# Predictive AI Capability Deck

Timspark, 2024

# Quick facts

**30+**

teams onboarded

**1000+**

vetted engineers involved

**800+**

projects accomplished
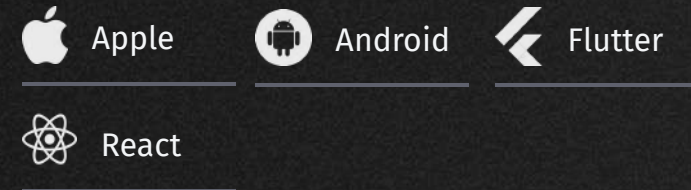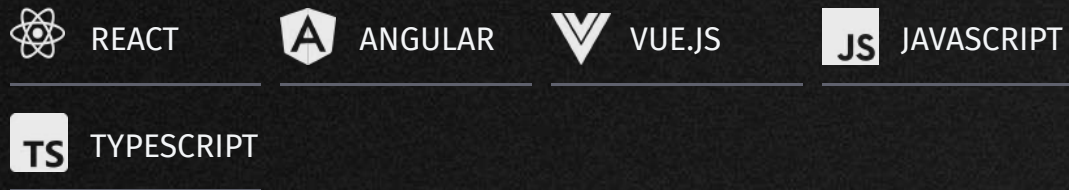
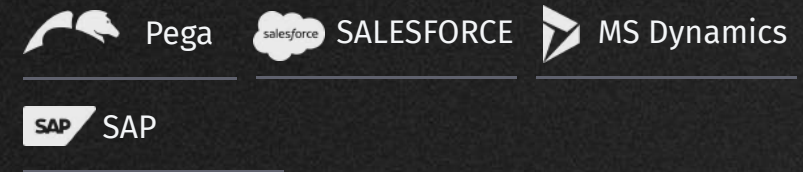Headquarters in London, UK

# Our capabilities

## BACK-END

- JAVA
- PYTHON
- NODE.JS
- RUBY
- .NET
- PHP
- UNITY
- GO
- C/C++
- RUST

## FRONT-END

- REACT
- ANGULAR
- VUE.JS
- JAVASCRIPT
- TYPESCRIPT

## PLATFORMS

- AWS
- AZURE
- GCP
- SAP
- SALESFORCE

## MOBILE APPS

- Apple
- Android
- Flutter
- React

## BI AND DATA VISUALIZATION

- Tableau
- Looker
- PowerBI
- Pyramid

## ERP, BPM AND CRM

- Pega
- SALESFORCE
- MS Dynamics
- SAP

# Industry verticals

- Finance, banking and insurance
- Healthcare and life sciences
- eCommerce and retail
- Education
- Manufacturing
- Automotive
- Logistics, supply chain and transportation
- Tourism and hospitality
- Media and entertainment
- Telecommunications
- Business management
- HR and recruiting
- Architecture, construction and real estate
- Energy, oil and gas
- Public services and utilities
- Agriculture
- Art and culture
- Ecology

# Our services

Timspark provides professional services around **bespoke software:**

**Full-cycle product development**

✦ We deliver a premium market-ready product that meets your customers' needs, from conceptualization to the design phase to final production and launch.

**IT-Consulting**

✦ With our technology audit and consulting expertise, we offer holistic guidance, identify areas for improvement, and develop effective strategies to meet your business needs.

# How you can work with us

We are flexible. At Timspark, we offer different engagement models, from full-fledged teams to staff augmentation, to help you achieve your current business needs.

## Core Teams
Pre-built development teams with deep expertise
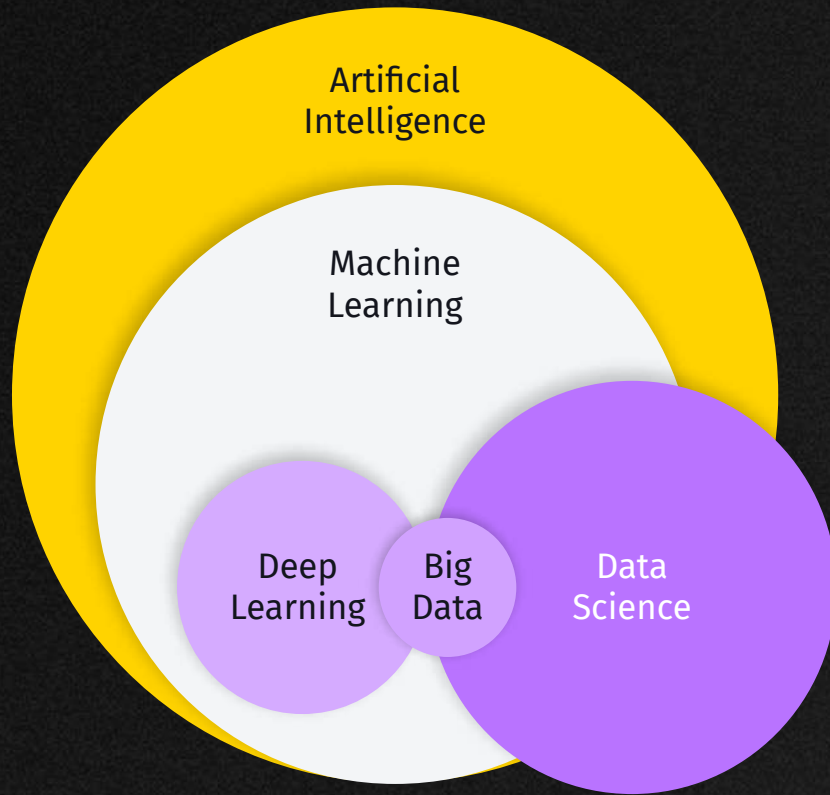
## Dedicated teams
Development units built specifically for your project

## Team augmentation
Skilled engineers to enhance your in-house team

# Artificial intelligence components



### Artificial Intelligence

Artificial intelligence is a wide-ranging branch of computer science with the ability to imitate intelligent human behavior, react and analyze data. AI is widely used to provide personalized recommendations to people based on their previous searches and purchases or other online behavior.

### Machine Learning

Machine Learning is a part of Artificial intelligence. It is the science of getting computers to learn and act like humans do, and improve their learning over time in an autonomous fashion, by feeding them data and information in the form of observations and real-world interactions.

### Deep Learning

Deep Learning is the final version of data. It is the science and practice of analyzing large amounts of data using all kinds of mathematical methods and solving related problems related to collecting, storing, and processing data sets. The DL uses complex algorithms and neural nets to train a model.

# Our AI & ML experience

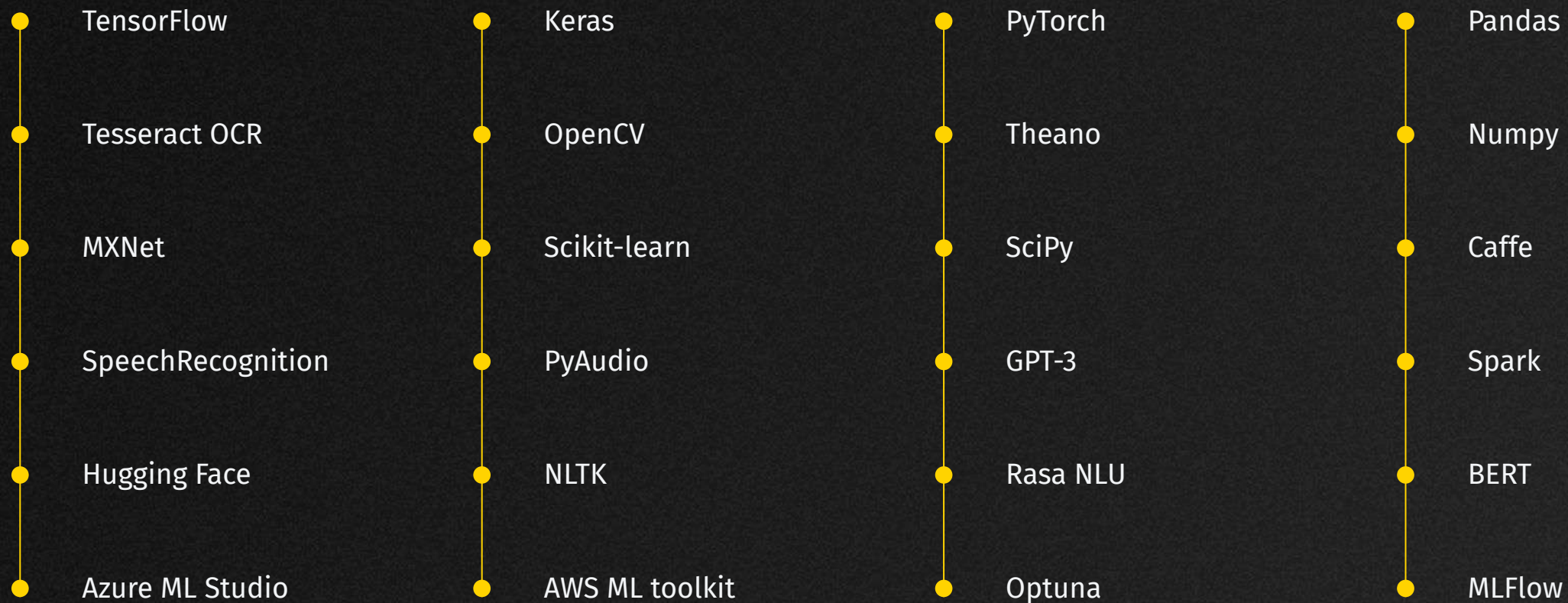| Conversation AI, NLP-based chatbots | Sentiment analysis for social networks | Speech-to-Text and Text-to-Speech tools |
| --- | --- | --- |
| Voice recognition modules | Voice control for smart home app | Face recognition systems |
| Visual search applications | Smart virtual assistants | Recommendation systems |
| Demand and sale forecasting models | Clustering algorithms for customer segmentation | Customer churn prediction models |
| Fraud detection systems | ML-powered apps for patient treatment | Predictive maintenance systems |

# AI & ML tech stack we master

- TensorFlow
- Tesseract OCR
- MXNet
- SpeechRecognition
- Hugging Face
- Azure ML Studio

- Keras
- OpenCV
- Scikit-learn
- PyAudio
- NLTK
- AWS ML toolkit

- PyTorch
- Theano
- SciPy
- GPT-3
- Rasa NLU
- Optuna

- Pandas
- Numpy
- Caffe
- Spark
- BERT
- MLFlow

# Industry competence

eCommerce and retail

Logistics, supply chain and transportation

Architecture, construction and real estate

Finance, banking and insurance

Tourism and hospitality

Energy, oil and gas

Healthcare and life sciences

Media and entertainment

Public services and utilities

Education

Telecommunications

Agriculture

Manufacturing

Business management

Art and culture

Automotive

HR and recruiting

Ecology

# Crowd data analytics web app
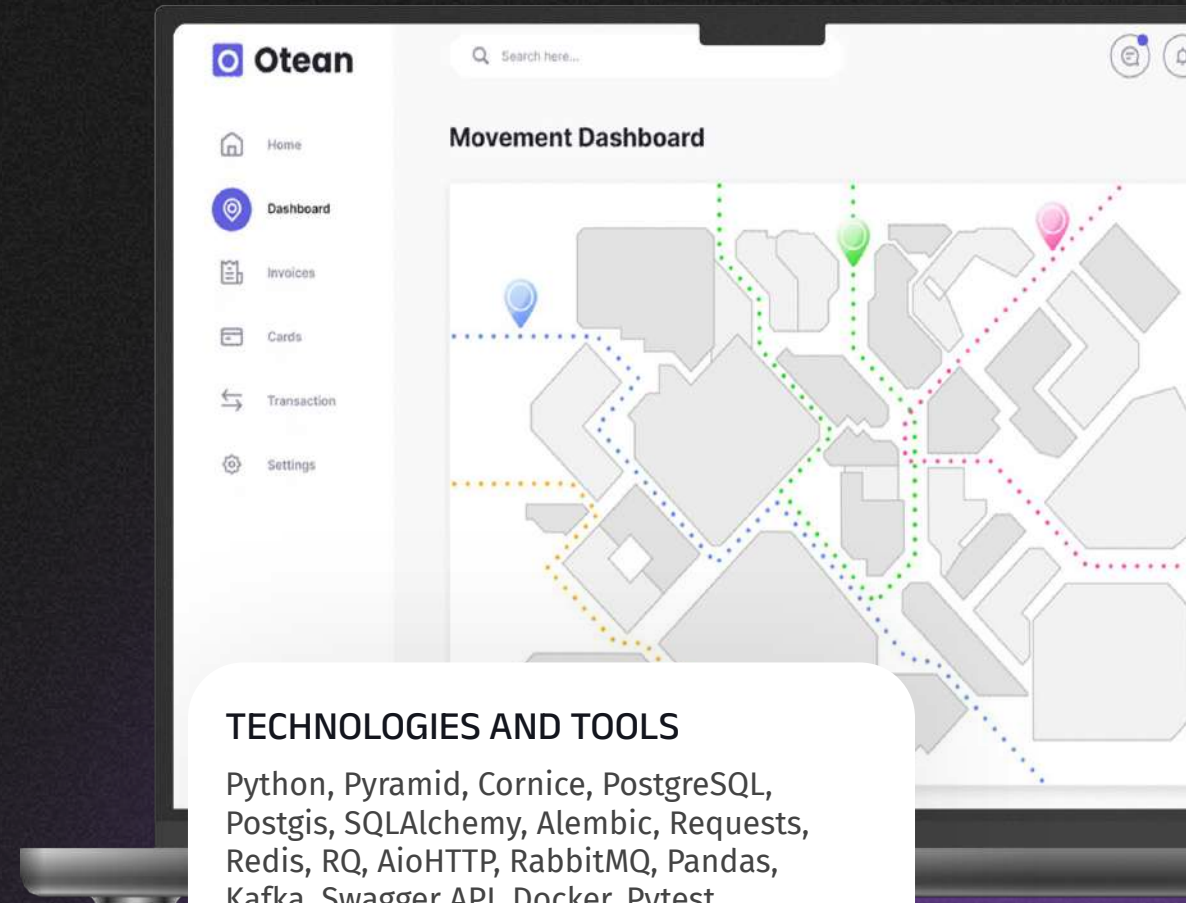
RETAIL    AI

### CHALLENGE

The web platform allows analyzing and predicting the behavior of visitors.

### SOLUTION

The solution helps offline stores and places gain data on the number of visitors, their paths, time spent, etc. This information helps retailers gain a clear understanding of typical visitor behavior, evaluate business performance, develop new marketing strategies, and make informed decisions. The web application captures anonymized Wi-Fi signals from visitors' smartphones and uses MAC addresses of devices to fulfill its core functions.

Also, the solution is enriched with unique technologies, including Artificial Intelligence and Machine Learning. Thus, offline businesses get access to analytical data, comparable to the e-commerce sphere.

\* The image is illustrative. Project details cannot be disclosed due to the conditions of NDA between the Development Team and the Customer.



**Otean**

Home
Dashboard
Invoices
Cards
Transaction
Settings

Search here...

**Movement Dashboard**

### TECHNOLOGIES AND TOOLS

Python, Pyramid, Cornice, PostgreSQL, Postgis, SQLAlchemy, Alembic, Requests, Redis, RQ, AioHTTP, RabbitMQ, Pandas, Kafka, Swagger API, Docker, Pytest, FactoryBoy, JavaScript, Kubernetes

# Sales forecasting solution
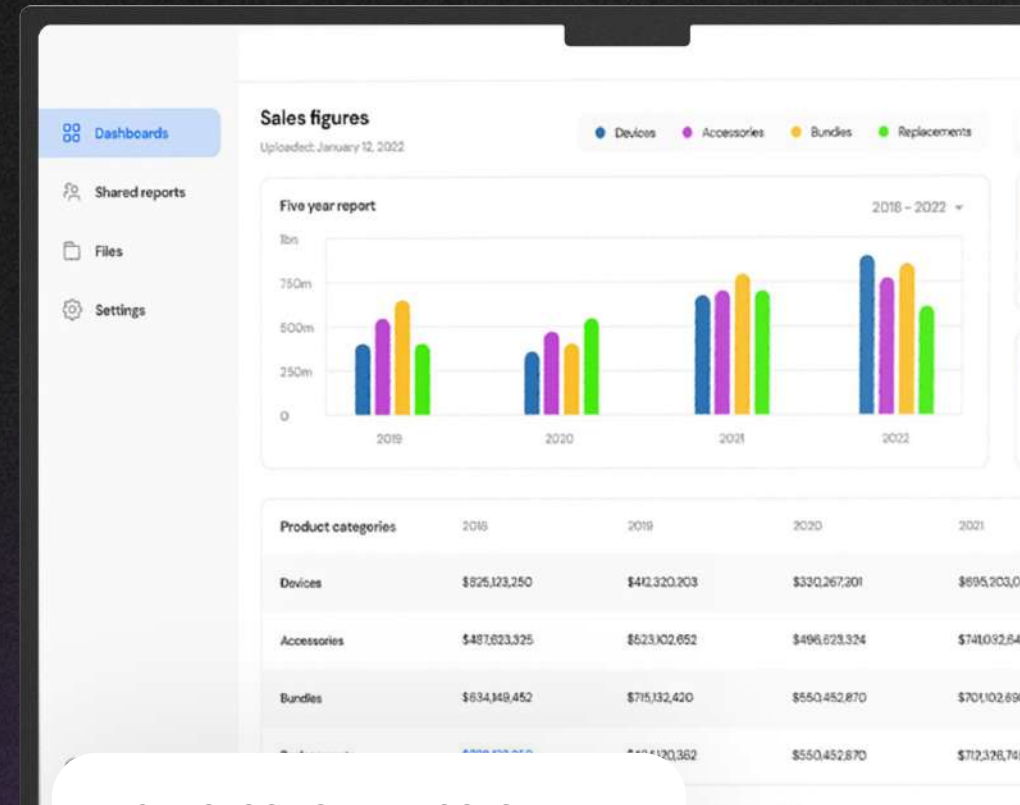
RETAIL       FORECASTING

## CHALLENGE

The solution allows forecasting sales and optimize inventory in the store's business processes.

## SOLUTION

The retailer solution makes forecasts for 5,000+ products. Using three years of accumulated data  on daily sales, purchased items, average checks, loyalty card types, etc., the application identifies seasonality in demand by month and day of the week, determines trends for each product group, and evaluates the impact of discounts and promotions on product sales. Based on this analysis, the program builds sales forecasts for 1, 3, and 12 months, as well as identifies changes in demand for individual groups of customers. As a result, the solution helped increase the accuracy of forecasting for the next 3 months from 77% to 93%, which helped optimize logistics and storage  of goods in the warehouse.

\* The image is illustrative. Project details cannot be disclosed due to the
  conditions of NDA between the Development Team and the Customer.



## TECHNOLOGIES AND TOOLS

Python, Tensorflow, Keras, PyTorch, ARIMA, ARCH, Recurrent neural networks, Prophet

# Customer outflow forecasting
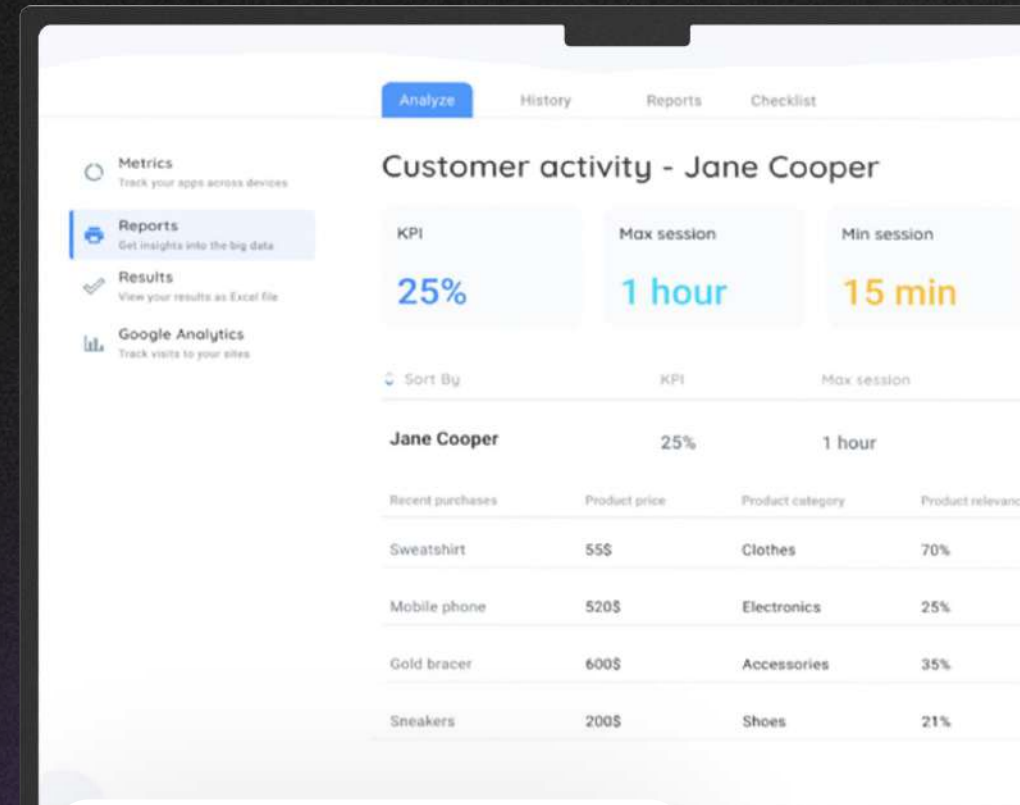
RETAIL    FORECASTING    ECOMMERCE

CHALLENGE

The solution created for large stores can predict and manage customer outflow.

SOLUTION

Using a number of parameters that we identified through a study of customer activity, our team calculated the likelihood of outflow within 1-3 months. We identified groups that are "at-risk zone" and helped the company find out the most relevant text messages, which will motivate customers to buy goods. During the preparation stage, we analyze the following parameters: frequency and volume of purchases, number of site visits, date of the last purchase, viewed and selected products, positive or negative user experience.

As a result, the solution enabled the business to increase the efficiency of communications with users, conversion and repeat purchase rates, and the customer lifetime value (LTV).

* The image is illustrative. Project details cannot be disclosed due to the
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Analyze    History    Reports    Checklist

Metrics
Track your apps across devices

Reports
Get insights into the big data

Results
View your results as Excel file

Google Analytics
Track visits to your sites

## Customer activity - Jane Cooper

| KPI | Max session | Min session |
|-----|-------------|-------------|
| 25% | 1 hour | 15 min |

Sort By    KPI    Max session

**Jane Cooper**    25%    1 hour

| Recent purchases | Product price | Product category | Product relevanc |
|------------------|---------------|------------------|------------------|
| Sweatshirt | 55$ | Clothes | 70% |
| Mobile phone | 520$ | Electronics | 25% |
| Gold bracer | 600$ | Accessories | 35% |
| Sneakers | 200$ | Shoes | 21% |

TECHNOLOGIES AND TOOLS

Python, Tensorflow, Keras, PyTorch, Pandas, NumPy, Scikit-learn.

# ML-based sales forecasting
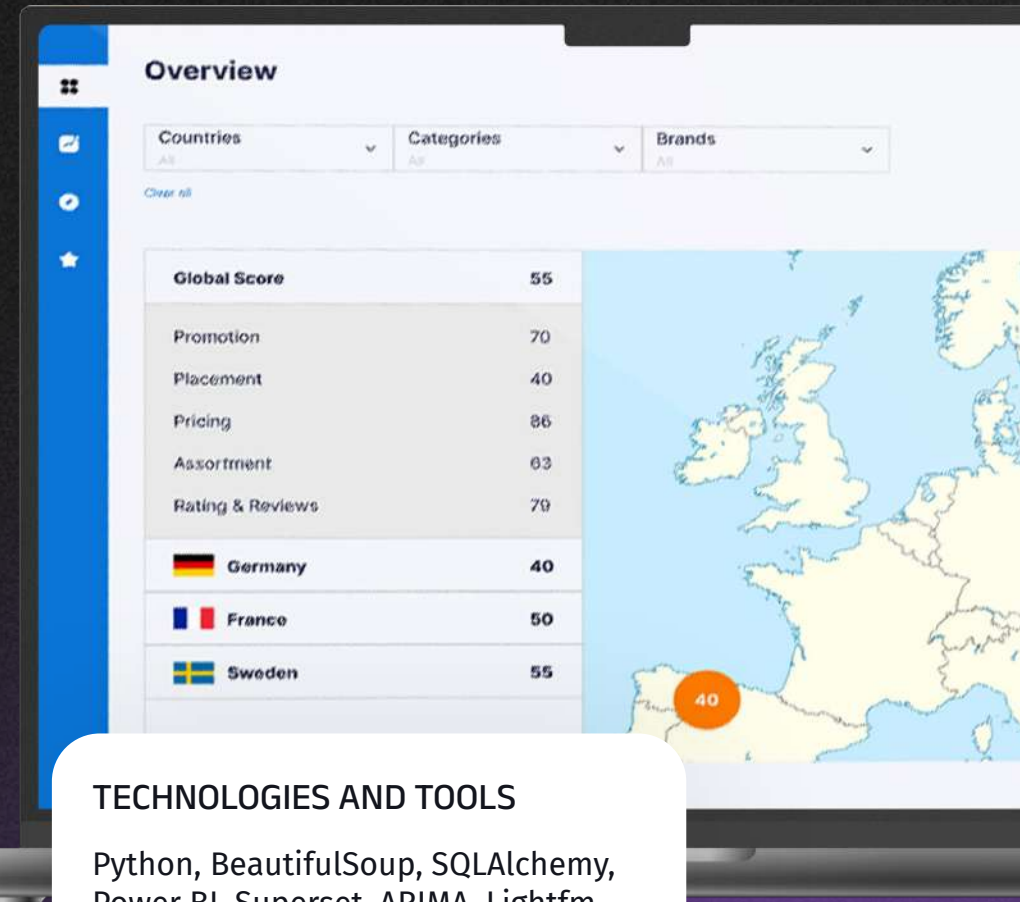
ECOMMERCE    FORECASTING    ML

## CHALLENGE

Custom solution for an eCommerce company designed to analyze and predict demand and sales based on data.

## SOLUTION

Our goal was to use data engineering and AI to predict product trends. The solution collects data from major e-commerce platforms such as Amazon, eBay, Walmart and Aliexpress, and uses Parse, the largest commerce performance analytics platform. Web scraping and API calls were used to extract and process product search and purchase data.

Using time-series forecasting techniques and ML tools such as collaborative filtering and ranking algorithms, we optimised inventory levels by predicting demand for specific products and adjusted marketing strategies to target the most promising customer segments, resulting in increased sales.

\* The image is illustrative. Project details cannot be disclosed due to the conditions of NDA between the Development Team and the Customer.



### Overview

| | |
|---|---|
| Global Score | 55 |
| Promotion | 70 |
| Placement | 40 |
| Pricing | 86 |
| Assortment | 63 |
| Rating & Reviews | 79 |
| Germany | 40 |
| France | 50 |
| Sweden | 55 |

**TECHNOLOGIES AND TOOLS**

Python, BeautifulSoup, SQLAlchemy, Power BI, Superset, ARIMA, Lightfm, LightGBM, RankLib,   Prophet, Statsmodels, AWS

# Contract analysis platform
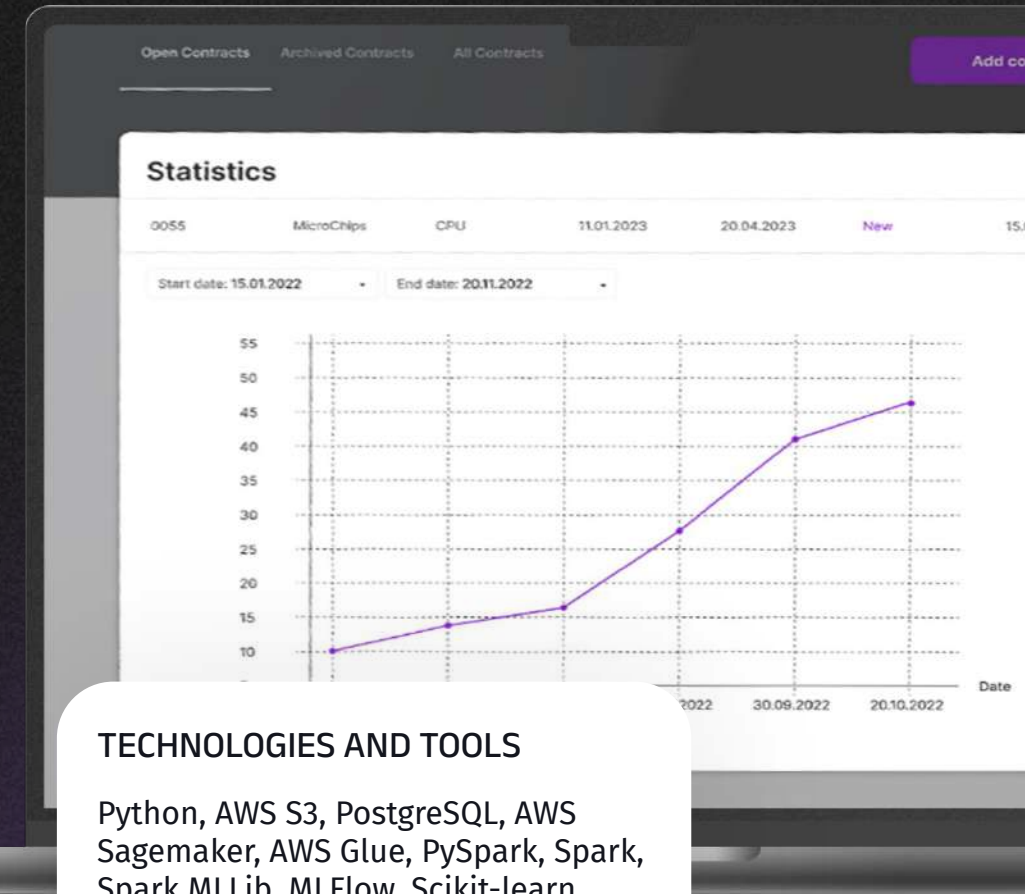
MANUFACTURING

CHALLENGE

An ML platform that analyzes previous interactions with partners and predicts possible outcomes for the future ones.

SOLUTION

Our data engineers have built a separate module for the client's platform that gathers historical data about the contracts with partners and their outcomes and puts it to in-depth analysis to create a model of interacting with a particular partner. Based on the analyzed data, the solution builds the predictions on future shipments and visualizes all the data via graphs.

The solution allows the client to plan sales and manufacturing actions more precisely, increase the accuracy of shipment predictions, and reduce customer churn rate.

\* The image is illustrative. Project details cannot be disclosed due to the conditions of NDA between the Development Team and the Customer.



Open Contracts    Archived Contracts    All Contracts    Add co

## Statistics

0055    MicroChips    CPU    11.01.2023    20.04.2023    New    15.

Start date: 15.01.2022    -    End date: 20.11.2022    -

2022    30.09.2022    20.10.2022    Date

TECHNOLOGIES AND TOOLS

Python, AWS S3, PostgreSQL, AWS Sagemaker, AWS Glue, PySpark, Spark, Spark MLLib, MLFlow, Scikit-learn, XGBoost, CatBoost, LightGBM, Matplotlib, MLFlow, Tensorflow

# Recommender system

HRM    BUSINESS PROCESSES

## CHALLENGE

Our team developed a recommendation system for the staffing process that would ease business processes.
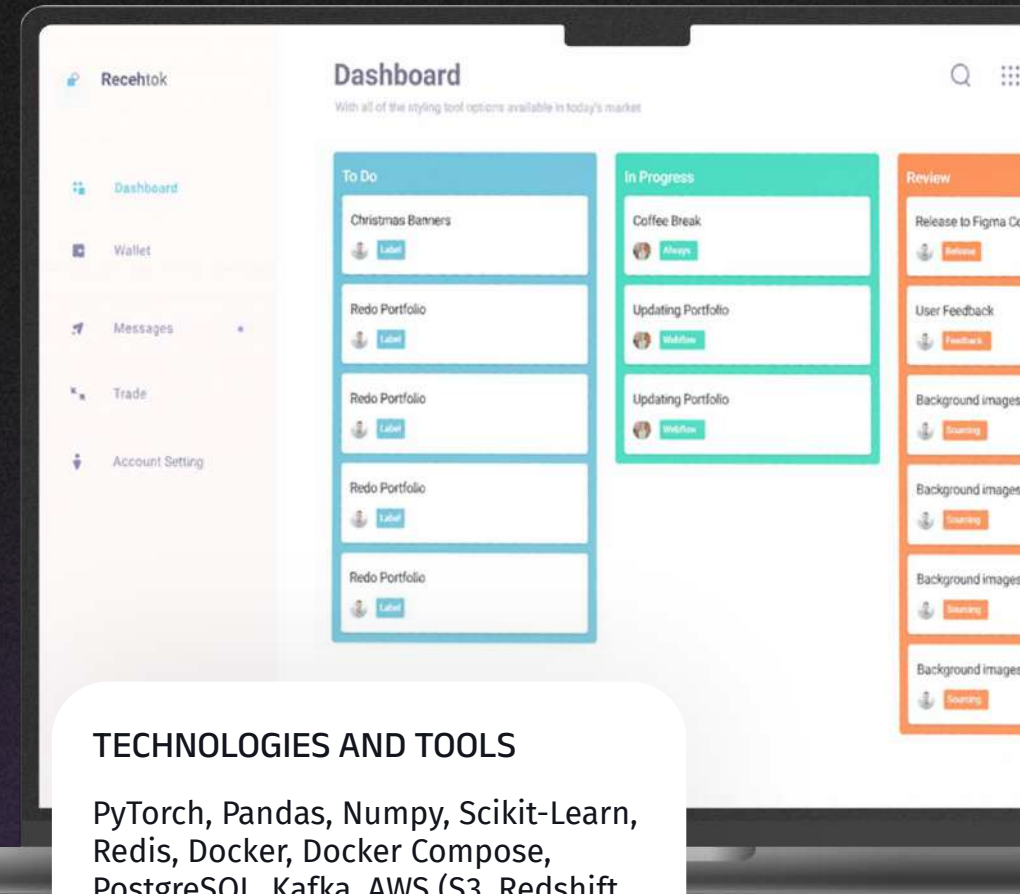
## SOLUTION

We built the system from scratch, starting from the data flow design, integration of specific business rules and restrictions into the product, and creation of an explainability layer for each model proposal.

The system was designed as a ranking algorithm built around a DNN with a custom multi-headed loss function in order to incorporate penalties from different types of environment feedback. Despite the tabular nature of the data, DL approach turned out to be the only one that could meet business process features. Due to recent changes in business processes, we also designed a solution for data drift detection and handling.

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### TECHNOLOGIES AND TOOLS

PyTorch, Pandas, Numpy, Scikit-Learn, Redis, Docker, Docker Compose, PostgreSQL, Kafka, AWS (S3, Redshift, Kinesis, Sagemaker, Studio, Pipelines, Experiments), MLFlow, Optuna, GitHub

# Risk analysis API

FINTECH

## CHALLENGE

The solution allows a FinTech company to accumulate information about the client's credit score and latest loans for further assessment of non-return risks.

## SOLUTION

Timspark has built a solution that accumulates data about the client's recent loans and overall credit score. After that, the accumulated historical data is processed by ML algorithms to create forecasts about the particular client's capabilities of covering the requested loan conditions.

The data is gathered from various sources including public records and our client's history of interactions with the particular customer, put into a multi-layer data warehouse, and then analyzed by an array of data analytic tools integrated into the solution.

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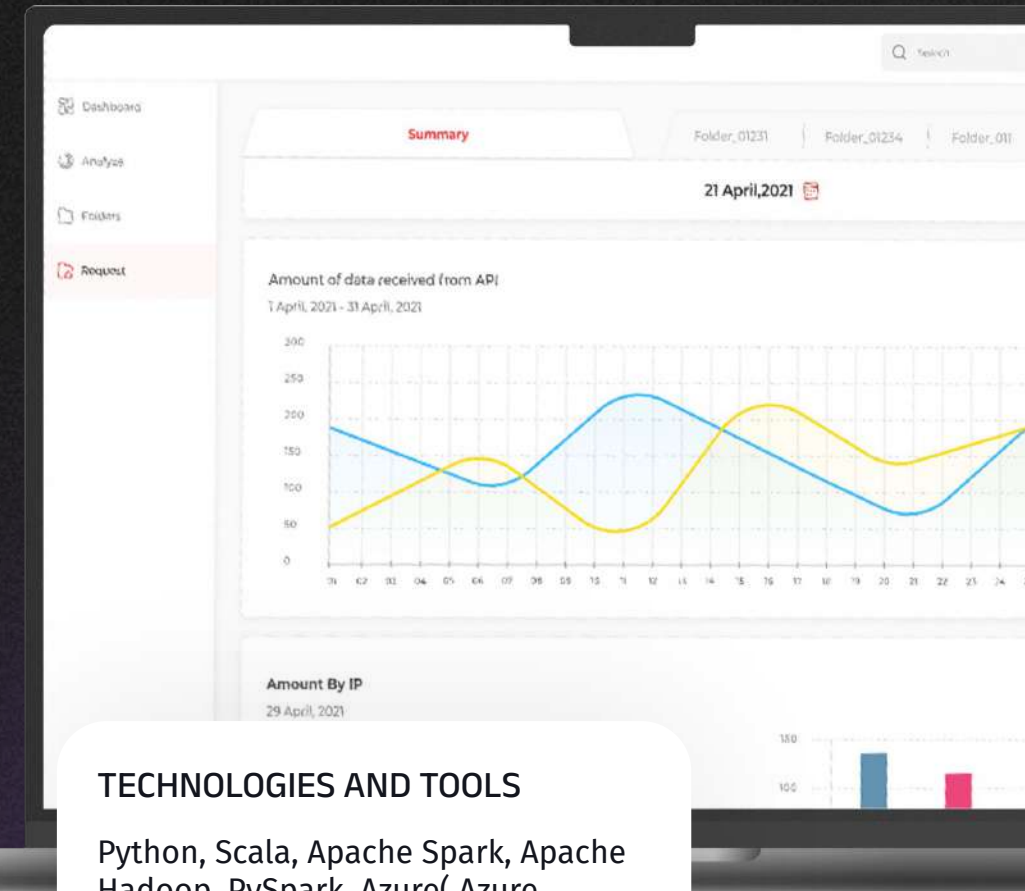
### TECHNOLOGIES AND TOOLS

Python, Scala, Apache Spark, Apache Hadoop, PySpark, Azure( Azure Machine Learning, Data Lake, Data Factory, Synapse), PowerBI.

# Anomaly detection in banking
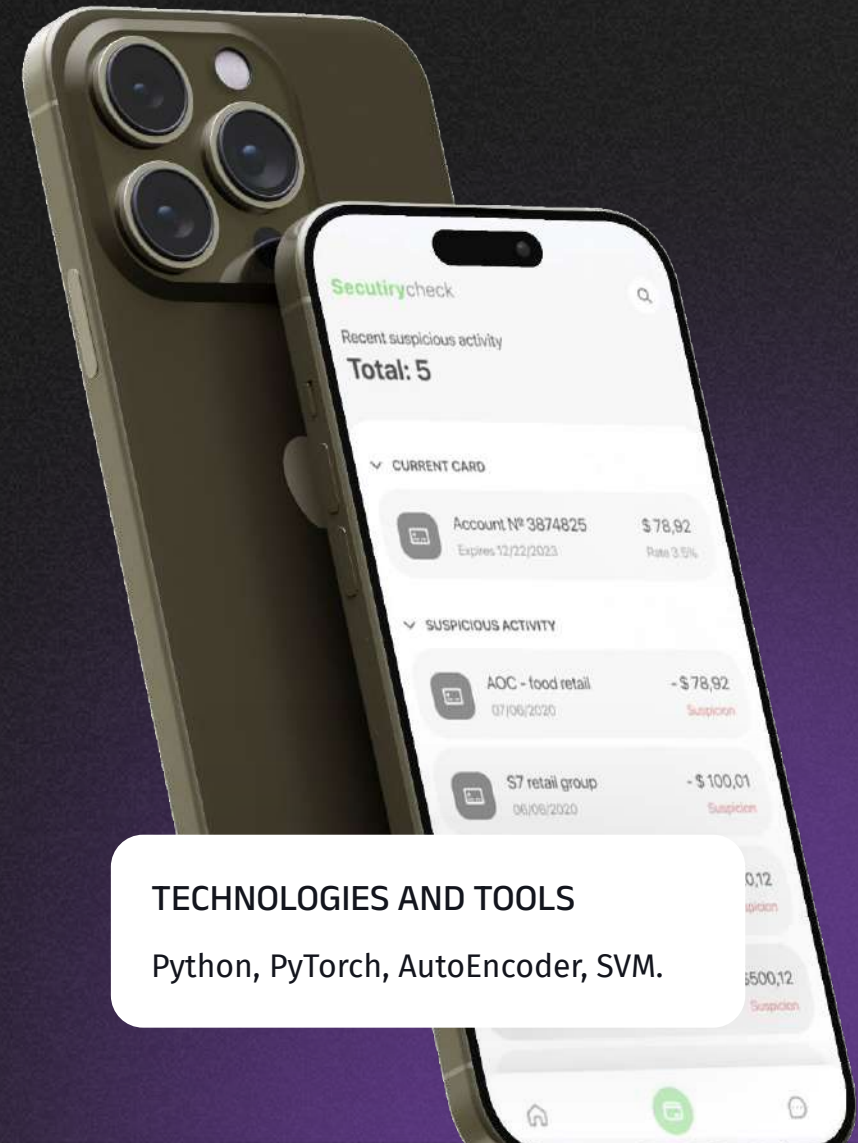
BANKING

## CHALLENGE

The system integrates with the banking equipment and calculates uncharacteristic for the user transactions made by the card.

## SOLUTION

The corporate system allows identifying possible threats associated with card transactions at ATMs, payment terminals, etc. Unusual behavior is considered a threat. For example, making many transactions without entering a pin code, or making transactions not previously conducted for this product group.

When a threat is detected, the system transmits this data in real-time to the administrator. We identified the factors that facilitate the detection of anomalies and integrated software and hardware sensors into the equipment. Then we analyzed the initial anomalies and created a training environment to train the system. Our next step was creating an anomaly alert module and an analytics module that can be used to identify and recognize deviations.

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Secutirycheck

Recent suspicious activity
Total: 5

CURRENT CARD

Account № 3874825          $78,92
Expires 12/22/2023          Rate 3.5%

SUSPICIOUS ACTIVITY

AOC - food retail          - $78,92
07/06/2020                 Suspicion

S7 retail group            - $100,01
06/06/2020                 Suspicion

0,12
Suspicion

5500,12
Suspicion

**TECHNOLOGIES AND TOOLS**

Python, PyTorch, AutoEncoder, SVM.

# Agricultural cost forecasting service
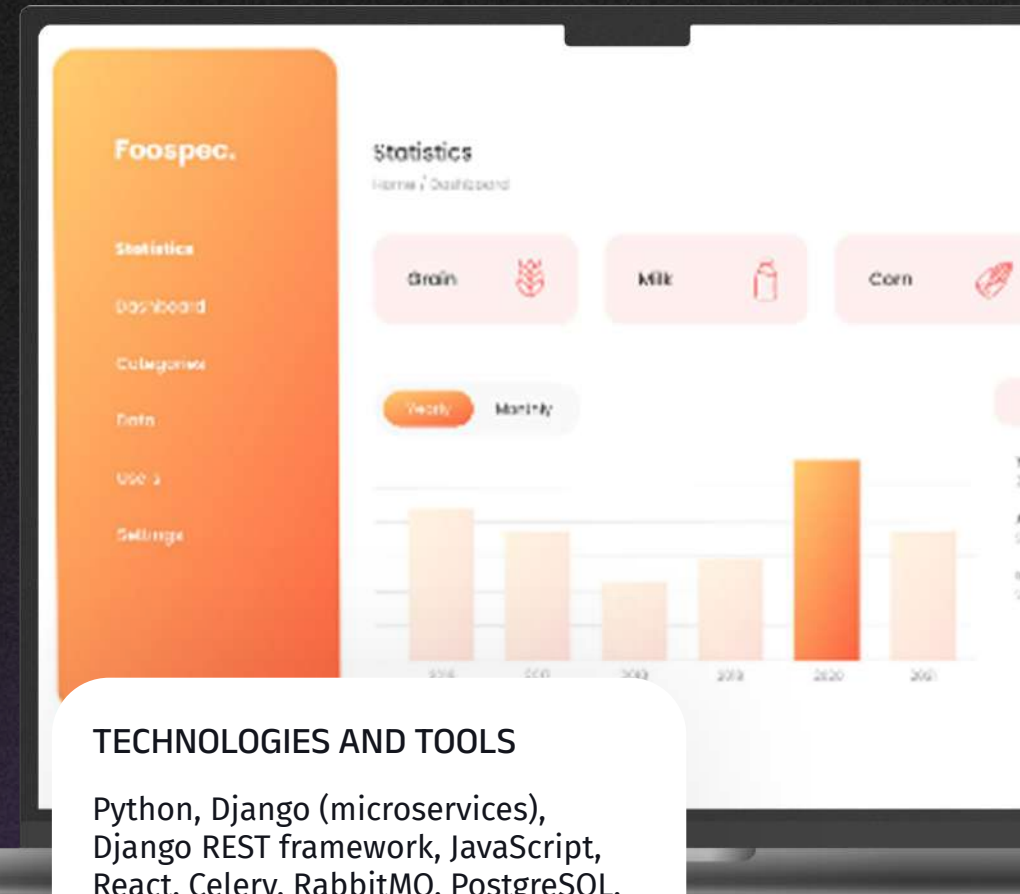
AGRICULTURE    ML

## CHALLENGE

ML-based system for precise forecasts of agricultural products cost.

## SOLUTION

Timspark team participated in the development of the web app that uses various data sources, including time series, texts, images, etc., to generate the most accurate agricultural commodity cost forecasts. The solution is based on Data Science and Machine Learning technologies.

A unique AI algorithm generates the most accurate trend forecast possible from over 65 million pieces of data. The system's users can differentiate their requests depending on the agriculture product, time frame, and region. Also, we have adjusted a backend to release a comprehensive web application allowing users to subscribe and view price predictions.

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  conditions of NDA between the Development Team and the Customer.

**TECHNOLOGIES AND TOOLS**

Python, Django (microservices), Django REST framework, JavaScript, React, Celery, RabbitMQ, PostgreSQL, Stripe, Docker, Docker Compose, AWS, Kubernetes, Jenkins, GitHub

Foospec.

Statistics
Home / Dashboard

Grain    Milk    Corn

Statistics
Dashboard
Categories
Data
Users
Settings

Yearly    Monthly

# Vehicle market price forecasting
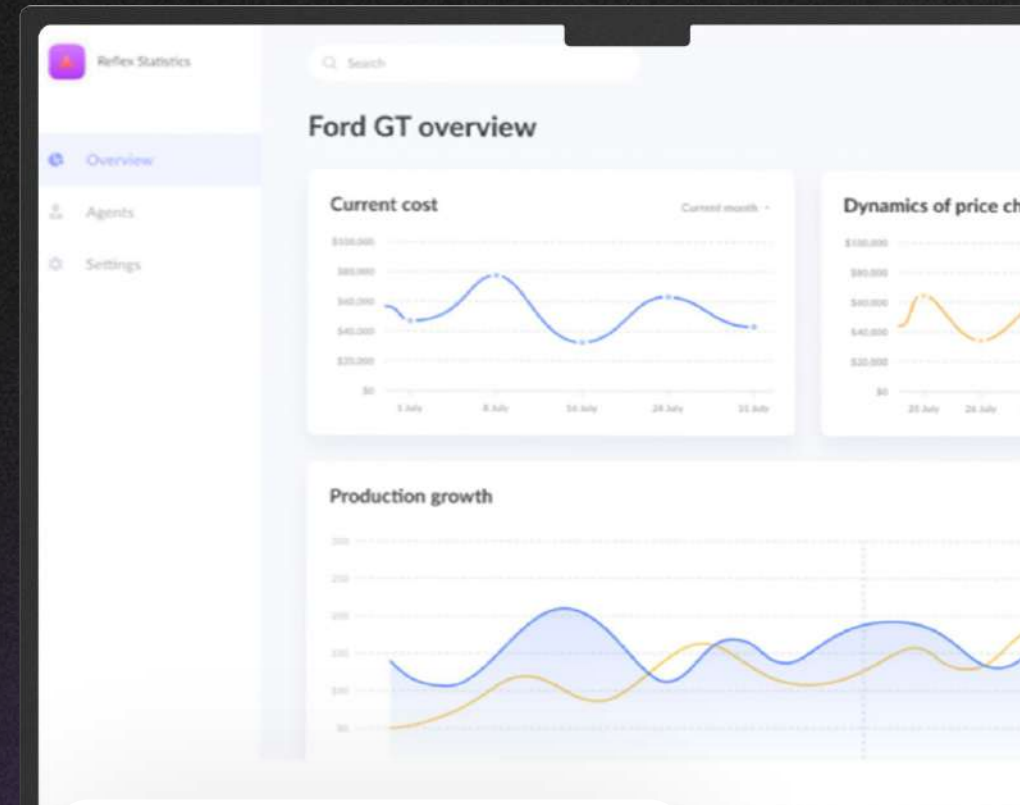
VEHICLE    FORECASTING

## CHALLENGE

The forecasting solution can predict prices for vehicle models based on user request.

## SOLUTION

With the third-party systems integration, the solution collects data from the vehicle market and predicts an increase/ decrease in the price of a vehicle model over a given period of time. To find out the forecast, the user enters the parameters: make, year, mileage, condition of the car.

So the system recognizes a specific car, collects data from integrated services and gives the average price and its dynamics over a certain period of time. This allows vehicle sales companies to set prices in such a way as to ensure optimal sales and the highest possible margins.

\* The image is illustrative. Project details cannot be disclosed due to the conditions of NDA between the Development Team and the Customer.



Reflex Statistics

Overview

Agents

Settings

### Ford GT overview

**Current cost**

Current month

**Dynamics of price ch**

**Production growth**

### TECHNOLOGIES AND TOOLS

Python, Tensorflow, Keras, Pandas, Numpy, Scikit-learn.

# Keen on exploring further?

Let's discuss your requirements and come up
with a tailored solution!

At Timspark, we intend to bring value and competitive
advantage to our clients. Our dedicated teams can help you
achieve your goals and add value to your offerings.

REACH OUT

**Konstantin Kariapin**

VP of Business Development

✉ konstantin.kariapin@timspark.com