BRAIN

NPL Prediction Using Advanced Machine Learning

Track 2 - Credit Risk Analysis of SME based on Financial Data

provided by Yapi Kredi Teknoloji

Matteo Campellone – Founder

Brain at a Glance

Brain is a research-oriented company that develops proprietary signals and algorithms for investment strategies on financial markets combining **Statistical methods**, **Machine Learning** and **Natural Language Processing** techniques.

SKILLS

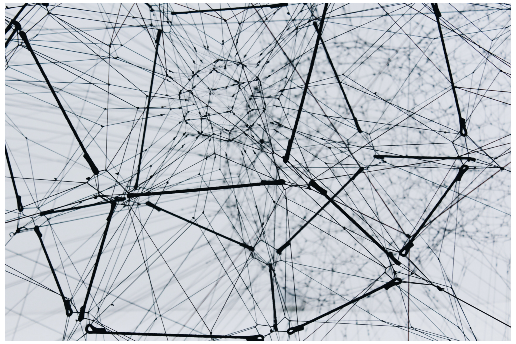
The founders share a **common academic research background** in **physics** as well as extensive experience on financial markets.

LOCATIONS - CLIENTS

- Global scope
- Large quantitative funds using Brain datasets as “raw signals”
- Financial investment firms that are willing to include Brain models in their investment strategies

COMPANY WEBSITE

braincompany.co



Technical Specifications of Proposed Solution

Product Highlights - Functionalities

Brain Credit Monitoring platform will use A.I. to generate **early predictions on defaults of credit positions** in a comprehensive scalable tool for credit monitoring.

Credit Metrics

ML model to predict for each credit position of the **Probability of Default** and other related metrics.

Key Risk Indicators

Monitoring at granular level **Key Risk Indicators** (KRI), following the EBA guidelines (2020).

Stress Tests

Module for **Stress Tests and Scenario Analysis** where predefined stress tests will be available

Early Warnings

Generation of **Early Warning Signals**, based on credit metrics, KRIs, sensitivities or user defined criteria

Watchlists

Generation of **Watchlists** of most relevant and sensitive exposures.

Product Highlights - Characteristics

The architecture of the system will be apt to support a scalable model to target a large number of clients

Aggregate

The model output will be integrated in a **robust data model** where various aggregations will be possible.

Scalable

Monitoring at granular level **Key Risk Indicators** (KRI), following the EBA guidelines (2020).

Flexible

Flexible API with various user roles for direct integration into client systems or access through Dashboard

Compliant

Compliance with EU regulations regarding **GDPR**, and specific **regulations on AI**

Main Product Innovations

1 Alternative Data

Leveraging Brain expertise to exploit **alternative sources of information** (e.g. news, corporate documents)

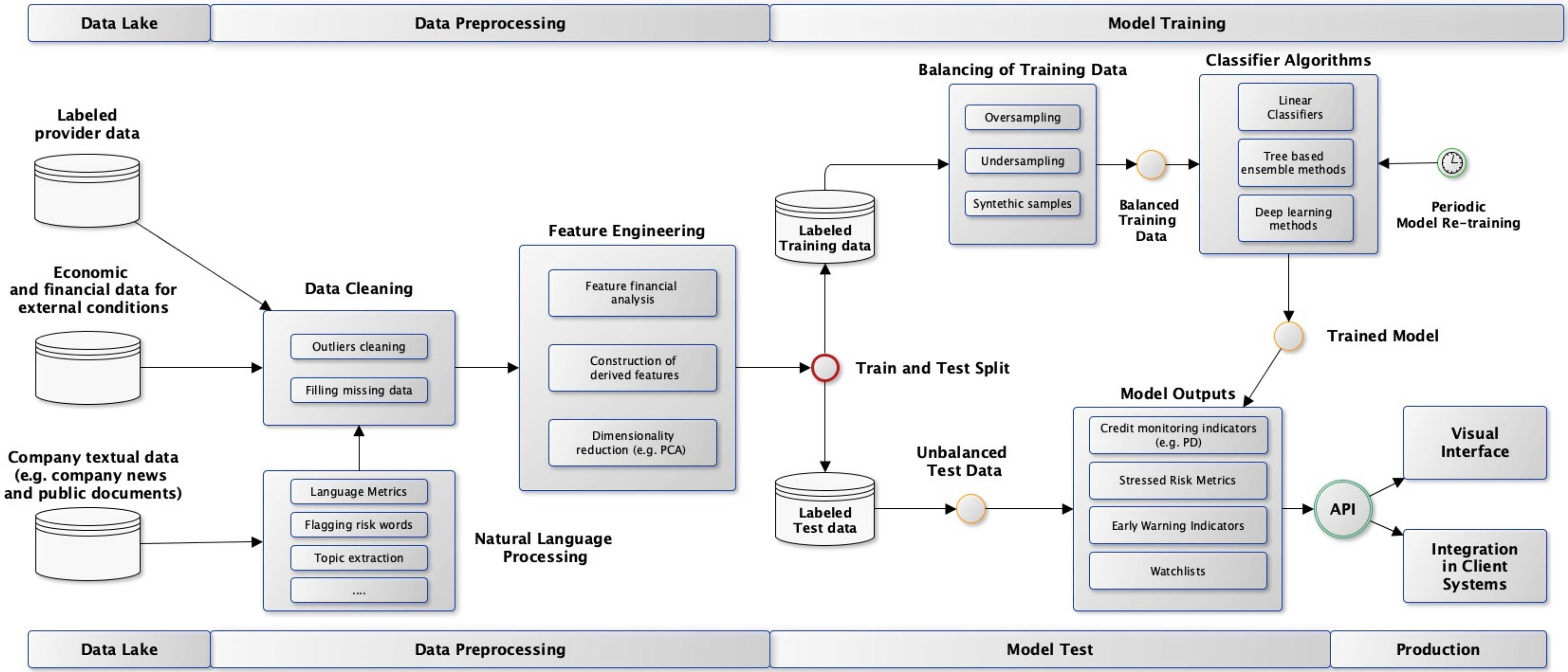
2 ML Models

- State-of-the-art **Ensemble tree models**
- **Neural Nets**
- Techniques for dealing **unbalanced samples**

3 Scalability

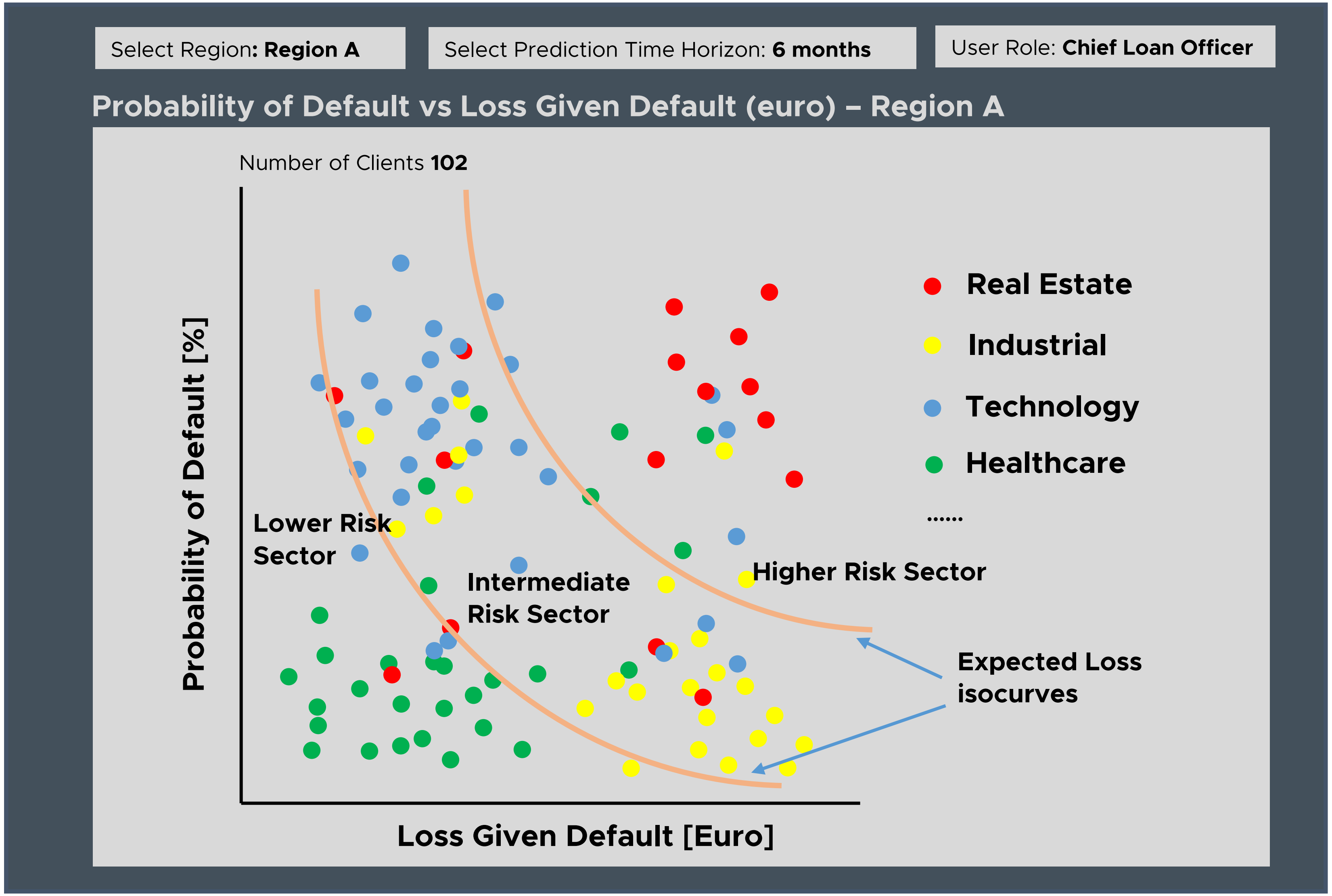
Flexible API and standardized input to facilitate deployment for new clients

Product Workflow and Architecture



Use Case 1 – View by Sectors of Expected Loss

Areas of relevance can be identified based on **expected loss isocurves**



Use Case 2 – Total Portfolio View

The **Chief Loan Officer** can:

1. Visualize the population of **different classes of credits** (Healthy, Degraded, Default) at portfolio level
2. Perform **filters and aggregations by areas and sectors**
3. Select a specific prediction **time horizon**
4. Access to tables with data at more **granular level** for a detailed analysis

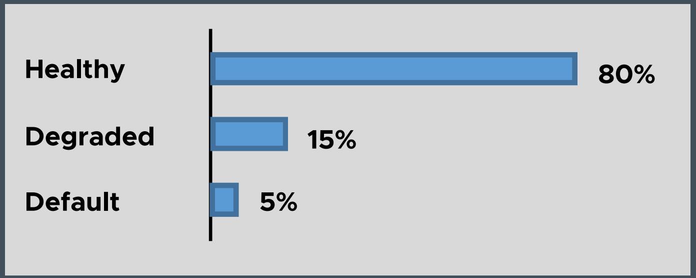
User Role : **Chief Loan Officer**

View on all Regions

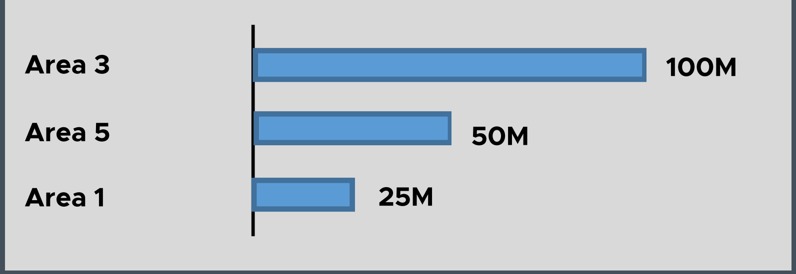
Number of Clients **10231**

Select Prediction Time Horizon: **6 months**

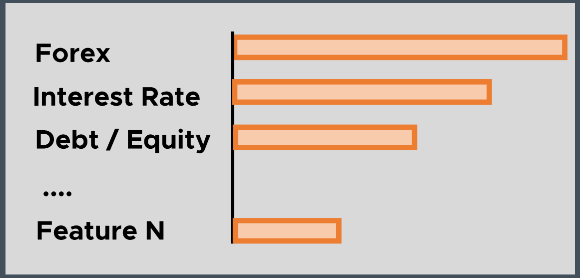
Credit Prediction Status in 6 Months – Total



Predicted NPL in 6 Months – by Area



Most Relevant Features for Prediction



Region Details

Region	Average Debt / Equity	Average Feature N	Metric A	Metric B	Metric C
Region A	0.1		0.1	10k	10
Region B	0.05		0.05	30k	20
... Region N	0.2		0.2	50K	50

Use Case 3 – Regional View

The **Area Loan Officer** can perform credit aggregations at **regional level** and only visualize the Client details for a specific region

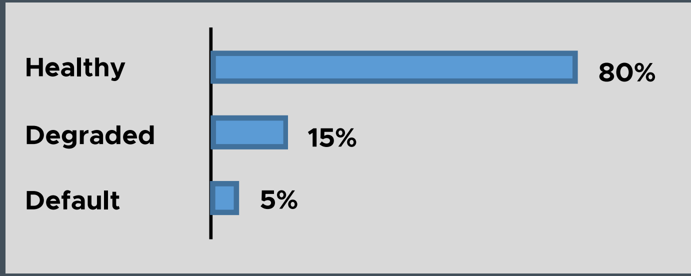
User Role: **Area Loan Officer**

Select Region: **Region A**

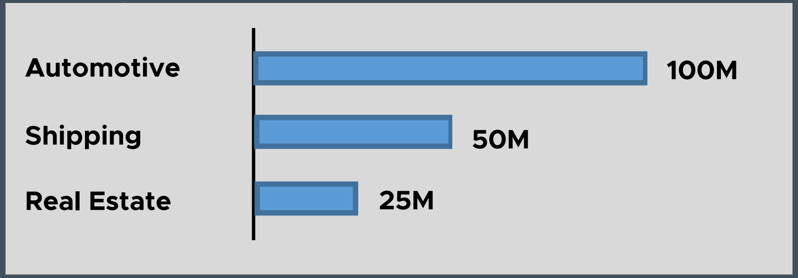
Number of Clients: **1020**

Select Prediction Time Horizon: **6 months**

Credit Prediction Status in 6 Months – Total



Predicted NPL in 6 Months – by Sector



Most Relevant Features for Prediction

Client List with Details

Client Number	Debt / Equity	Loan / Cost	...Feature N	Metric - PD	Metric - LGD	.. Metric N
1018900	20	50	80	0.1	10k	10
1017890	30	60	90	0.05	30k	20

Use Case 4 – Key Risk Indicators Monitoring

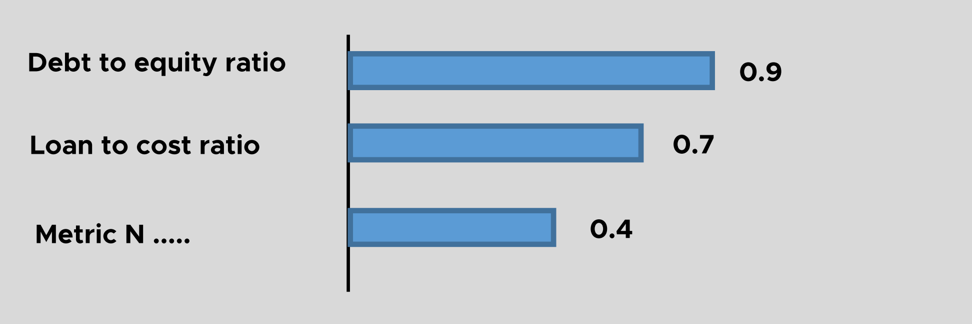
1. The user (e.g. **Credit Risk Officer)** can monitor **specific Key Risk Indicators** as suggested by EBA guidelines and other user defined metrics. Such metrics will be aggregated and monitored at various levels: **single client, region, global.**

2. Possibility of defining thresholds for early warnings

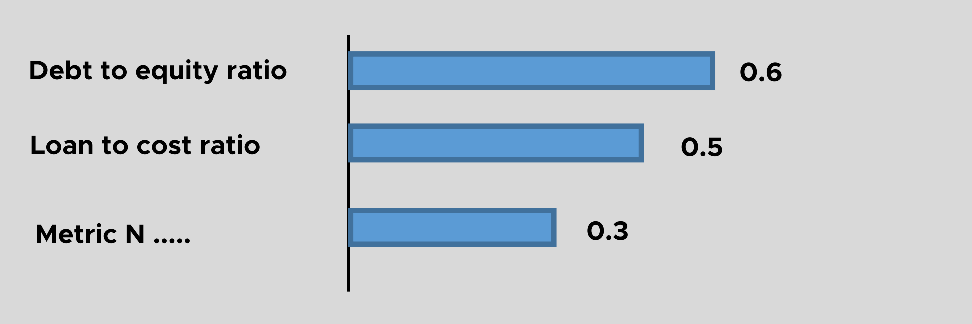
User Role: **Credit Risk Officer**

Select Region: **Region A**

Key Risk Indicator– Global Average



Key Risk Indicator– Regional Average



KRI – Debt to equity Ratio

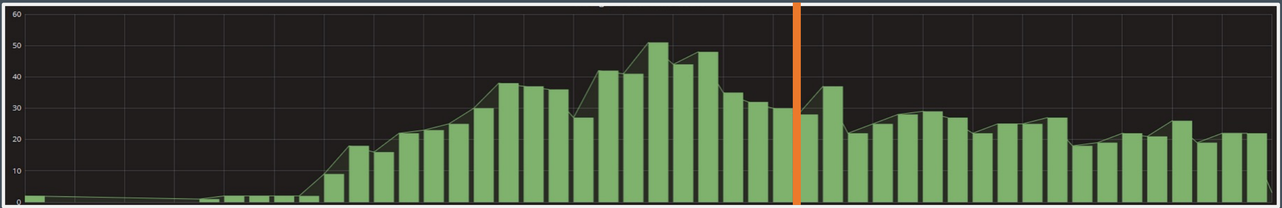
Selected Threshold – Larger than 1.2

Number of Clients beyond Threshold: 321

Selected Clients

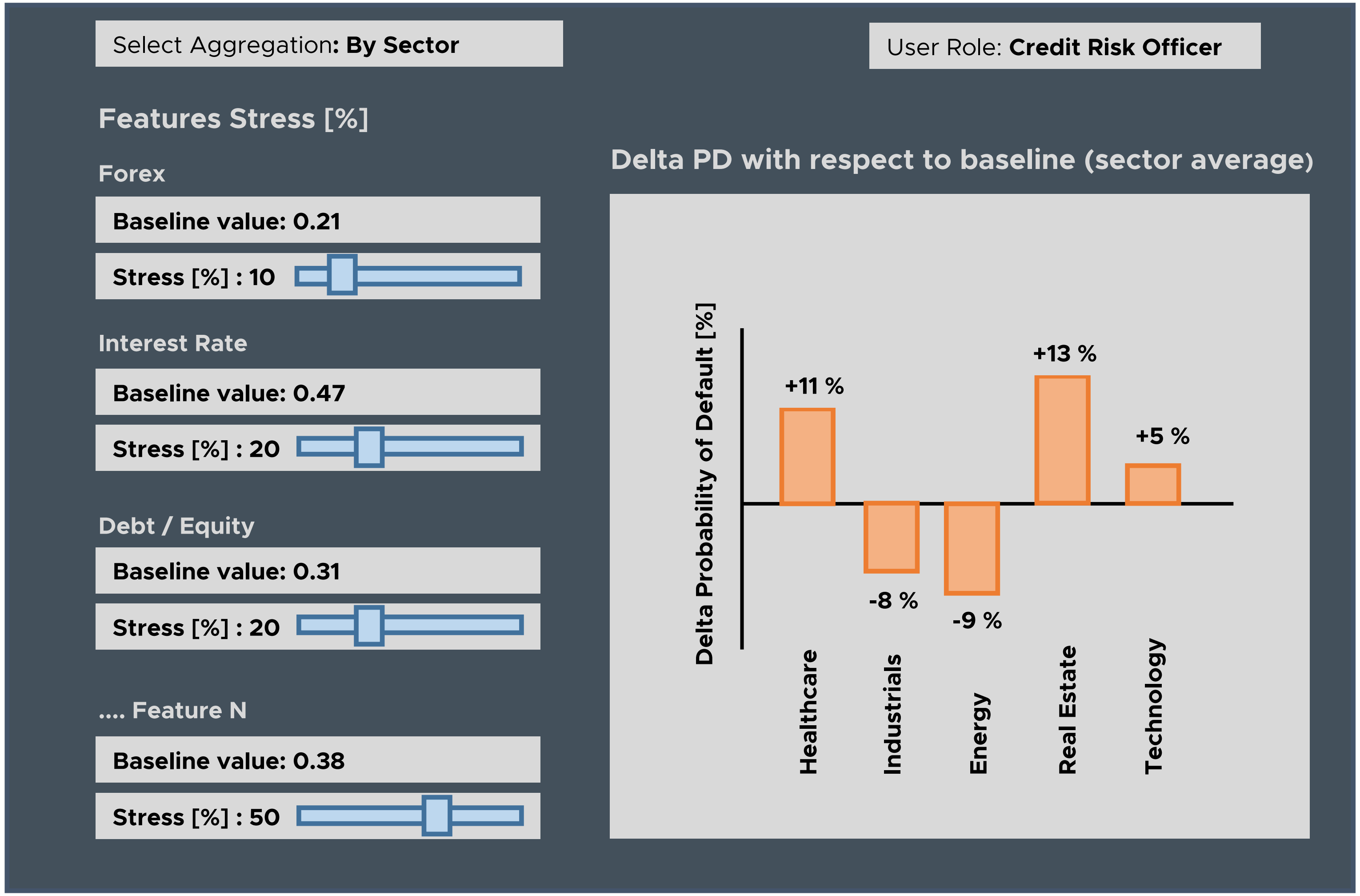
Client	Debt to Equity Ratio
1018900	1.23
1017890	1.35

Distribution Selected Risk Metric



Use Case 5 – Stress Test Results by Sector

The user with role **Credit Risk Officer** can stress specific model features and visualize the change of PD averaged by sector to assess sector sensitivity to specific features stress



The Brain Team

1 Research and Business

A unique mixture of **academic research** in hard sciences and **business experience**

2 Machine Learning

Strong expertise in applying ML on financial markets where signal to noise ratio is extremely low

3 Alternative Data

Established player in creating **alternative datasets** based on financial textual data

4 Robust Deployment

Proven expertise in **deploying software** in a robust and scalable IT infrastructure

Matteo Campellone
Physicists PhD, MBA. Diversified experience in Business and Finance

Francesco Cricchio
Physicist PhD expert in computational problems and creation of industrial SW architectures

Alessandro Sellerio
Physicist PhD expert in numerical simulations SW development

Pietro Russo
Economist expert in quantitative bankruptcy models

Contacts

BRAIN

https://braincompany.co

matteo.campellone@braincompany.co

francesco.cricchio@braincompany.co