CoTIA

Machine Learning & Fraud Detection

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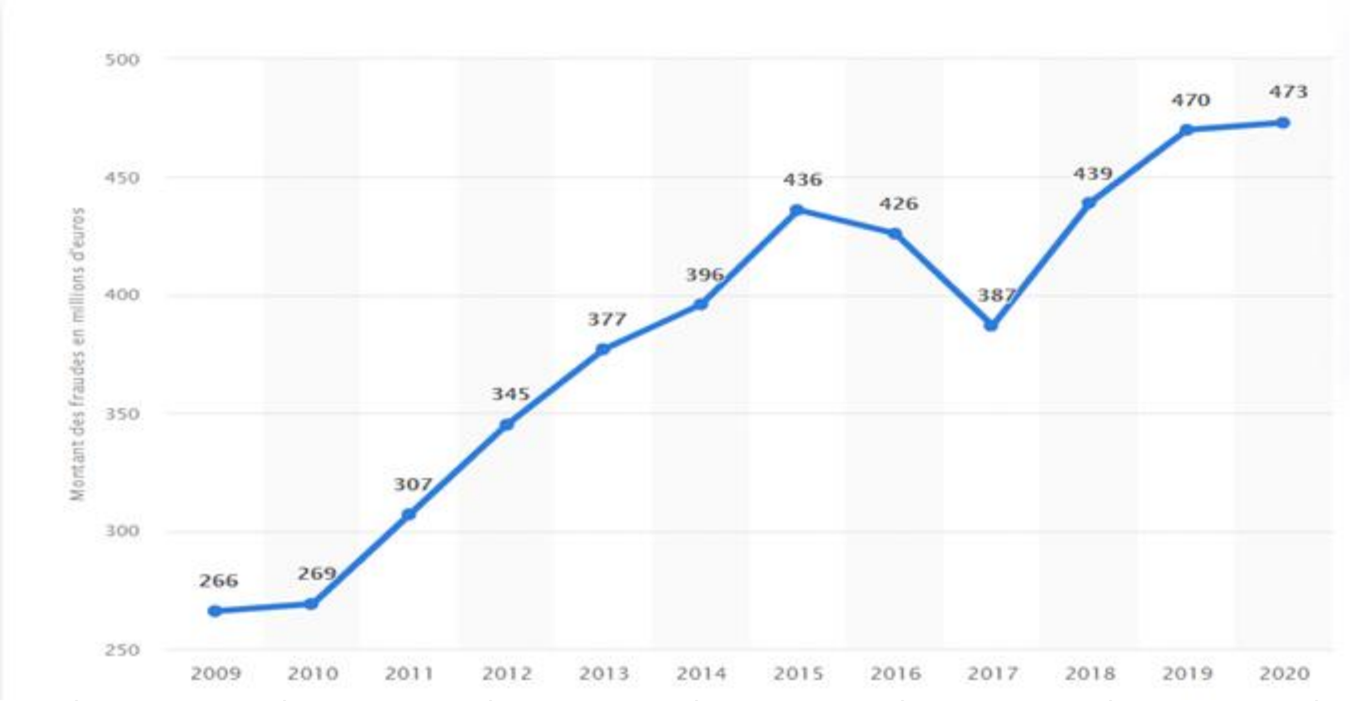
01 MOTIVATIONS & CHALLENGES

02 METHODS IN PRACTICE

MOTIVATIONS

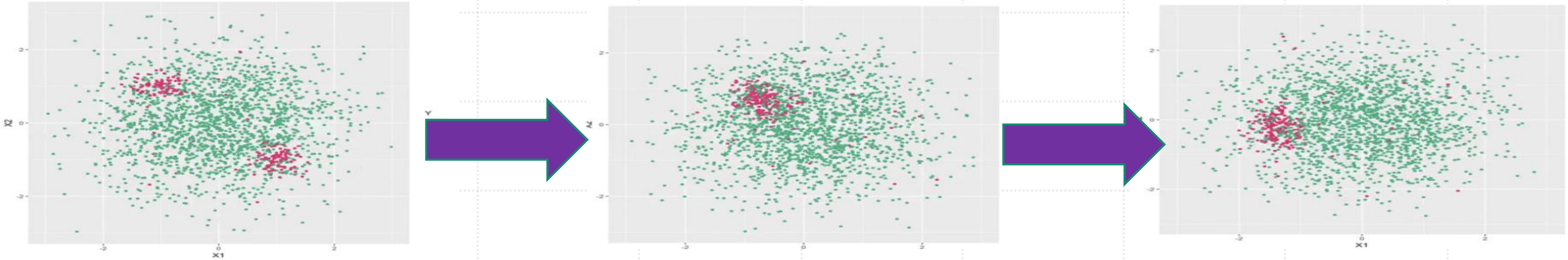


- Value of bank card fraud in France from 2009 to 2020
- Despite efforts, fraud losses are not significantly reduced

Credit: Banque de France, found on statista

CHALLENGES

1. Change in data distribution over time: concept drift



2. Class imbalance (e.g. 1 fraud for 1000 genuine transactions)
    - This is problematic for most learning algorithms

3. Noise in the training data (labels)
    - Transactions that are erroneously considered authentic

4. Need of interpretability
    - As the usage concerns humans, we need to make sure for example that the model does not discriminate against certain categories of users.

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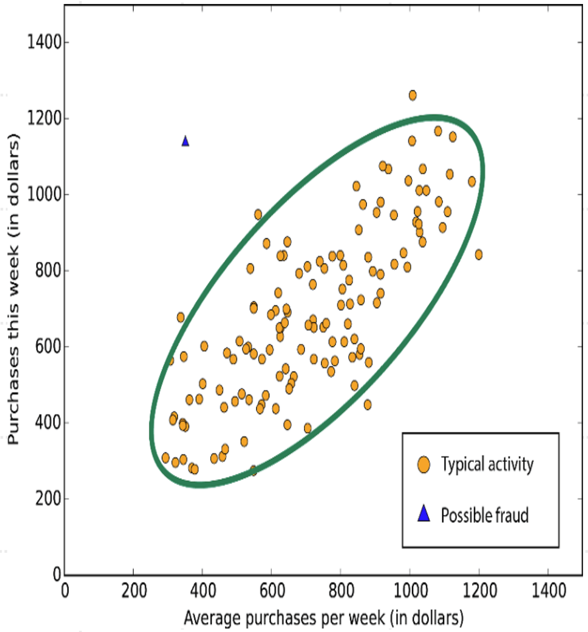
UNSUPERVISED METHODS

In this paradigm, fraud is assumed to be an aberration or anomaly and therefore very different from genuine transactions



Advantages

- Easy to implement (no need to have examples of fraud)
- Examples: IForest, LOF, Autoencoders

Inconvenients

- Difficulty in handling overlapping cases (fraudulent transactions very similar to genuine transactions).
- Difficulty in assessing the model before going into production

Outils:

1. PyOD https://pyod.readthedocs.io/en/latest/
2. Sklearn https://scikit-learn.org/stable/

SUPERVISED METHODS

In this context, the objective is to prevent the same or similar techniques from falling through the cracks several times

Advantages

- Generally provide "better" performance than unsupervised methods.
- Easy to evaluate with AUCPR, precision, recall.
- Examples: XGBoost, LightGBM, RF, Deep Learning models

Inconvenients

- Requires examples of fraud as well as considerable work by investigators
- **Concept drift**

Some strategies to adapt to concept drift

Re-training after performance degradation

- Backtesting after obtaining some labels
- Difficulty in choosing new learning data

Periodical retraining

- Periodically retrain models (daily, weekly, monthly)
- Difficulty to take into account reoccurring concepts

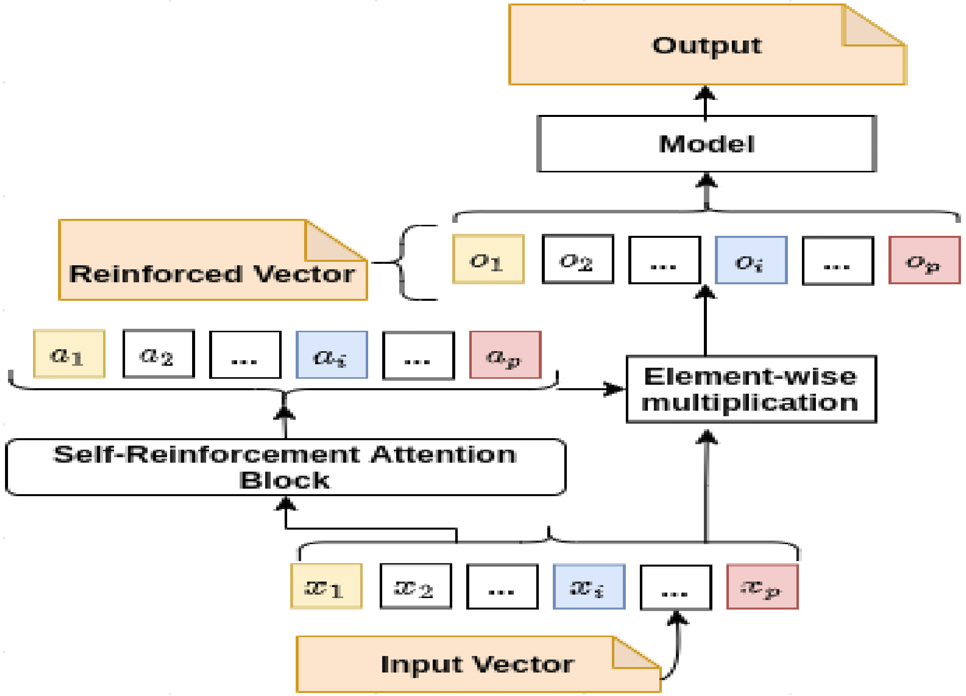
Stacking

- Stack models built over different time periods
- Generally more expensive in resources and computing time

What use case do you have in mind?

Thanks

Annex: Self-Reinforcement Attention (SRA)



One of our recent works in publication

88wknbzz	3 days ago	KodjoDjehouti	SRALR_CV_T...	0.104115022	0.111290122	Private attention based interpretable model, CV, binary score