

SalesAI

E-COMMERCE

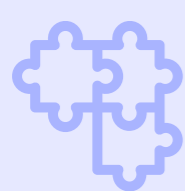
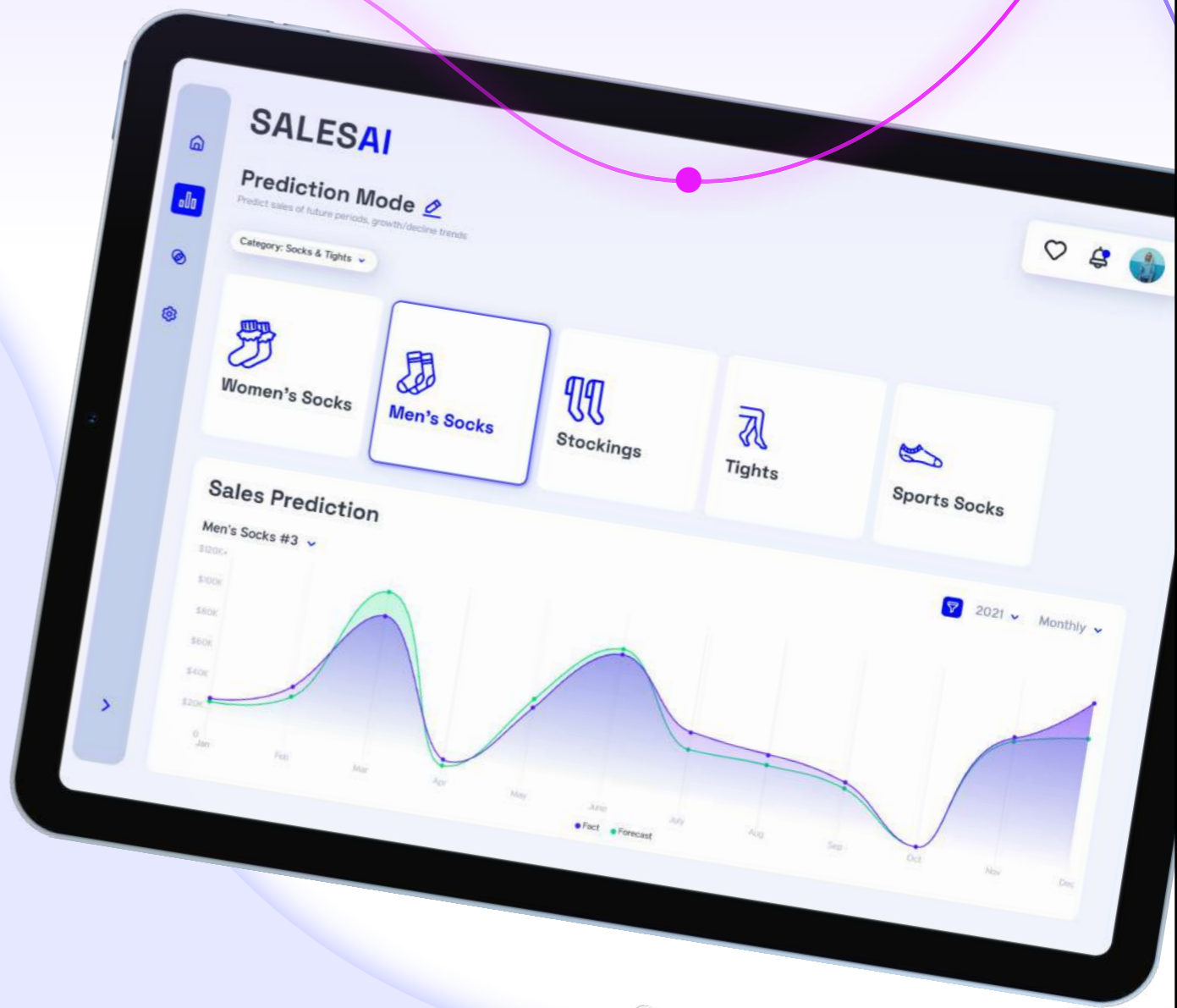
The module that is based on machine learning algorithms predicts sales of future periods, growth/decline trends for certain groups of goods.

#Recurrent neural networks

#ARIMA

#ARCH

#Time Series Model



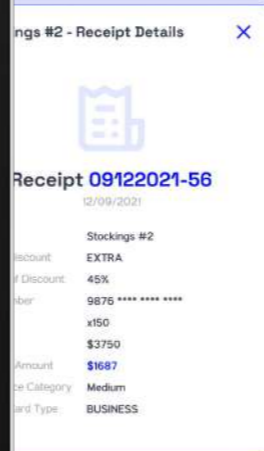
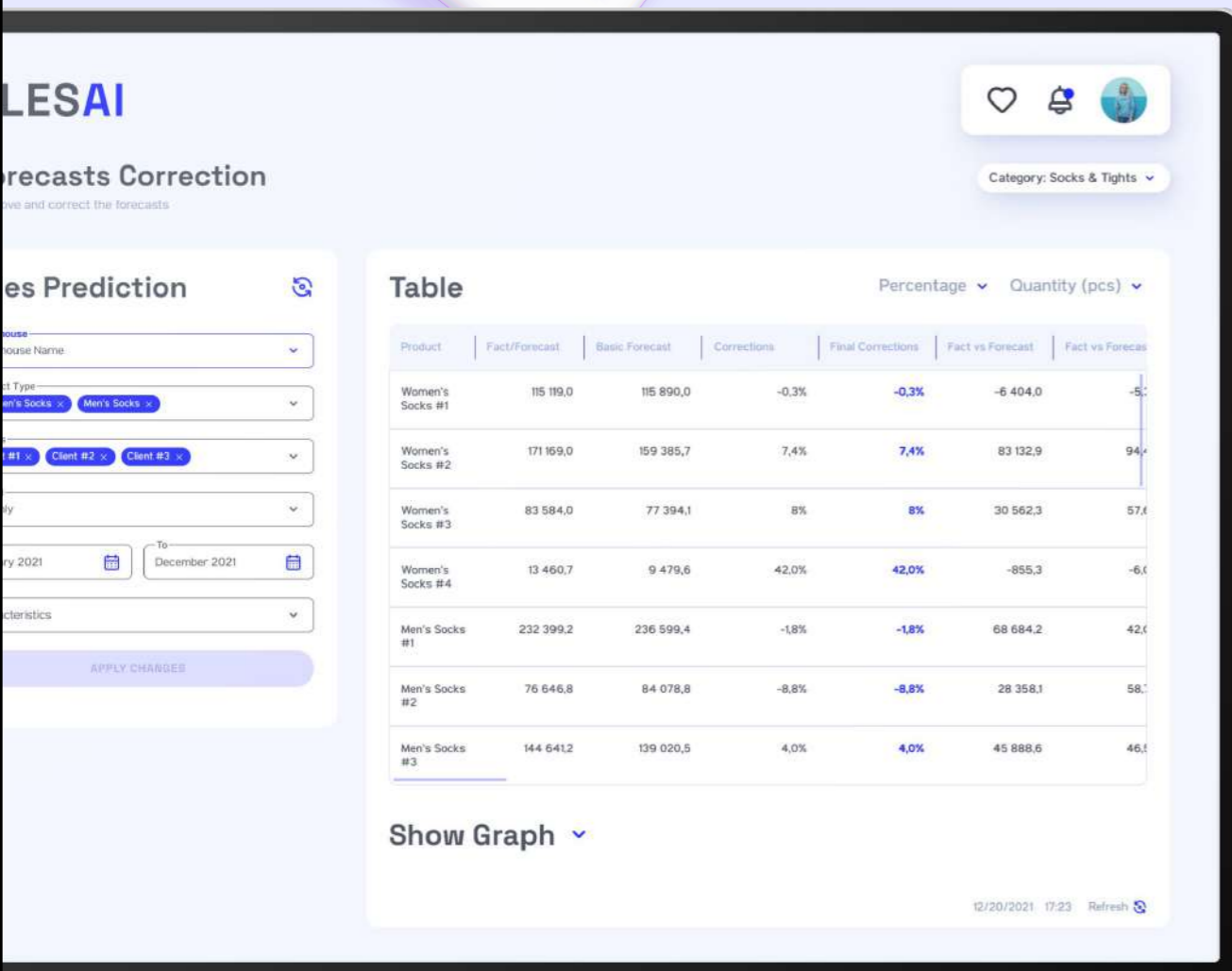
Business Case

The store assortment has a certain value for categories and subcategories of goods. It was required to make a prediction of sales for each subcategory over a period of 3 months.



Initial Information

- ▣ Daily sales for the certain period (date, product, product group, product balance at the end of the day, number of sales)
- ▣ Content of Receipts (daily for the period): receipt, date, product, type of discount, percent of discount, card number, quantity, amount, discount amount, retail price category, type of loyalty card
- ▣ Description of goods and product categories product, product name, brand product group, subcategory, supplier



TECHNICAL IMPLEMENTATION

Solution & Functionality

The dataset with the time series of sales by product subcategories was prepared based on the initial dataset. Various approaches to forecasting time series have been tested for modeling purposes: ARIMA, ARCH, recurrent neural networks, etc.

At each step, the symmetric mean absolute percentage error (SMAPE) based on model predictions and actual sales over the last 3 months was calculated. As a result, the decision to use an additive regression model was made.

Seasonality of demand for goods was identified for each subgroup:

- ▣ Annual
- ▣ Monthly
- ▣ Weekly

In addition to that:

- ▣ The trend per each product group was determined
- ▣ Weekly sales forecasts for a three-month range were made
- ▣ Prediction accuracy for 75% of sales comprised over 85% (SMAPE)



AI analysis system for checking compliance with safety regulations

SAFETY AND HEALTH

The system determines different types of protective equipment and if they are used correctly.

#Python

#TensorFlow

#JavaScript

#HTML5



Business Case

For production facilities, there is a need to control the proper use of protective equipment to minimize accident occurrences. Cameras record the working process. Videos from them are viewed by the neural network in real-time mode to observe the compliance of wearing personal protective equipment. If a violation is detected an operator/shift supervisor is immediately informed to address the issue promptly.







TECHNICAL IMPLEMENTATION

Solution & Functionality

The system is aimed at recognizing protective equipment - headgear (helmet) and protective clothing (gloves, boots) as well as the correctness of use (working clothes are fully buttoned, sleeves are not rolled up, etc.)

Cameras monitor personnel during work and flag violations.

The system is a client-server solution consisting of:

-  A media server processing video from cameras;
-  A neural network based on MobileNetv3 architecture, trained on 250,000 videos, is used to detect violations in images;
-  Notification modules;
-  Report generation.



AI security with biometric facial recognition

SECURITY

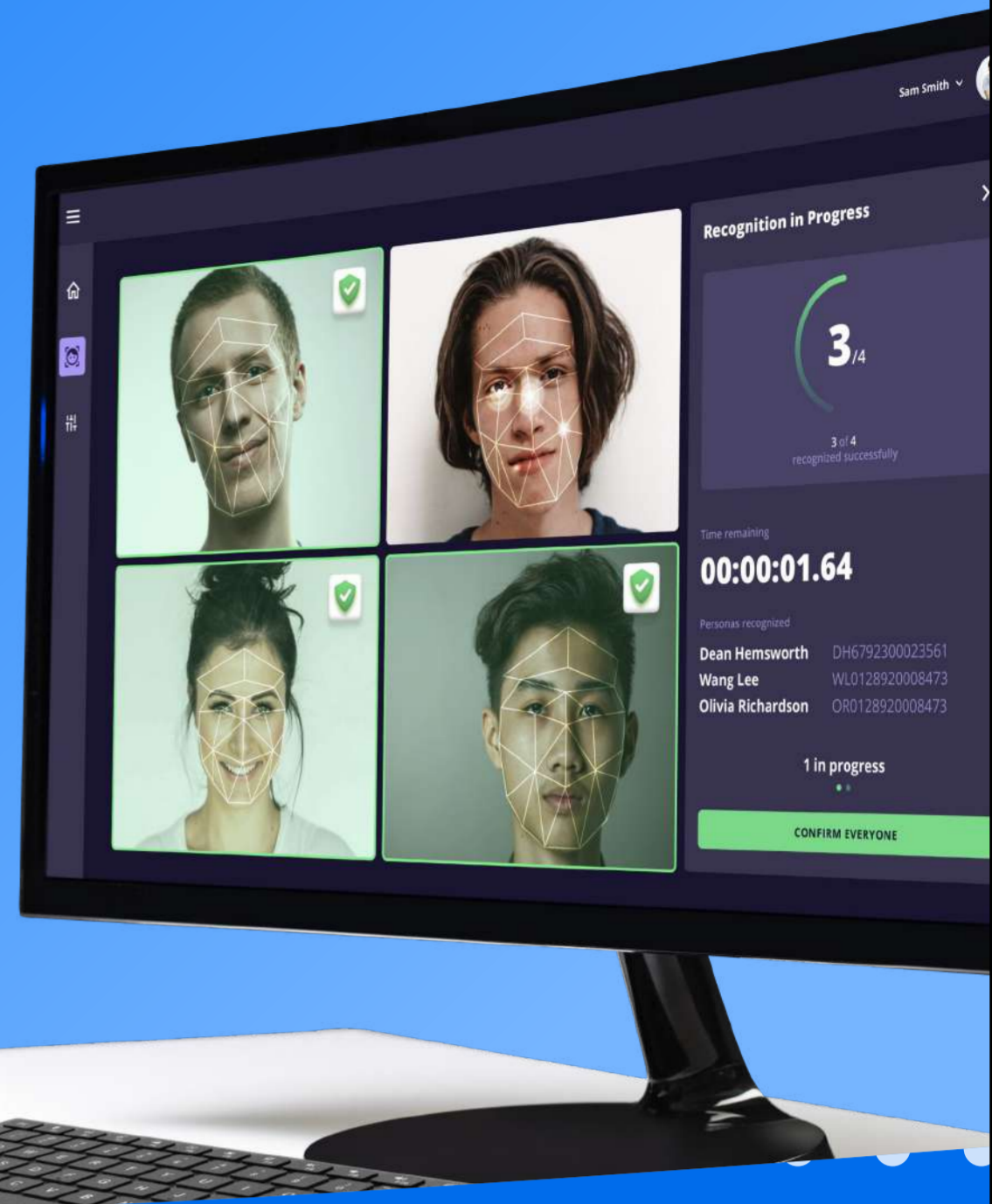
Face recognition system that uses biometry to match facial features on photo or video within several seconds. With the purpose of identification or authentication, the recognition technology compares obtained data with the existing database to find the match.

#Python

#TensorFlow

#JavaScript

#HTML5



Business Case

For security reasons access to the building and separate rooms is granted only to certain people. Biometry-based recognition allows organizing a system of quick access that does not require additional actions from visitors. The system also enables visitors' location control.

TECHNICAL IMPLEMENTATION

Solution & Functionality

The biometric system is a client-server application and works in four steps:

-  Photography
-  Saving
-  Matching
-  Acceptance

When uploading a photo (video), general information about a person (name, surname, passport data) is entered into the database. Then the face is analyzed and a unique identifier is generated. To generate the identifier the MobileNetv3 architecture based neural network trained on 200,000 photos is used. During each verification, the generated identifier is compared with the stored identifier. Then the system either confirms or denies the access right.

AI For Merchandising

E-COMMERCE

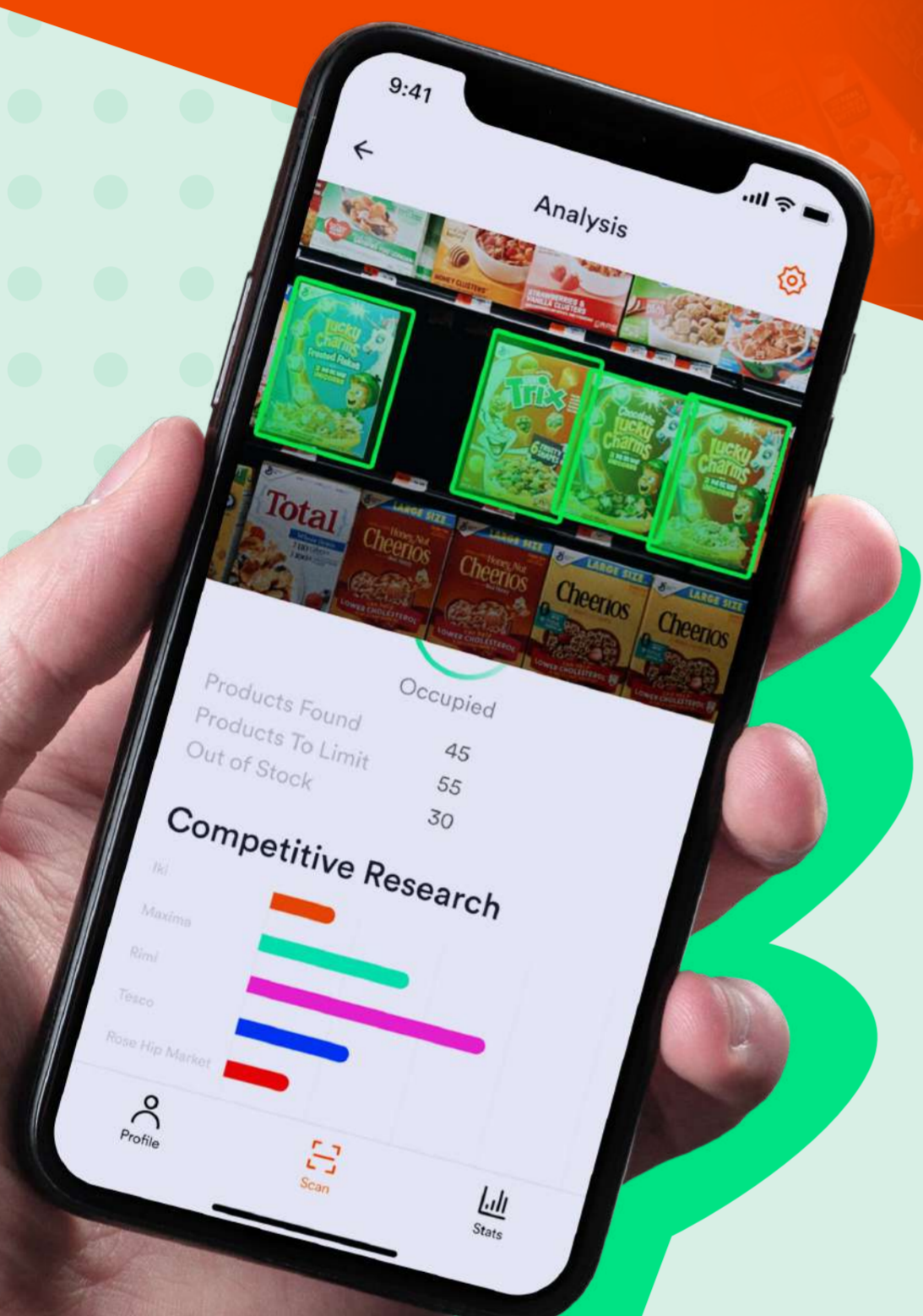
Layout control automation. Merchandisers take pictures of shelves with products. The system recognizes photos, compares to a reference and automatically forms the list of goods available on stock, checks assortment correctness and proportion of occupied shelves compared to competitors.

#Python

#TensorFlow

#JavaScript

#HTML5



Business Case

The goal of the project was to reduce human participation while improving the quality of work performed in retail outlets.

Monitoring of goods layout on the shelves allows evaluating assortment correctness depending on the object type and proportion of occupied shelves compared to competitors. Further, it can be leveraged for order automation within integration with a warehouse.

TECHNICAL IMPLEMENTATION

Solution & Functionality

- 🛒 Recognition of goods on photos with the help of CNN neural networks.
- 🛒 CNN - is a deep learning algorithm able to take an incoming image, assign values (learning weights and biases) to various image aspects and objects as well as identify one from another.
- 🛒 Image recognition models are complemented by a predictive analytics module.

Recognition accuracy	97%
Recognition speed	~2 minutes
Number of learning images	~300000 (300 per product)



VirtuExpo

E-COMMERCE

Web application for virtual product presentation. Allows potential buyers to familiarize themselves with product appearance and consumer properties using virtual reality.

#JavaScript

#HTML5

#Unity3D

#IBM

#Watson



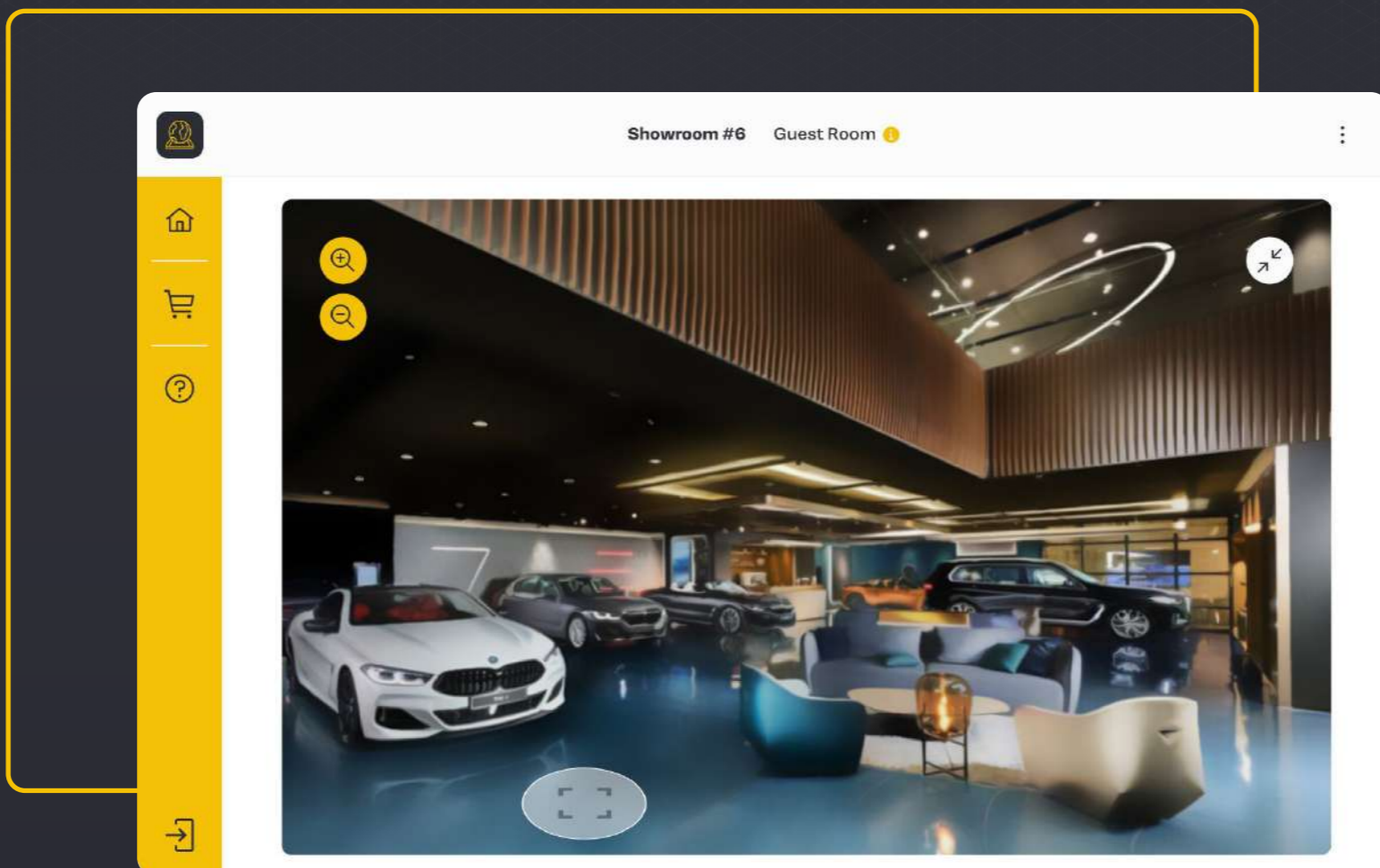
Business Case

Quarantine measures and restrictions on the movement of people during the COVID pandemic resulted in a significant drop in sales for shop owners selling general goods. Buying something significant potential customers still wanted to thoroughly study product characteristics and appearance, consult a shop assistant which was impossible without visiting the store.



Showroom

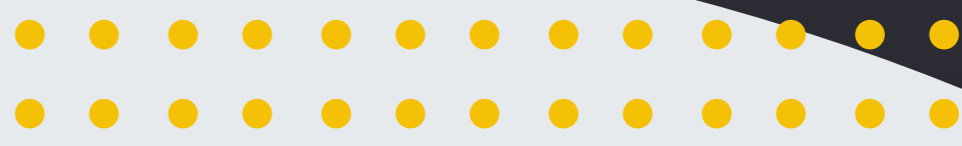
A virtual showroom for products was created as a solution to address the need enabling customers to walk between the stands with goods, study their design in detail, get comprehensive information about the characteristics of the goods, and consultant a virtual assistant on demand.



TECHNICAL IMPLEMENTATION

Solution & Functionality

- The application is a client-server solution where the client part provides a 3D showroom space implemented using the Unity3d technology. The choice of technology was determined by the business requirement to provide ultimate photorealism and maximal consumer immersion in VR.
- First-person navigation and on-demand presentation of additional stand elements with product details were implemented in VR space.
- A virtual assistant (chatbot) was built into the showroom along with a shopping cart enabling adding items without leaving the showroom. The IBM Watson service was utilized as an assistant implementation technology to create chatbots equivalent to Siri and Google Assistant having specific knowledge about the product though.
- The backend was used as a repository of 3D models and all the content required for the operation of the virtual showroom.
- The web application was integrated into the online merchandise trading platform and launched when viewing the product card.



2D in 3D Converter

REAL ESTATE

Embedded web widget that automatically creates a 3D model of a room based on its 2D plan. Enables users to transform the obtained 3D plan in terms of colors/textures and allows them to navigate through the final virtual space.

#Real Estate

#Rental

#Web

#Conversion

#Responsive

#Mobile

#3D



Business Case

A study of conversions on real estate sales/lending platforms-aggregators demonstrated that having an object 3D plan in the announcement increases the chance of closing a deal.

The majority of sellers and landlords in the secondary housing market don't have 3D plans and have to either buy them from designers, which considerably increases the cost of ads placement or miss the opportunity of making their announcements more attractive.



2D to 3D

The widget recognizes a plan issued by the real estate registration bureau or a plan on the facility certificate and recreates the 3D object scene considering scale. All the elements on the plan are taken into consideration: doors, windows, ventilation shafts, etc.

TECHNICAL IMPLEMENTATION

Solution & Functionality

The widget is a client-server application.

The Server Side

- * Room plan is recognized and transformed into an object structure applying neural network based on MobileNetv3 architecture taught on 200K of marked up plans of houses and apartments.
- * If needed the plan image quality can be improved utilizing OpenCV library algorithms.

The Client Side

- * Presents a 3D image of floor/walls considering doorways, windows, and other elements of the plan. 3D space is realized based on the ThreeJS framework that provides a great speed to reality ratio requiring no installation of additional browser components.
- * Transforms wall and floor colors/textures alternating object 3D models in real-time mode. Scene objects are not pre-baked.
- * Provides first-person navigation using ThreeJS integrated functionality.

The widget automatically supports CSS styles of the site it is embedded in if realized applying recognized HTML standards.

Textile Visualizer

E-COMMERCE

Embedded widget for online stores enabling the dynamic demonstration of textiles with a quality close to photorealistic. Allows visualizing how potential textile might look in motion with different lighting.

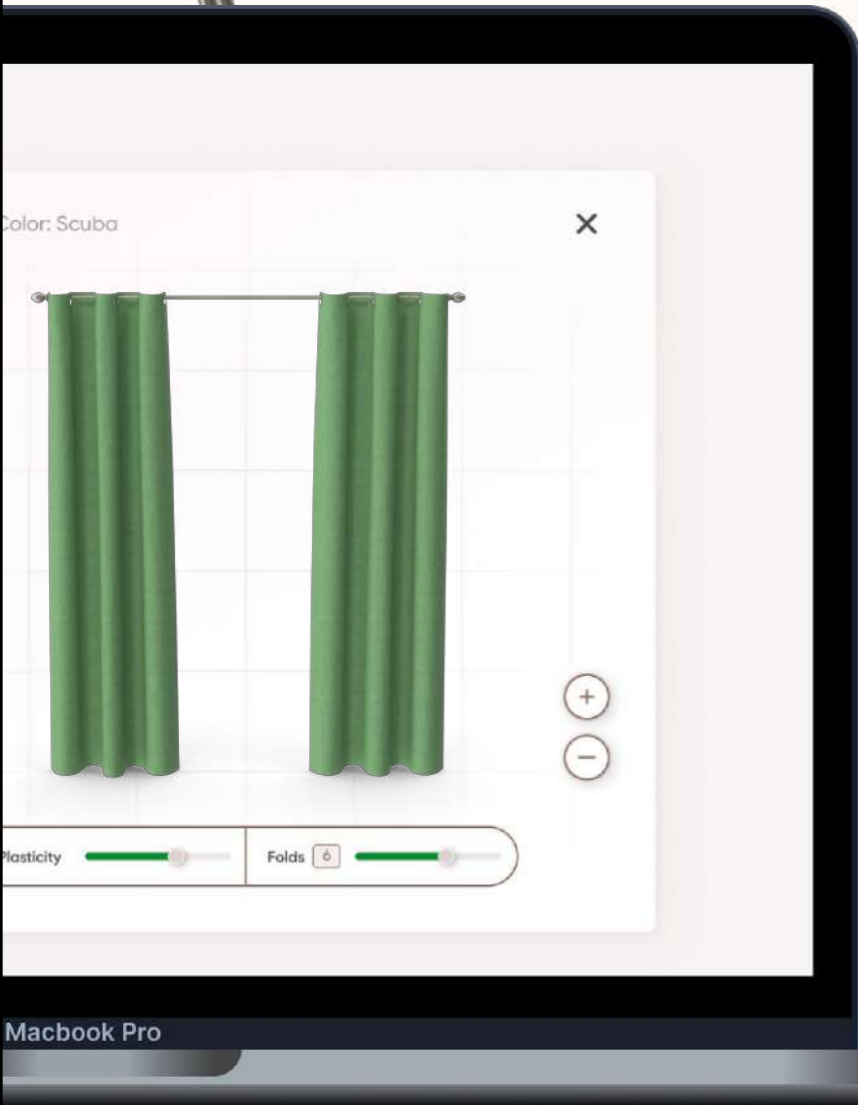
- #E-commerce
- #Web
- #Visualization
- #Widget
- #Textile



Sample Widget

Product presentation matters a lot when selling textiles and accompanying goods. Fabric on a plain surface looks differently than pleated and flowy. Online sales of textiles make the choice even more challenging when a buyer has no opportunity to see and sense product samples live.

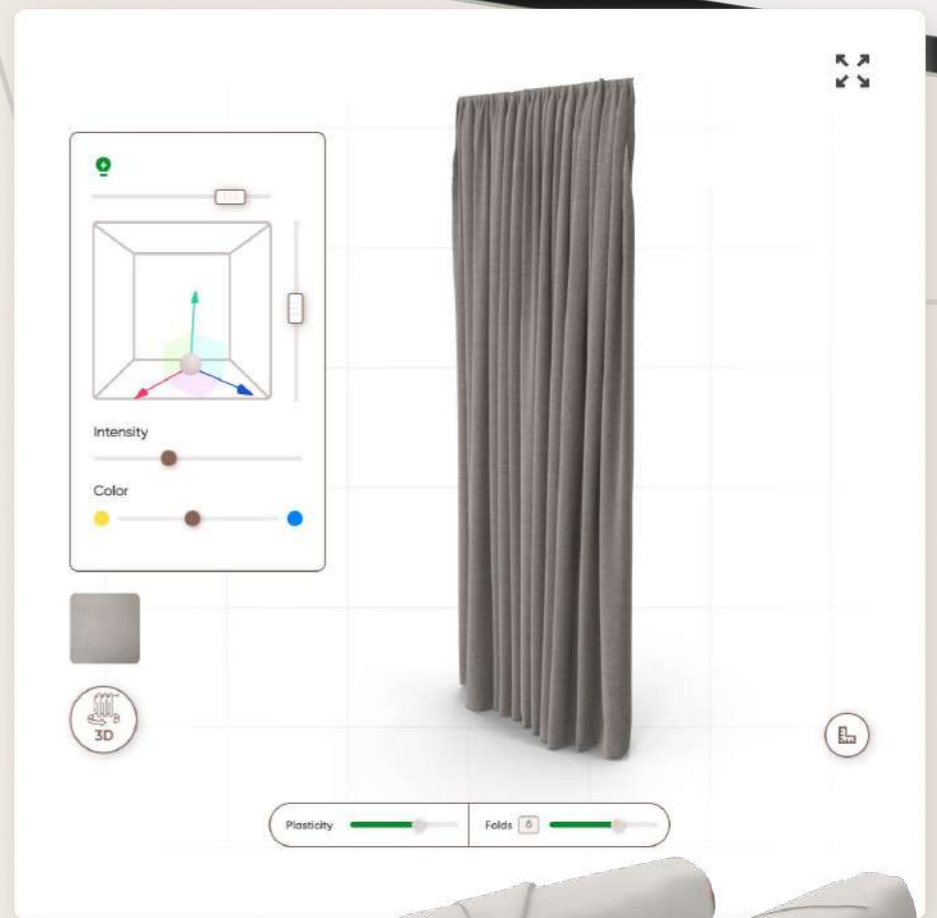
A widget presenting fabric in motion was developed to enable the online presentation of textiles. A user can change lighting parameters, the number of pleats and motion range to dynamically visualize textiles. The widget allows demonstrating textiles with exquisite texture at photorealistic scale. To realize this the system of tile (unique textile elements) positioning on curtain surface was designed.



TECHNICAL IMPLEMENTATION

Solution & Functionality

- ▣ The widget functionality is based on an adjustable 3D scene realized based on the ThreeJS framework. The choice of the framework was determined by the business's need for high working speed without installing additional components and plugins.
- ▣ A curtain 3D model, being a set of points each of which is an atomic physical entity having its parameters and space orientation, is the central object of the scene.
- ▣ At the same time, the color of each entity is set based on the textile texture pattern and color considering rapport that allows users to percept curtains as a single object.
- ▣ Realization of the widget assumes automatic site style application to the widget directly employing standard CSS.
- ▣ The widget is absolutely self-contained: it gets only texture from the site while all the controls of lighting, scale, etc. are realized utilizing UI provided by the widget.



SmartAd

E-COMMERCE

A machine learning algorithms based module that predicts customer behavior when they receive advertising content (SMS / Viber / Telegram). The task of the module is to generate a list of buyers interested in a particular mailout in order to reduce the number of "unnecessary" messages and increase conversion.

#Healthcare

#CatBoost

#Python

#IOS

#Android



Be always on with your consumers



Business Case

Using machine learning and customer data the objective was to create a product that would:

- save money and assist in budget management;
- assist in making a marketing strategy;
- increase conversion;
- allow avoiding unnecessary interruptions of a customer.



SmartAd



Maximum optimization of mailings

Utilizing the available customer data (purchase history and behavior during sales) the objective was to ultimately optimize sending promotional offers.

Having identified favorable moments for sending messages, the module helps to save on delivery of "unnecessary" messages + increase customer loyalty.



TECHNICAL IMPLEMENTATION

Solution & Functionality

The module is a cloud solution using the CatBoost library. Neural network training is based on the user database.

The following parameters were used to create the algorithm:

- Purchase frequency, seasonality (annual, monthly, weekly, daily), date of last purchase;
- Average purchase volume, favorite products;
- Activities in promotions: in which participated, the discount amount, ignored promotions;
- Loyalty card based buyer's profile: gender, age, personal data;
- Synthetic data (Generation of datasets based on existing business processes. Applying various distortion methods to existing data).

The module revealed certain data patterns based on which further decisions were made. Behavior prediction accuracy comprised 80-82%.

