



Optimization and AI in Cash Logistics

 Cashpoint Cash Management

Introduction

The cost of servicing Automated Deposit Machines (ADMs) is a significant expense in the budget of any bank. The costs can be reduced if you create an optimal collection schedule, but this is not as simple as it seems.

The cost of collection consists of two parts: a fixed amount for one visit from a cash transit team and a percentage of the amount transported. On the one hand, if the bank serves terminals too often, then it has to overpay for the extra trips. On the other hand, if collection is carried out too rarely, the terminals accumulate too much cash, on which funding is charged.

Read on to learn about how Veeroute optimizes the cash collection of one of the largest banks in Europe. We'll show you how much you can save if you entrust AI with scheduling the cash collection.

Client Profile

A private commercial bank performing all types of operations

Established:

1992

Offices:

60+

Terminals:

2000+

Challenge

At first glance, the challenge of the joint project turned out to be very simple: we had to reduce the cost of cash collection. The bank has about 2,000 terminals across Europe. Each of them needs an optimal service schedule.

In order to analyze the problem and identify the course of action, we studied in detail how the cash collection was planned on the side of our client.

Before the project started, the bank used a system codenamed "traffic light." A sensor was installed in each terminal. It tracked the amount of cash deposited and sent to the bank employee one of three signals:

«Green»:

The amount of cash is far from critical. This terminal does not need service yet.

«Yellow»:

The amount of cash is approaching a critical value. This terminal needs to be serviced in the next 2 weeks. After 14 days, the collection must be carried out without delays, regardless of the accumulated amount.

«Red»:

The amount of cash has reached a critical value. The collection must be carried out urgently, as soon as possible.

Information from all 2000 terminals was collected in a database. Every day, a bank employee updated the data about each of the terminals manually. After that, he manually made a schedule for the cash collection team. The process of updating the data and scheduling could take a significant amount of working time.

A deep systematic review of previous deposits and collection schedules was not carried out. When scheduling, the employee was guided only by current data and his own observations.

What Problems Arise With Manual Planning?

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| <p>1. A large amount of monotonous work increases the risk of occasional lapses.</p> | <p>An employee who has to input 2000 rows of data into a table every day can make a mistake mechanically if he is tired — or even just distracted for a moment.</p> |
| <p>2. Lack of working time reduces the quality of planning in general.</p> | <p>An employee immersed in routine operations simply does not have enough time to analyze the business process as a whole, make strategic decisions, and show creative initiative.</p> |

A cost of a mistake

The servicing of one ADM including the cost of a trip of a cash transit team costs the bank \$39. The bank will lose \$78,000 in a year if it overserves each terminal once.

We have evaluated the current business process and identified two crucial directions of work:

1. Forecasting

To reduce the amount of monotonous work and expand the planning horizon, we decided to create a forecasting module. It would predict what amounts would be deposited into each of the terminals in the next 14 days.

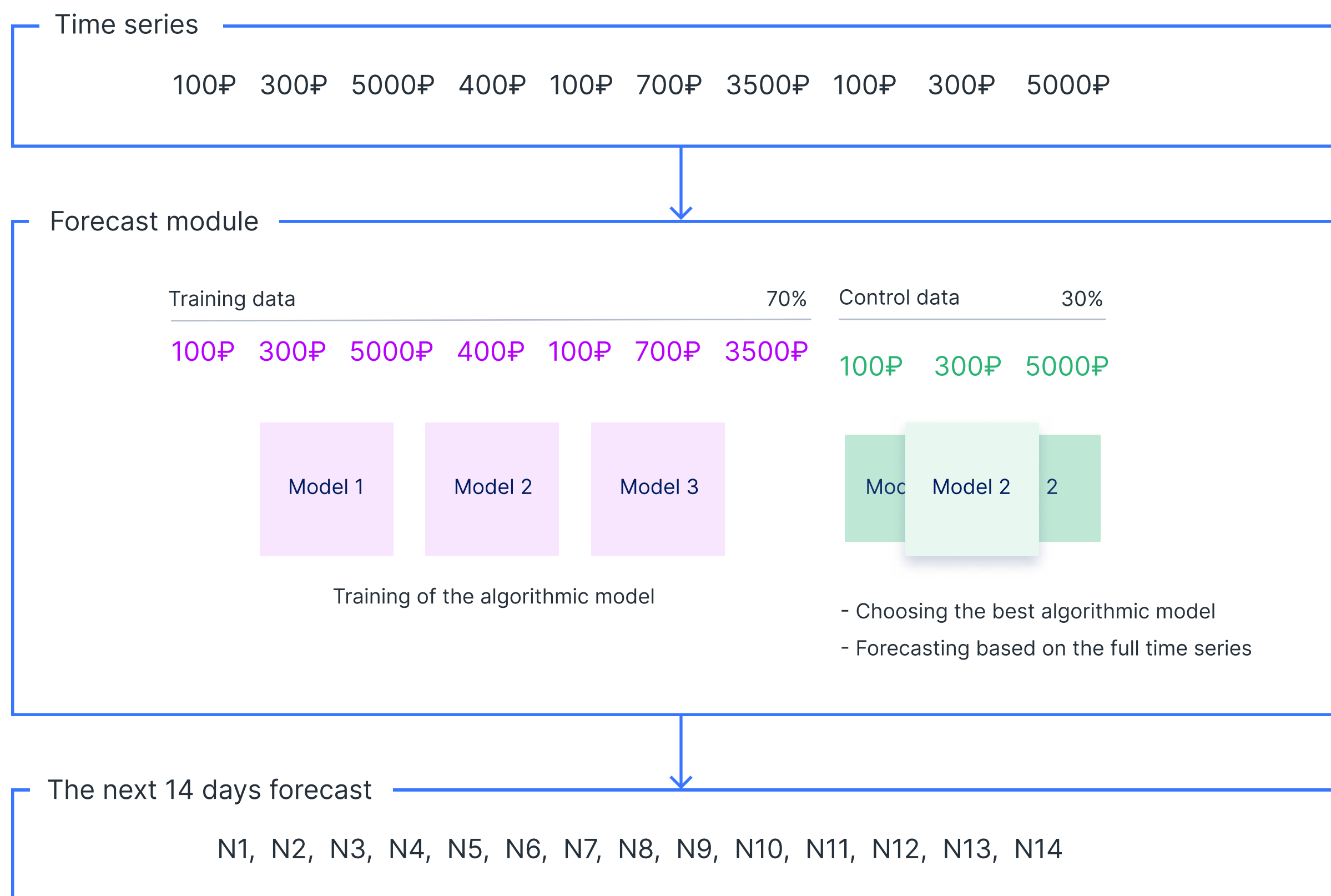
2. Optimization

Based on the forecasts received, the Veeroute optimizer must choose the optimal cash collection date for each terminal.

Solution

1. Forecasting

Veeroute's data science department immediately tackled forecasting. Our specialists asked the bank for historical data on each terminal for 2018 and 2019. Based on this data, a self-learning Forecast module was created.



How it works?

1. The module receives a time series as input. It contains information about how much cash was deposited into the terminal and when it occurred.
2. The time series is divided into two parts: training and control data.
3. Several different algorithmic models are trained on the training data.
4. Control data is used to test the algorithmic models created in the previous step, and the best one is chosen.
5. The best algorithmic model is employed to forecast the next 14 days.

Every time the module is launched, each terminal sends a time series to the input. AI uses each request to self-learn.

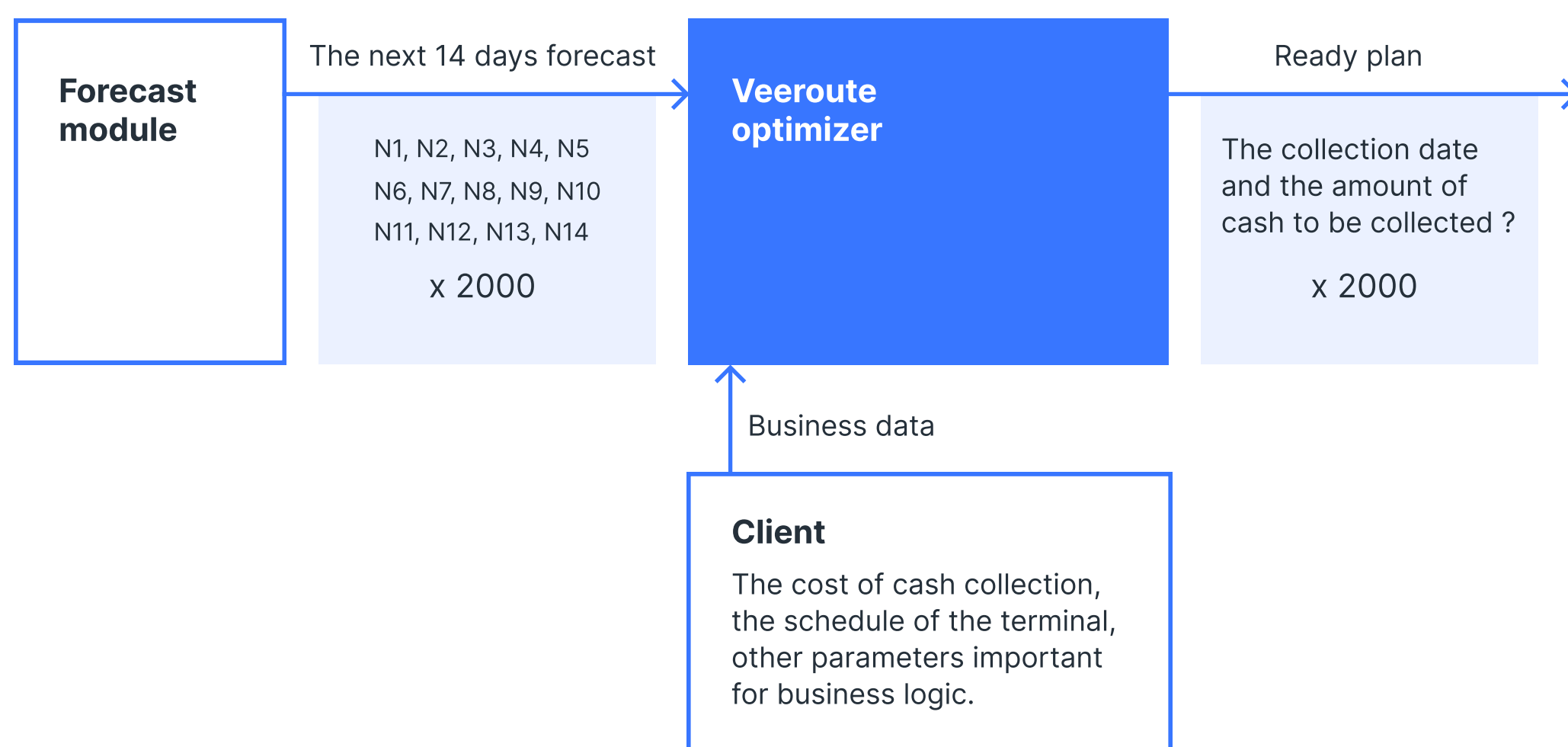
The Forecast module was installed inside the bank's IT infrastructure for safety reasons. The module is accessed through the API.

2. Optimization

After the Forecast module predicts how much cash each terminal will receive in the next 14 days, this information is sent to the Veeroute SaaS-optimizer. The forecast is completely impersonal. It does not contain a key, address, or geo-coordinates — it just includes 14 numbers.

Besides forecasting, the optimizer takes user input data. The bank employee indicates how much cash collection costs, how much money is already in the terminal, on which days service can and cannot be performed, and many other parameters important for business logic.

After receiving all the necessary information, the optimizer predicts and displays the collection date and the amount of cash to be collected.



Results

Testing was done alongside operational work for several months. During this period, a bank employee ran a forecast and received a ready cash collection plan every morning.



The algorithms of Veeroute provide savings by maintaining an optimal balance between the cost of storing the diverted funds and the collection for each individual point. When working manually, it is not possible to predict and calculate this balance quickly and accurately. We have seen extensive actual savings while testing. This is highly relevant to the present situation in which the refinancing rate has risen significantly. Moreover, I would like to note that the Veeroute solution reduces the cost of ADM cash collection; furthermore, it allows the release and optimal redistribution of human resources that are currently in short supply in the labor market.

— **Director of the Digital Business Directorate of the bank**