FALCONDALE

Quantum Machine Learning for Finance

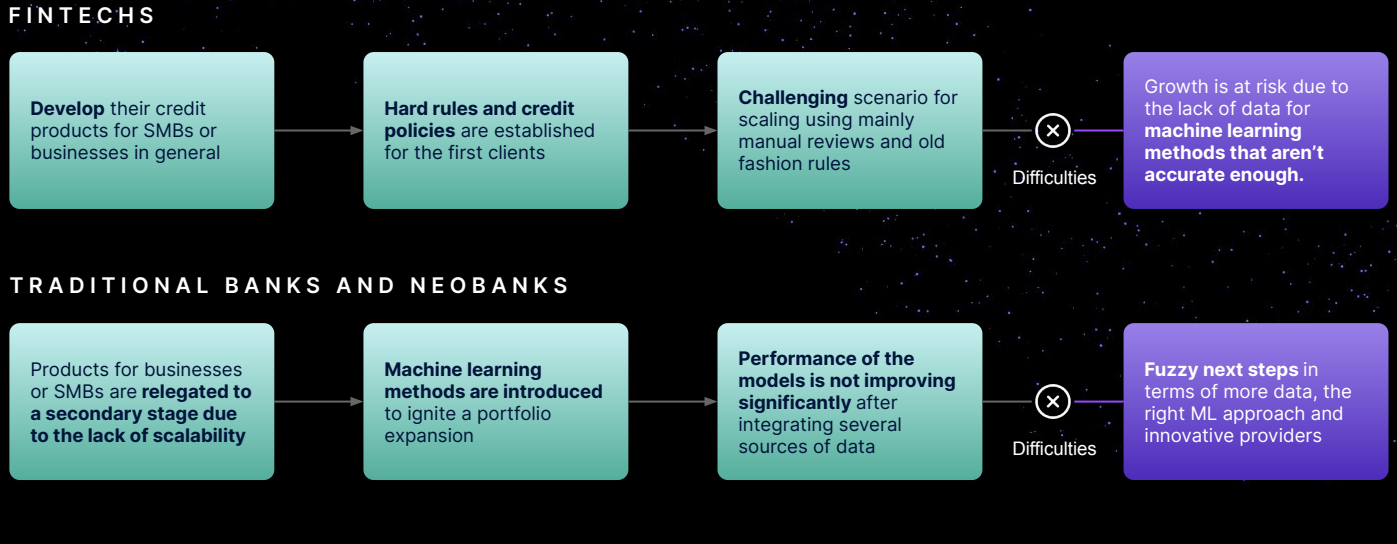
We leverage quantum and quantum simulated capabilities

to boost machine learning for businesses risk assessment

SEE MORE

Typical journey when fintechs and banks are providing credit services to businesses

The data scarcity and low performance of classical machine learning models represents a challenge.



SMBs have different needs than large companies

47%

of SMBs believe that banks don’t try to understand their challenges

14%

of total SMBs funding needs are met only

70%

of the growth economic output will be created by ecosystems in coming decades (SMBs)

Source:
McKinsey: How banks can reimagine lending to small and medium-size enterprises
McKinsey: A digital approach to SME banking
PartnerHUB analysis

QSAAS

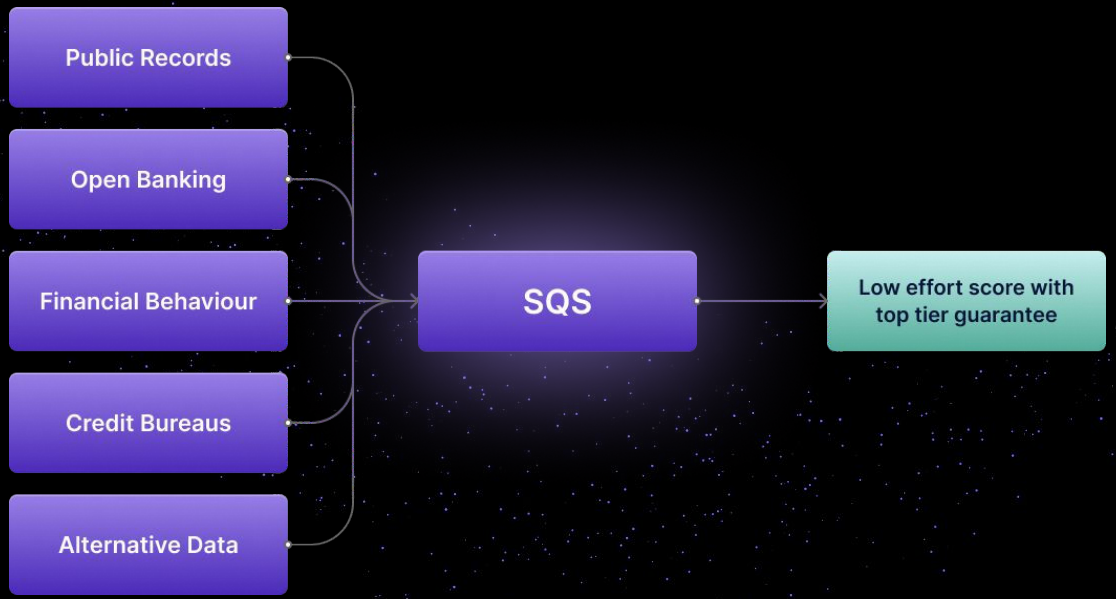
Our core product

Systemic Quantum Score (SQS)

Highly accurate and proved scoring system specially designed to provide a risk score for businesses under different regimes of financial products.

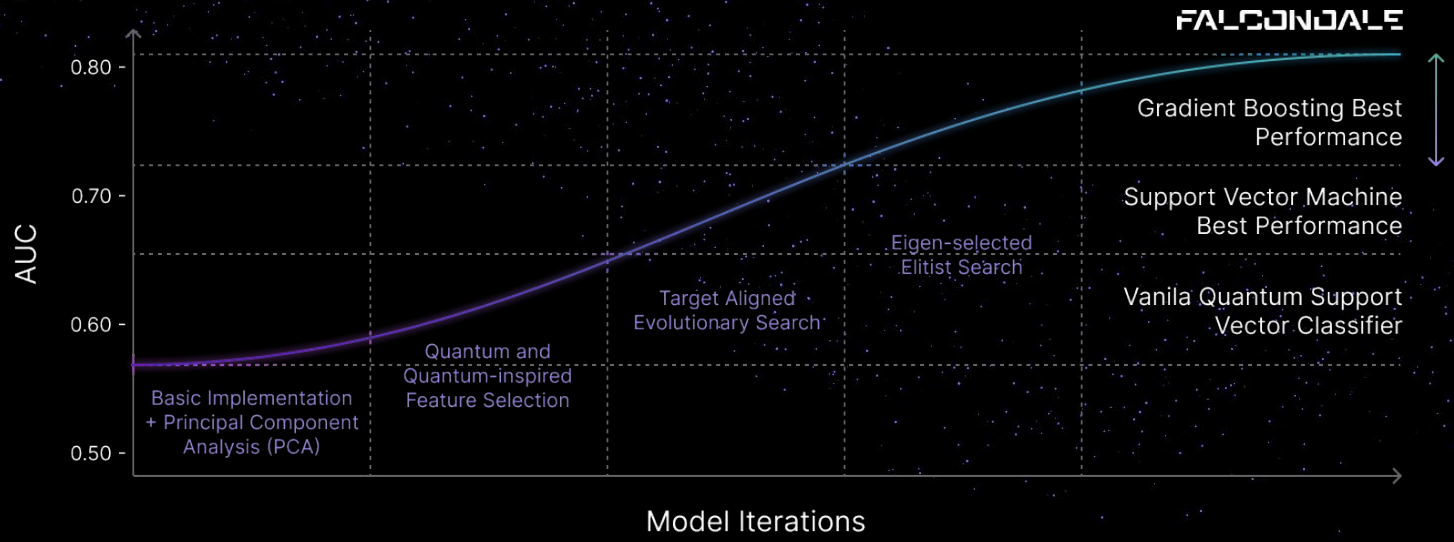
Systemic Quantum Score (SQS)

Supercharged scoring system based on cutting edge quantum methods.



We provide a tangible incremental benefit

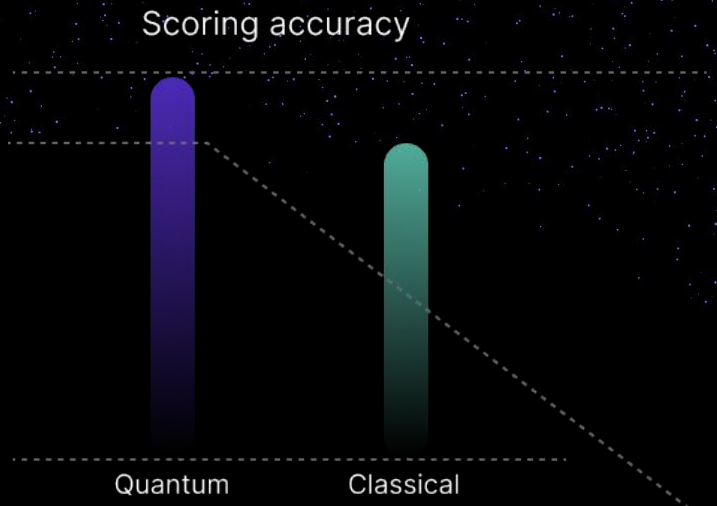
This margin in *AUC means a critical benefit in terms of default losses reduction.



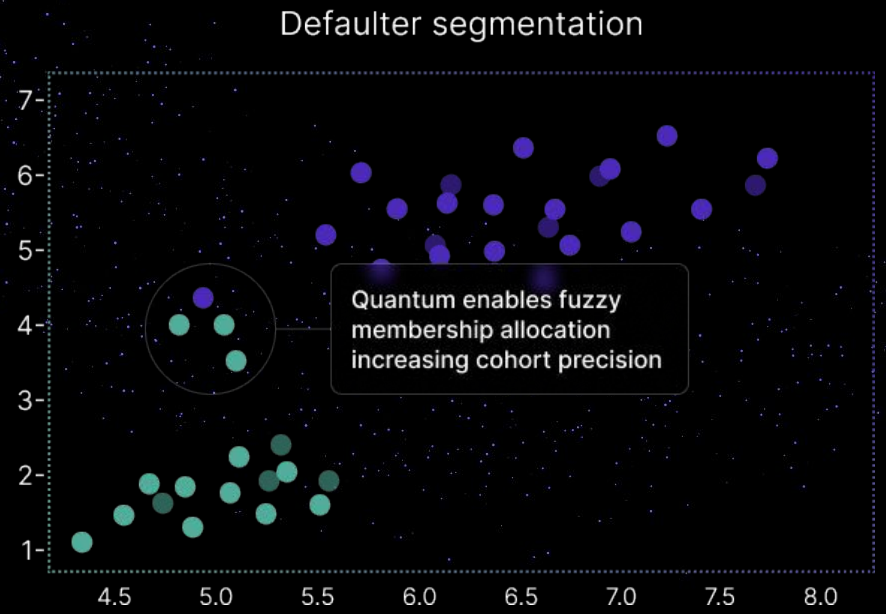
*AUC measures from 0 to 1 a model's ability to distinguish classes (higher is better). For credit scoring, it's key for identifying likely defaulters, reducing financial risks.

Systemic Quantum Score (SQS)

Use case example our score methods versus classical approaches.

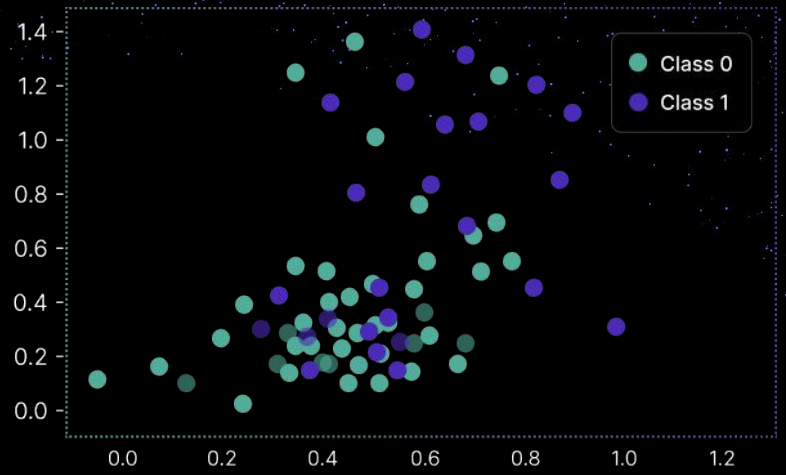


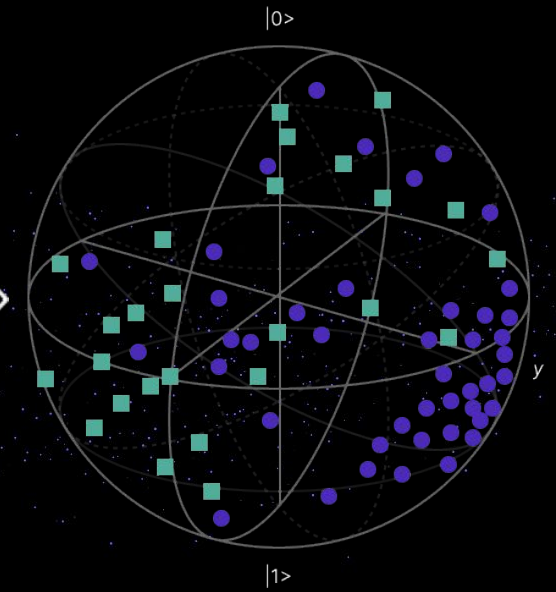
Working with higher dimensional regimes allows for better classification of individuals



Under the hood of SQS

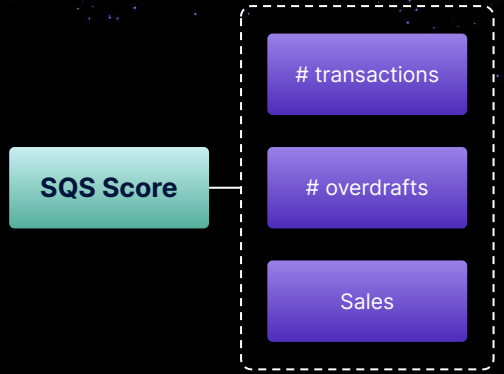
The power of quantum encoding gives the possibility to represent linearly separable data



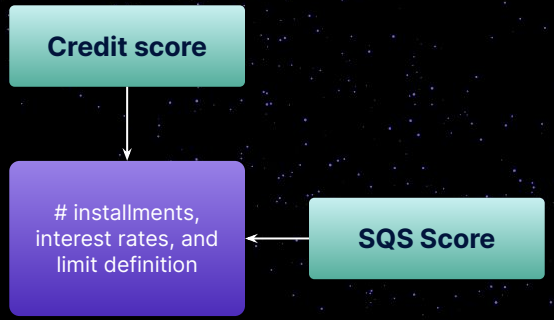


SQS can be used considering regulatory constraints

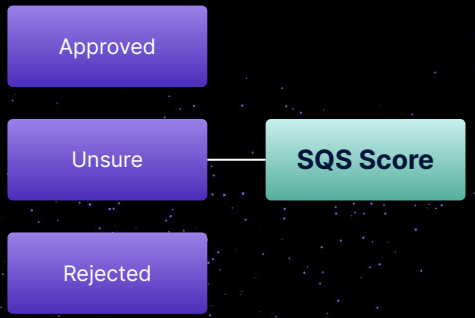
Extra feature for your internal model



Part of your affordability and credit product parameter definition



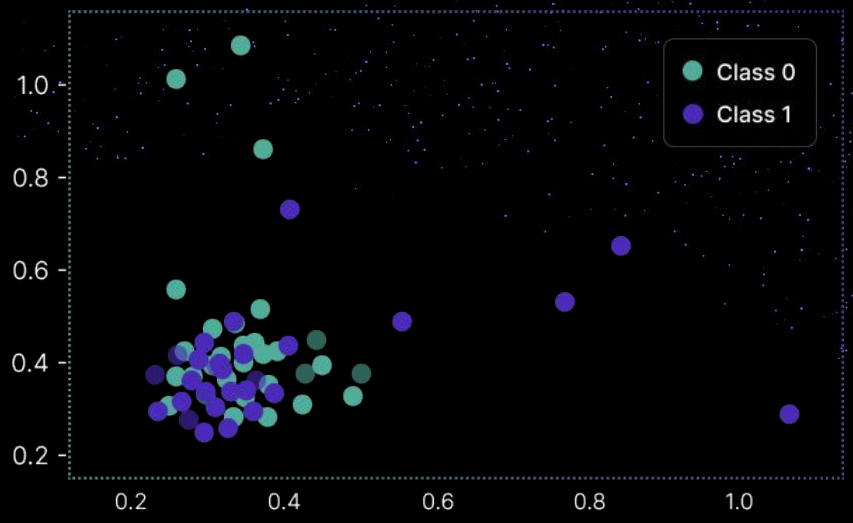
Portfolio augmentation on "gray" areas



Also SQS **can be used for several other purposes** such as portfolio monitoring, fraud detection, upselling, credit card limit variations, among other cases.

Use case: The challenge

The “extra mile” in model performance

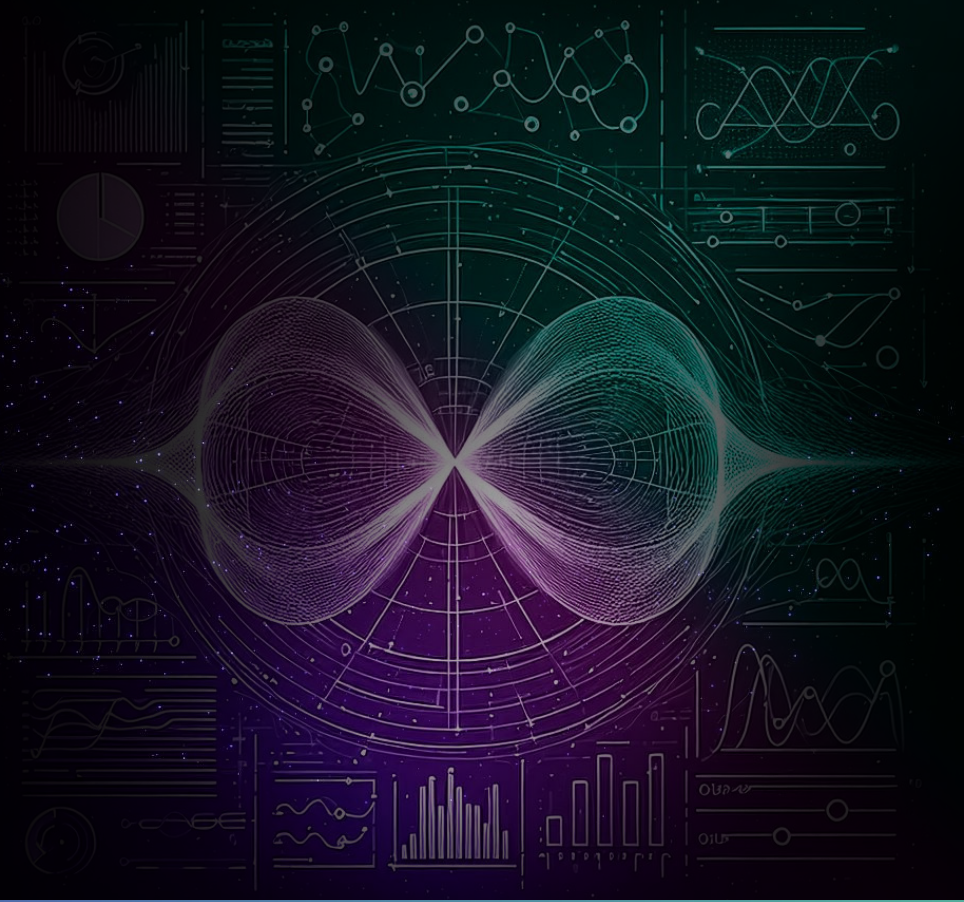


Non-linearly separable data

One of our clients decided to test our product facing the following difficulties:

- Scarcity of data (less than 5000 observations).
- Highly imbalanced.
- Over-engineered features.
- Limited capacity of reaching a better AUC with the classical methods.
- High percentage of false positives.

Use case: The method



Under the hood of SQS

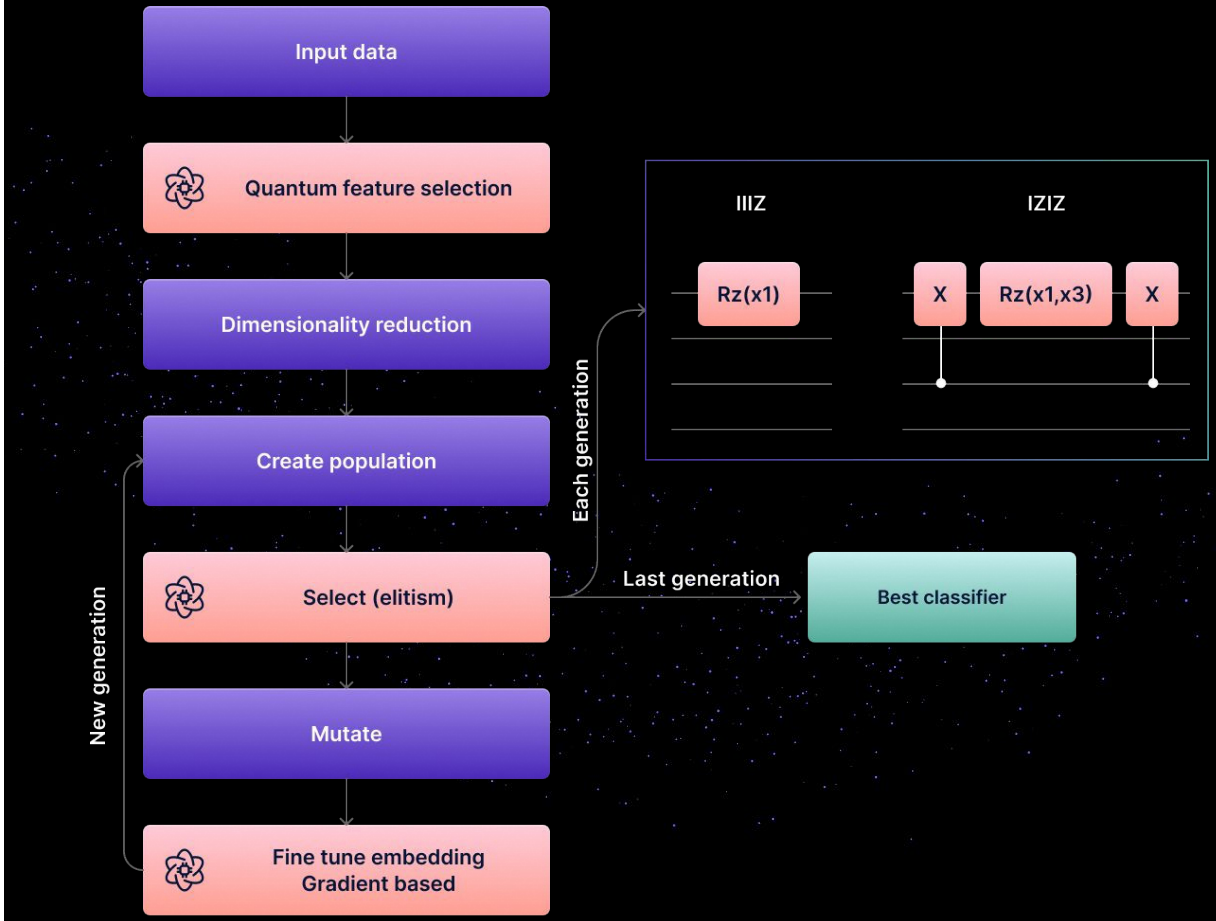
We went from more than 300 features to select less than 10 to be used by SQS algorithm.

Under the hood of SQS

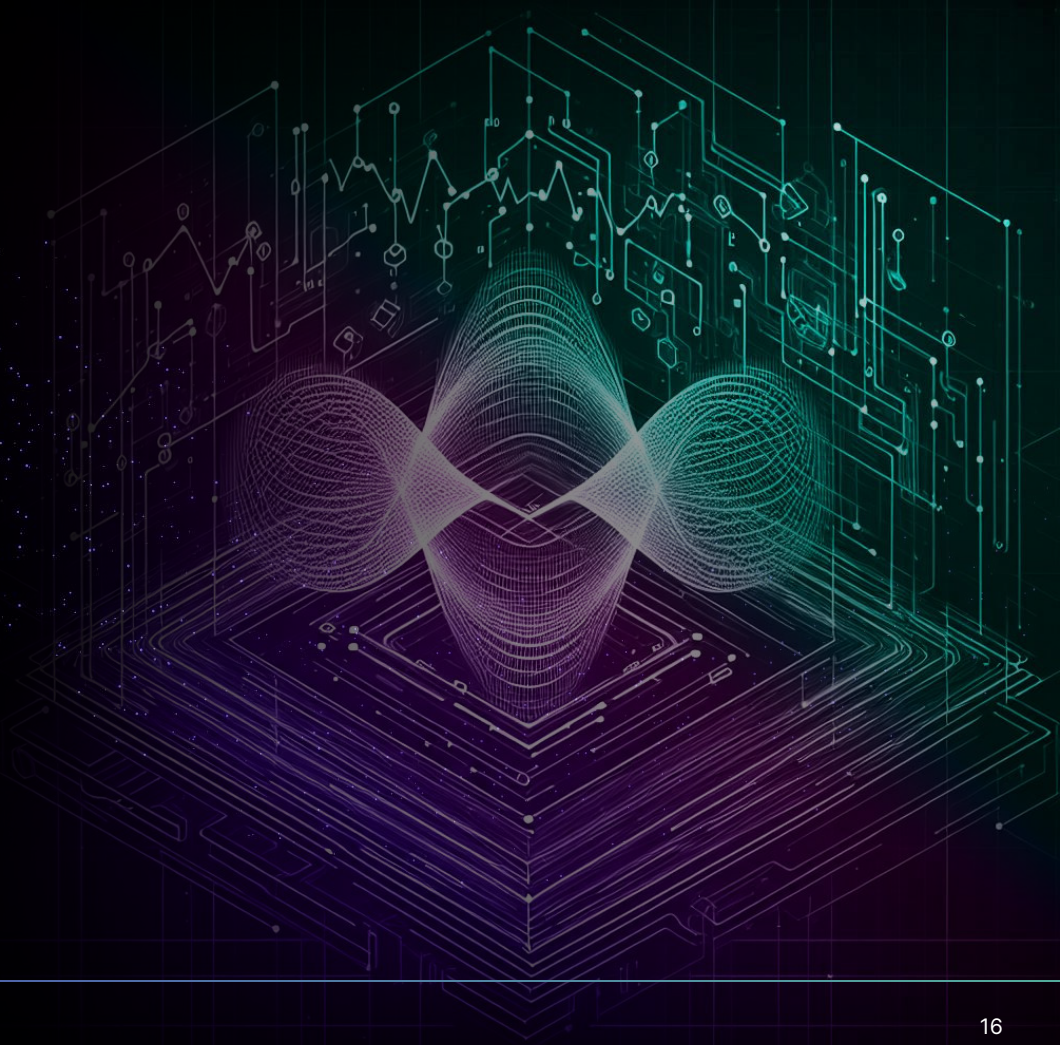
Evolutionary and gradient-based eigen-selected elitist search

A Pauli-based chromosome is used to explore feature maps through evolutionary methods aimed at increasing separability between inter- and intra-class kernel results. This process depends on analyzing the quantum kernel's internal statistics to optimize its performance, focusing later on target alignment, kernel matrix eigenvalues, and gradient-based fine-tuning.

Research paper available in the arXiv.



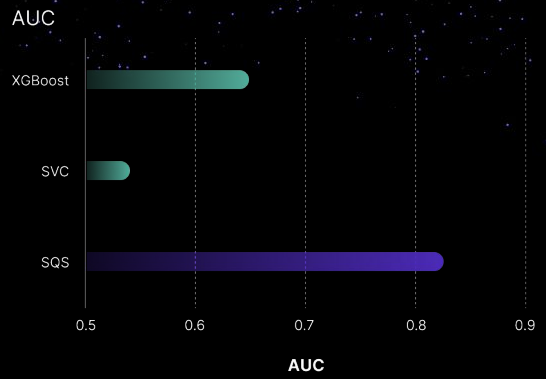
Use case: The results



Falcondale's SQS in action

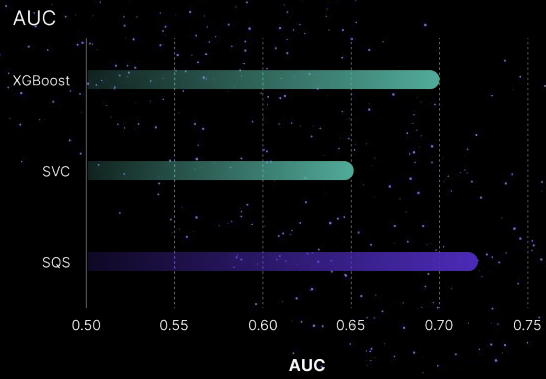
Comparison between SQS, SVC and XGBoost (both classical methods with tuned hyperparameters)

10% of the dataset



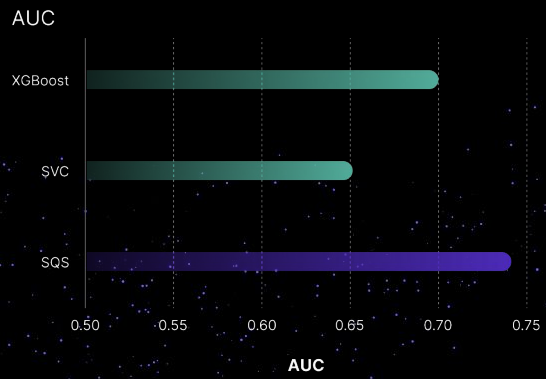
At 500 datapoints the AUC is superior compared to XGBoost by 18 percentage points.

50% of the dataset



At 2500 datapoints it's closer to XGBoost since the gradient boosting method is getting better with more observations but still SQS is superior.

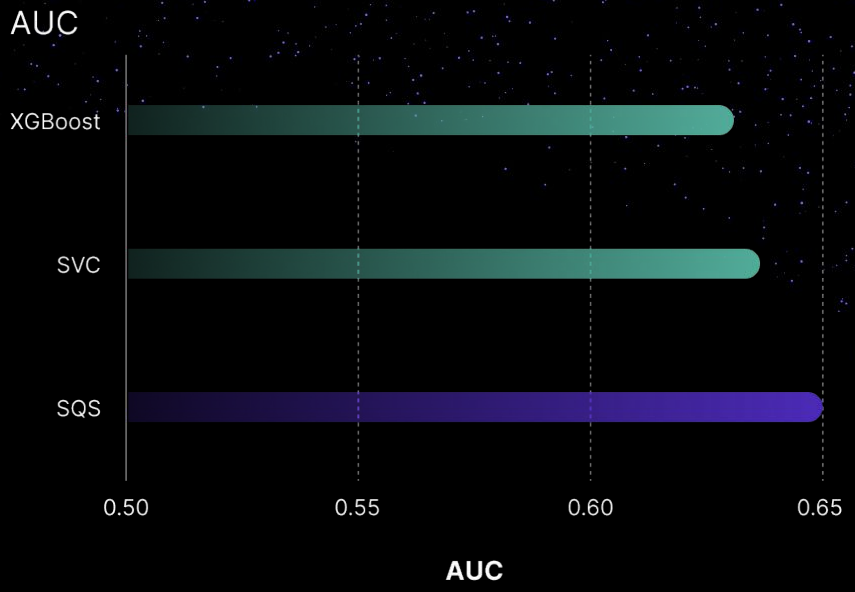
100% of the dataset



With near to 5000 datapoints, SQS confirmed once more the superiority of the quantum simulated method having 4 percentage points in AUC higher than the best classical model.

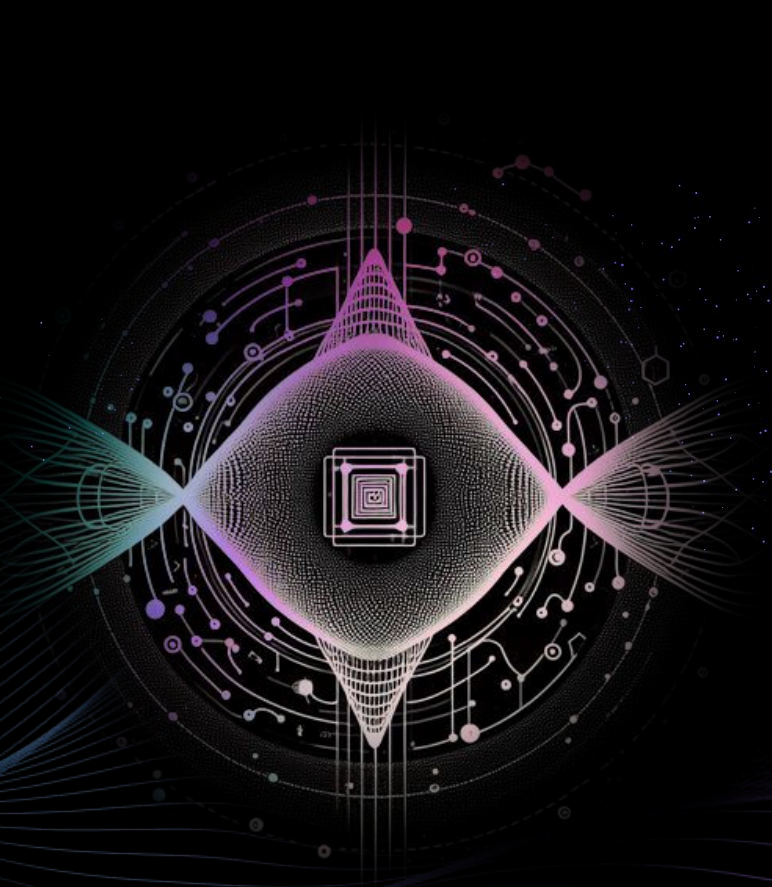
Falcondale's SQS in action

Impressive results training with 10% of the dataset and testing remaining 90%



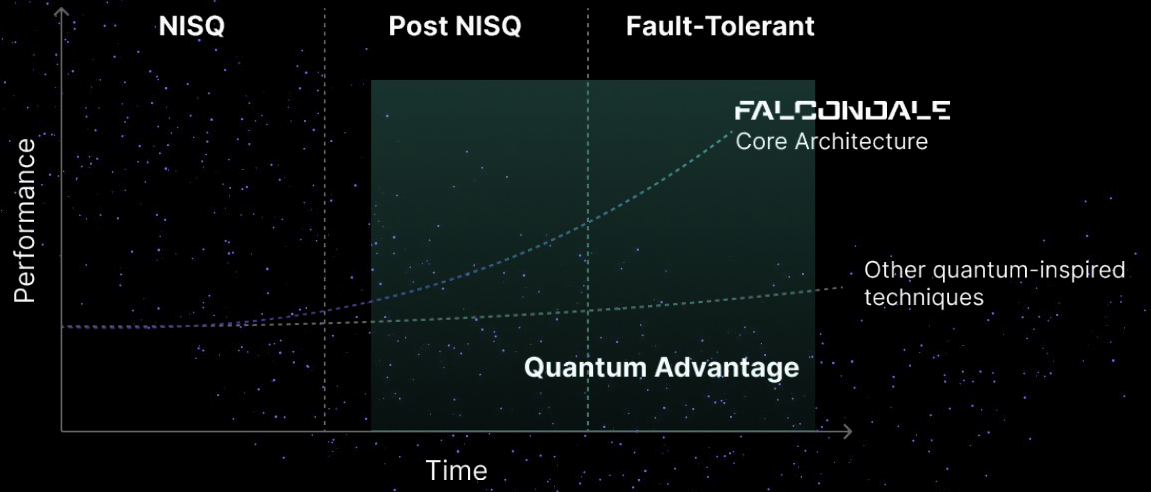
In a lower datapoints range and predicting on a larger dataset the AUC of SQS is 2 percentage points higher showing the special attribute of our quantum methods to deal with the problem of data scarcity.

This is a typical problem on several financial institutions when they are starting with some products or dealing with SMBs rather than individuals, so the dataset growth is slower and the model maturity is a complex subject.



Securing post NISQ scalability

Our core architecture can be switched to real quantum hardware



Seamless QML

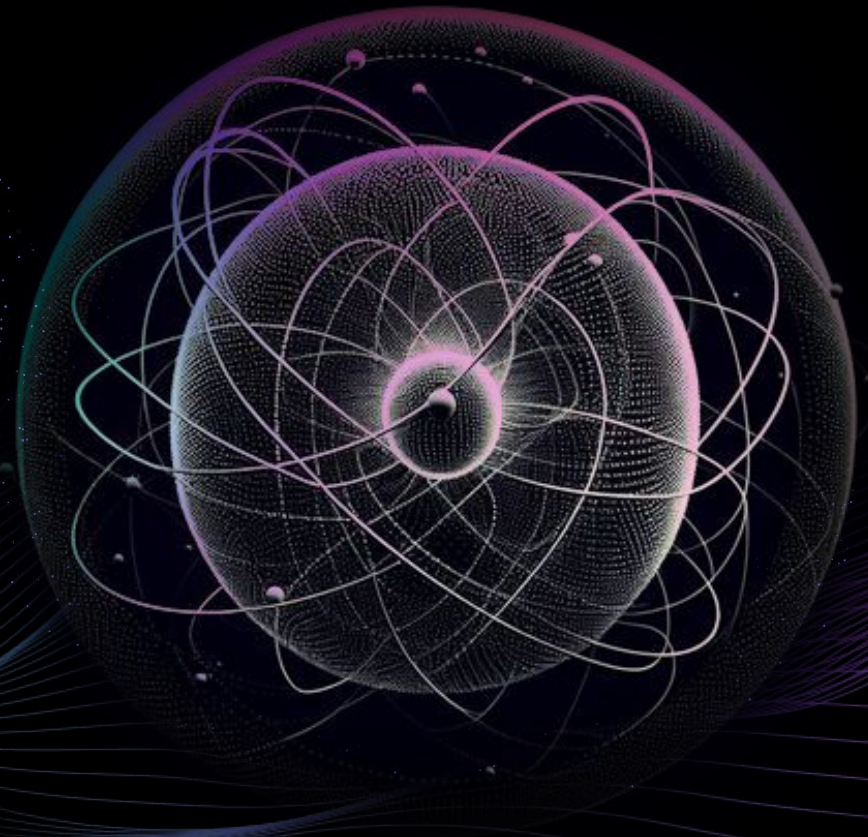
Best in class partners to boost our quantum hardware adoption.

Fermioniq

Emulate device noise model for the heavy-lifting before the device

Exploit the quantum hardware and make it cost efficient

Secure by default



DATA SECURE AND ALWAYS SAFE

Data will be managed in an extremely secure environment.

All our processes will be SOC 2 and ISO 27001 certified and compliant.

Bringing quantum computing where your data is

SQS can be used:

- In our public platform.
- Deployed on cloud hosted private infrastructure leveraging the full potential of cloud computing and customer data.
- On-premises with dedicated resources and no outside service thanks to cutting-edge quantum simulation mechanisms.

The modular solution of SQS allows to involve customer-owned data in those scenarios where no client data will be exposed, prioritizing private computing, federated learning and synthetic data enabling technologies alongside the existing customer infrastructure.

We embrace regulatory challenges

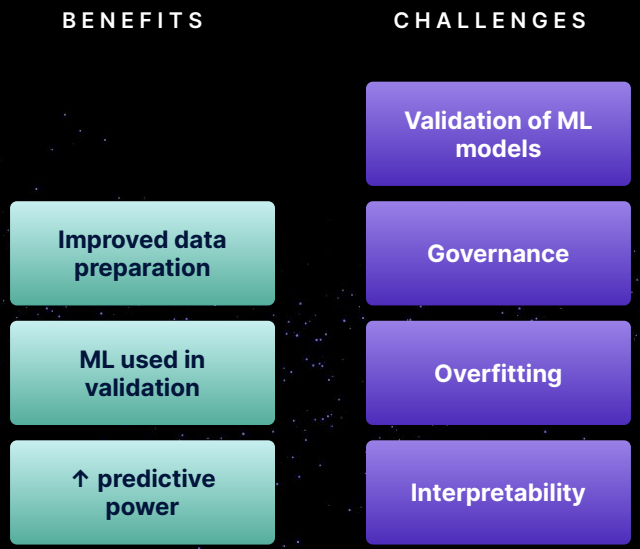
Our solutions are prepared to follow the most stringent regulatory environments

Our models are designed to tackle with the most precision available in the quantum-enhanced machine learning solutions, three main pillars:

1. Interpretability of results.
2. Ensure adequate understanding of the process and decision.
3. Evaluating the generalization capabilities of our algorithms.

We follow the recommendations of the European Banking Authority (EBA) in terms of Internal Ratings-based (IRB) models.

EBA | EUROPEAN BANKING AUTHORITY



Flexible pricing

All the possibilities to grow with us

Community based engagement scaled to enterprise scale needs.

STARTER

Free

Test our solutions through a free PoC*

*Limited shots and data points

ESSENTIAL

Setup Fee: 5000$

From **2000$*** (Billed monthly)

*Includes 5,000 API calls. Extra calls will decrease their price depending on the volume

Falcondale Cloud

PRO

Setup Fee: 15000$

From **7000$*** (Billed monthly)

*Includes 30,000 API calls. Extra calls will decrease their price depending on the volume

Deployed on your VPC, for extra security

ENTERPRISE

Let's Talk!

Custom on-premise deployment, based on your specific needs

Highly technical team

A team deeply committed to research

Javier Mancilla
Co-founder and CEO
Ph.D. in Quantum Computing

alt.bank, fintonic, greensill, rauva

Tomás Tagliani
Co-founder and General Manager
MBA

intuition machines, alt.bank, hsbc, gocap, mercado libre

Iraitz Montalbán
Co-founder and CTO
Ph.D.(c) in Quantum Machine Learning

iberdrola, sdg group (alten), panda security, tecnalia

Diego Tancara
Quantum Researcher
Ph.D. (c) in Physics

Christophe Pere
Quantum Researcher
Ph.D. in Astrophysics

André Sequeira
Quantum Researcher
Ph.D. (c) in Quantum Computing

Recognized in multiple scenarios

*Our CEO, Javier Mancilla, presenting a use case with the SQS solution at Q2B Paris 2024 conference.

- Selected in the top 7 pitches in the Q2B 2023 conference in Silicon Valley.
- Approved as use case speakers in the Q2B 2024 conference in Paris and evaluated by the stakeholders as “a powerful presentation”.
- Nominated for an award in the SME Banking Conference in Vienna 2024 (to be executed in November this year).
- Our CEO was recognized for three consecutive years as Quantum Computing Linkedin Top Voice.

FALCONDALE

Stay quantum