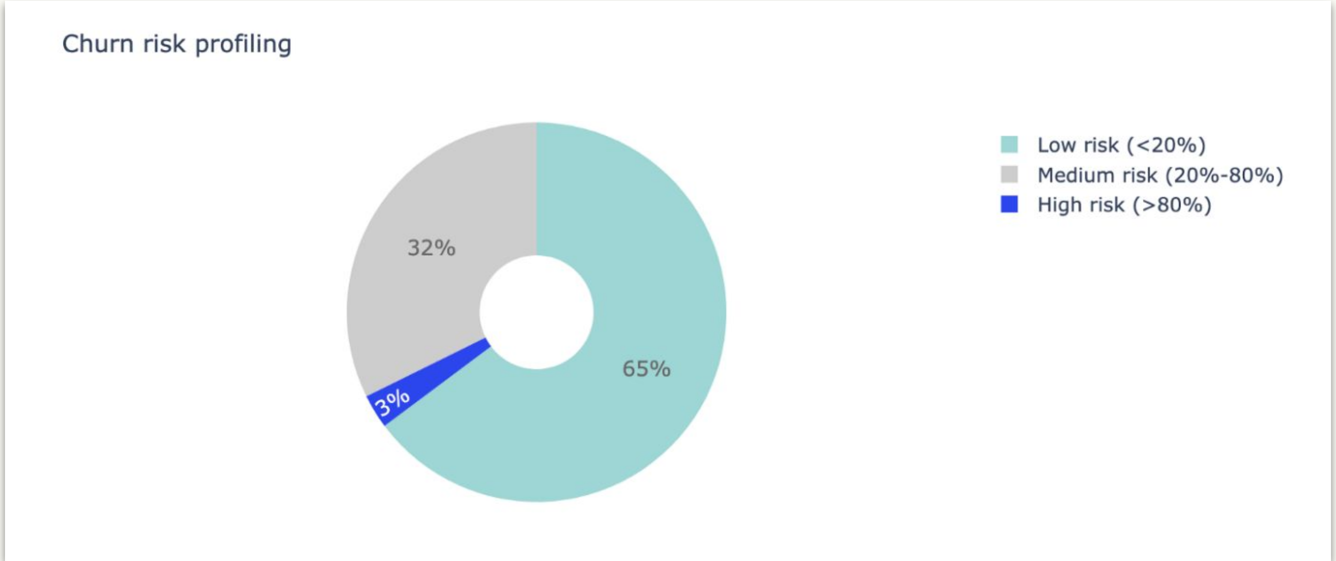
Churn Prediction



```
# Train the logistic regression model
from sklearn.linear_model import LogisticRegression
model = LogisticRegression(random_state=0)
model.fit(X, y)
```

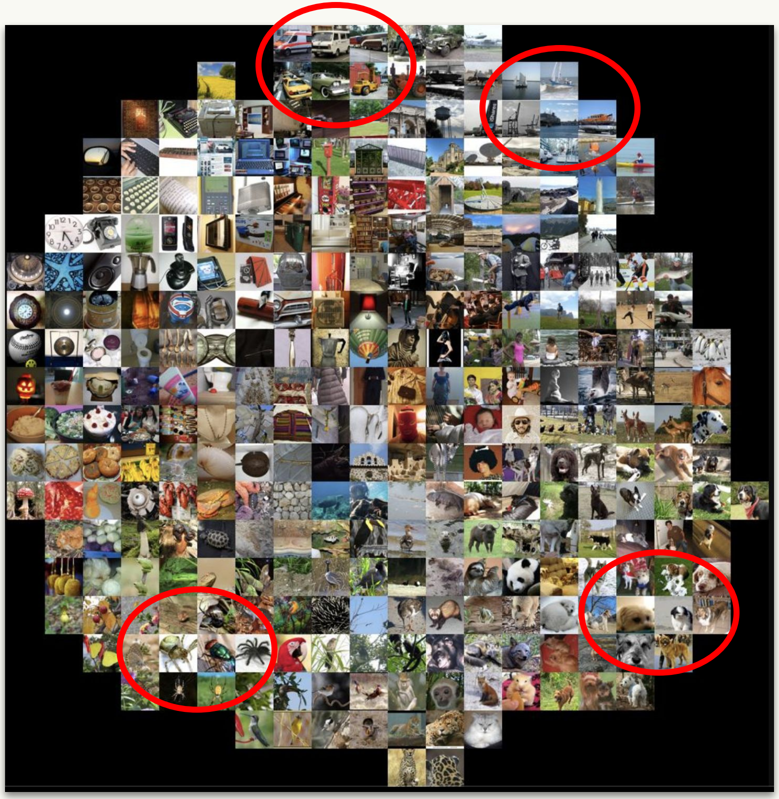


Risk profiling for customer churn analysis

Katinka Gereb Aug 1, 2020 · 6 min read

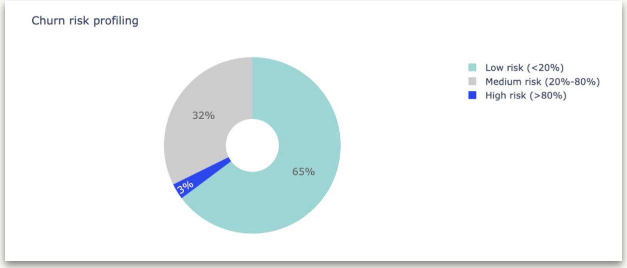
@katinka-gereb

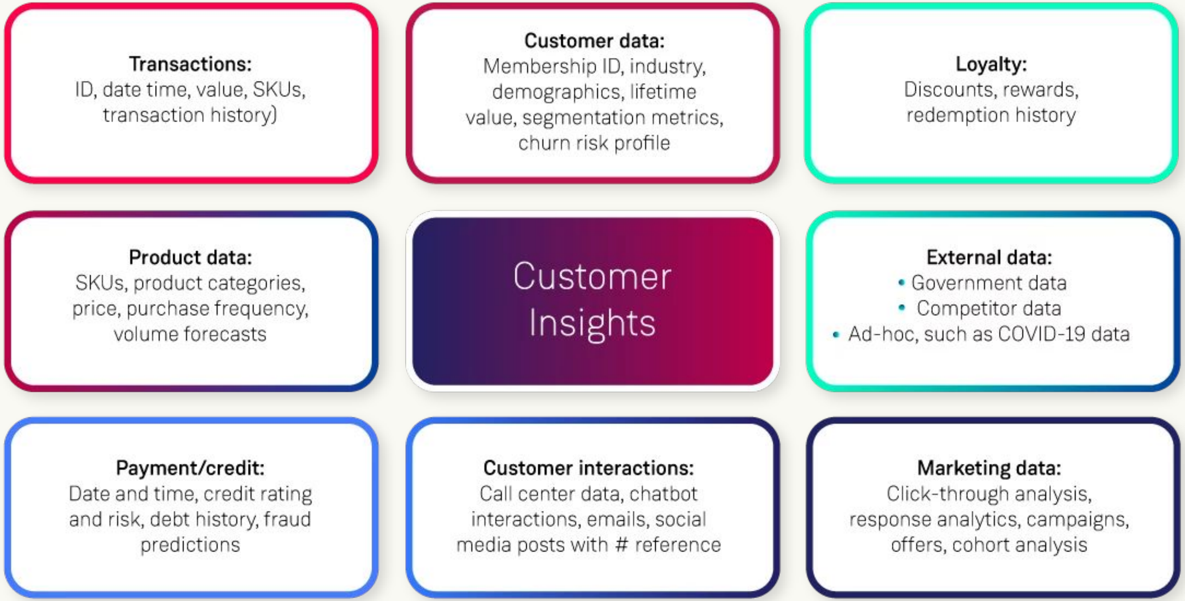
Clustering



https://cs.stanford.edu/people/karpathy/cnnembed/

Customer 360





Transactions:
ID, date time, value, SKUs, transaction history)

Customer data:
Membership ID, industry, demographics, lifetime value, segmentation metrics, churn risk profile

Loyalty:
Discounts, rewards, redemption history

Product data:
SKUs, product categories, price, purchase frequency, volume forecasts

Customer Insights

External data:
- Government data
- Competitor data
- Ad-hoc, such as COVID-19 data

Payment/credit:
Date and time, credit rating and risk, debt history, fraud predictions

Customer interactions:
Call center data, chatbot interactions, emails, social media posts with # reference

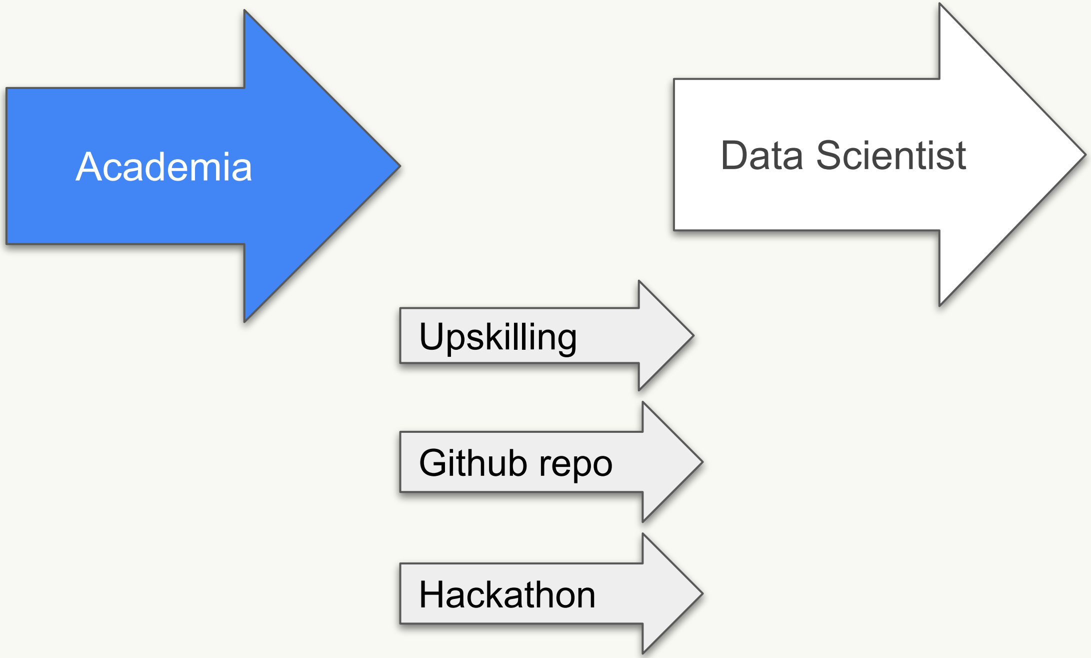
Marketing data:
Click-through analysis, response analytics, campaigns, offers, cohort analysis

Advancing your career

Academia

Data Scientist

Advancing your career



Academia

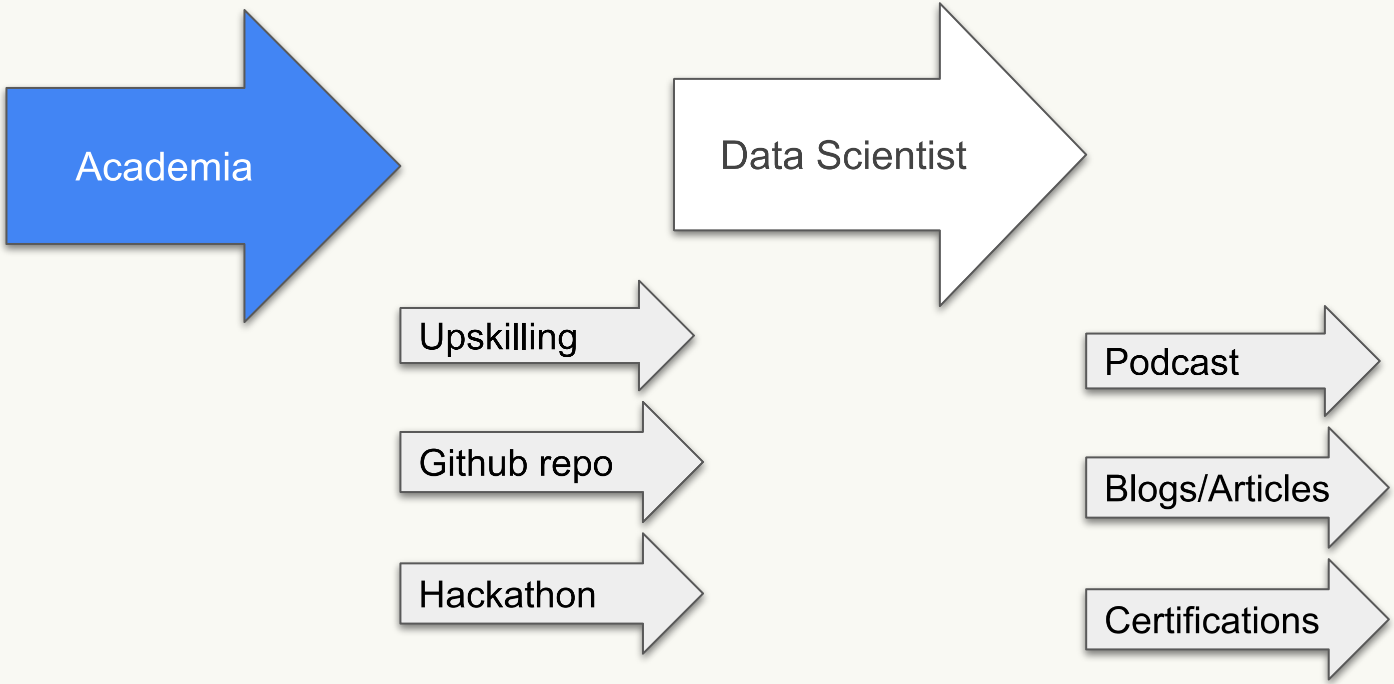
Data Scientist

Upskilling

Github repo

Hackathon

Advancing your career



Academia

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Github repo

Hackathon

Podcast

Blogs/Articles

Certifications

@katinka-gereb

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