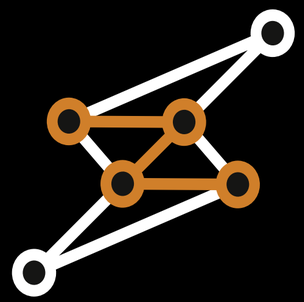
LLC “Real-V”



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AI& IT solution

Applied cases of using AI technologies

MAIN DESCRIPTION

MACHINE LEARNING

(англ. machine learning, ML) — is the study of computer algorithms that can improve automatically through experience and by the use of data.It is seen as a part of artificial intelligence. Machine learning algorithms build a model based on sample data, known as "training data", in order to make predictions or decisions without being explicitly programmed to do so

DEEP LEARNING

Deep learning (also known as deep structured learning) is part of a broader family of machine learning methods based on artificial neural networks with representation learning. Learning can be supervised, semi-supervised or unsupervised.

For the construction of such methods, the means of mathematical statistics, numerical methods, optimization methods, probability theory, graph theory, various techniques for working with data in digital form are used.

Основные решаемые задачи

THE MAIN TASKS TO BE SOLVED ON THE BASIS OF ML/DL

1) **regression** (predicting numerical values of features, for example, predicting future sales volumes based on known sales data in the past);

2) **classification** (predicting which of the known classes an object belongs to, for example, predicting whether a borrower will repay a loan, based on data on how borrowers have repaid loans in the past);

3) **clustering** (dividing a large set of objects into clusters - classes within which objects are similar to each other, for example, market segmentation, dividing all consumers into classes so that consumers are similar to each other within classes, and differ in different classes);

4) **anomaly detection** (search for rare and unusual objects that differ significantly from the main mass, for example, search for fraudulent transactions);

5) **stylization** (changes in the visual parameters of objects in accordance with any specified parameters of the imitated entity. For example: Prisma application-stylization of the input image in a given style)

6) **generation** (generation of a new object/component based on the properties of objects/components from a given training sample. For example: text generation, voice generation, picture generation, etc.)

Центр AI & IT решений

WORK WITH THE DATA. SOME OF THE PROVIDED SERVLYSISICES

Data analysis
Technologies designed for searching non-obvious, objective and useful patterns in large amount of data

Data extraction from the web-resources
Development and customization of parsing systems, processing information from various websites

Knowlege extraction from the data
Using of advanced mathematical tools in solving complex business problems in commercial projects in order to extract practically useful information from data

Data collection
Extraction of a large amount of unrelated data from various sources based on the task, data processing (cleaning, conversion to a standard type) and subsequent aggregation

Integration
- Assistance in integration the developed solutions in the customer's information systems
- Automation of marketing functions and deep customer analytics

Центр AI & IT решений

DIRECTIONS:

- Machine learning / Deep learning

- Software development

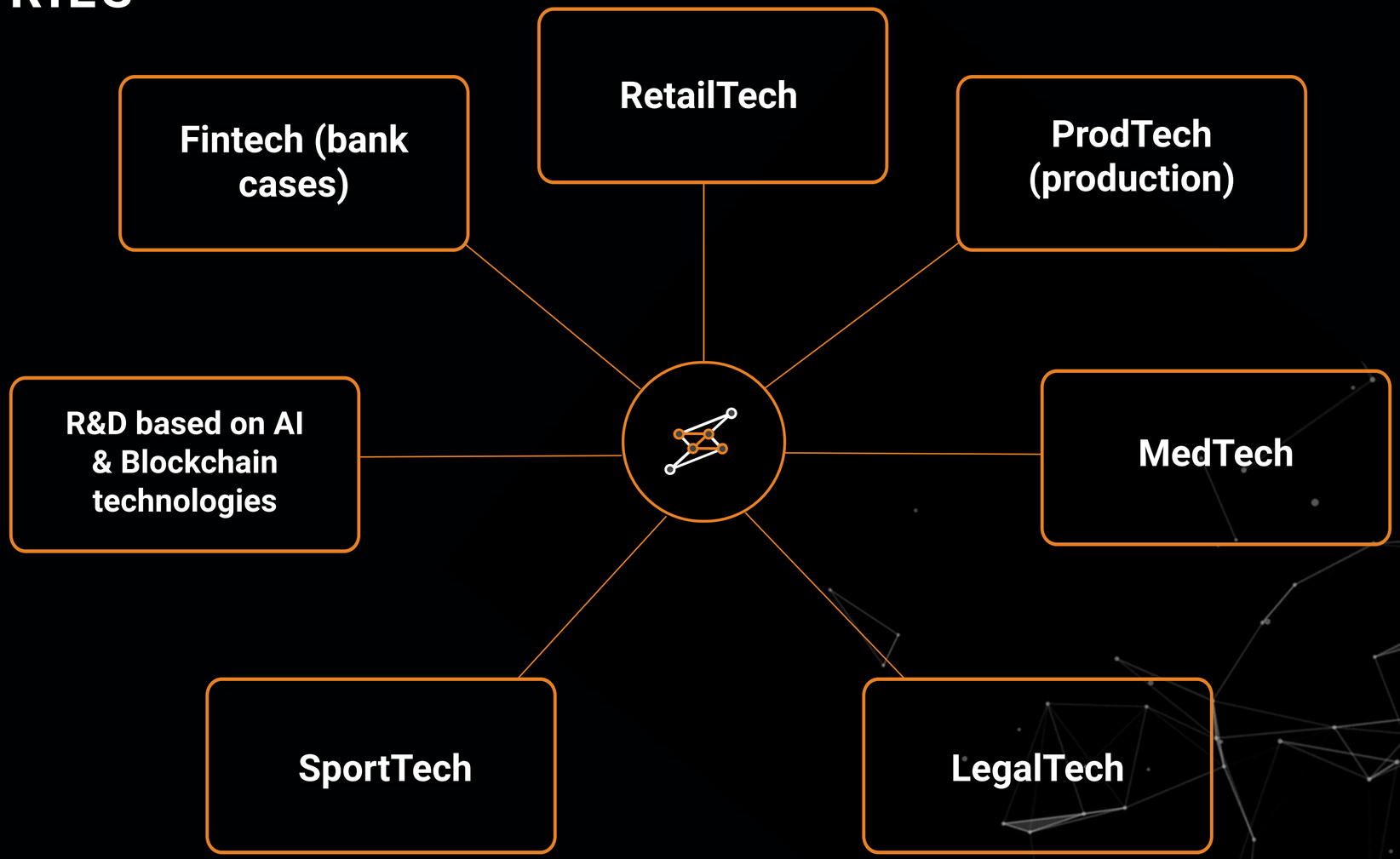
- Blockchain

- Reinforcement Learning

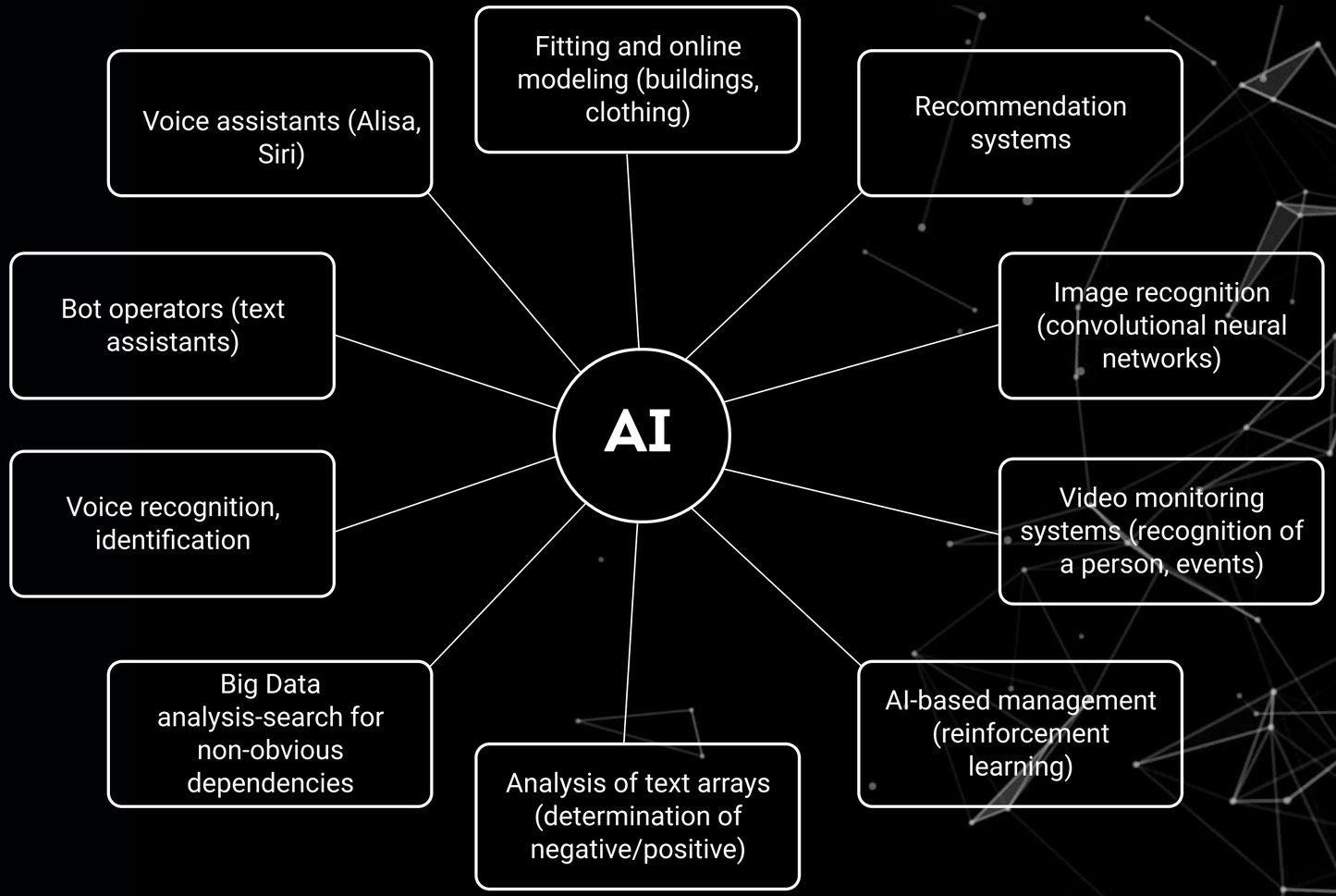
- Custom-made Research and Advanced Development

Центр AI & IT решений

INDUSTRIES

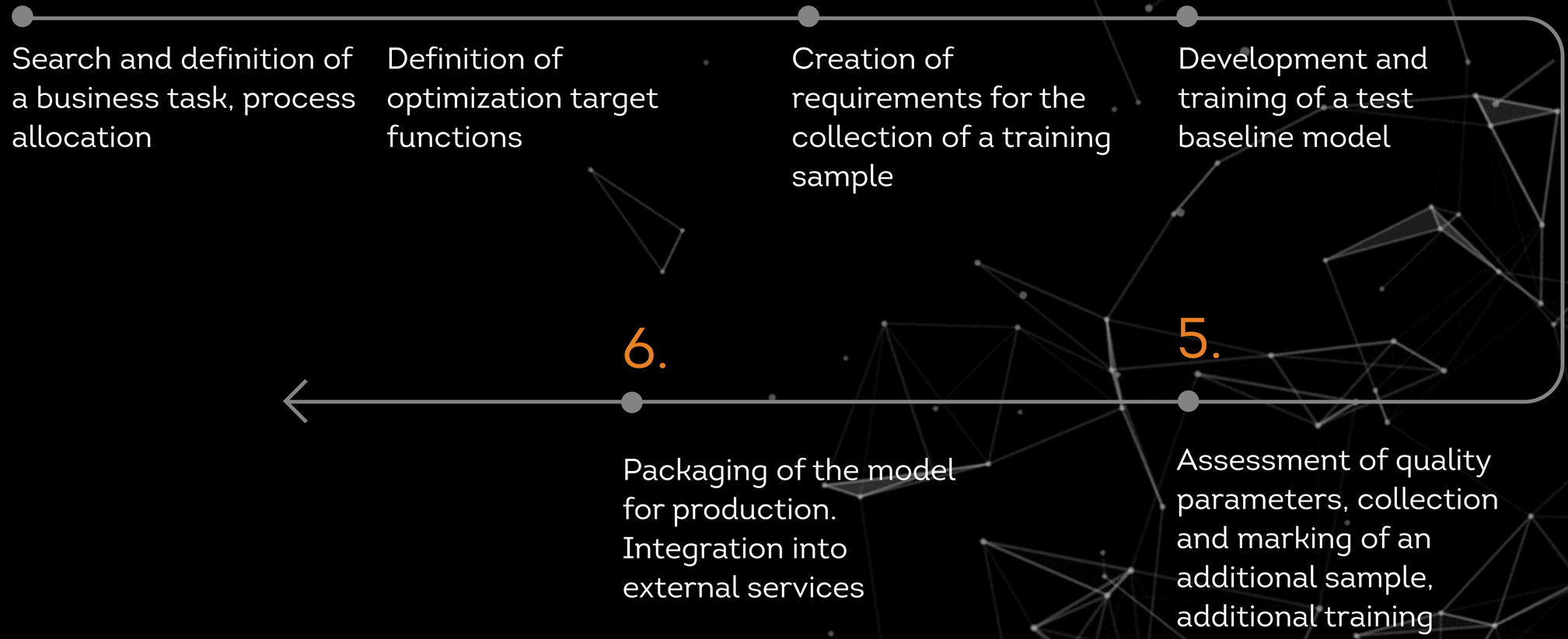


THE MAIN TRENDS



Основные этапы производства алгоритмов

THE MAIN STAGES OF THE ALGORITHMS BASED ON ML/DL'S PRODUCTION



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RetailTech

Our case (online fitting):

ONLINE FITTING

TECHONOLY STUDY DOMAIN:

Computer vision

TECHONOLY:

Semantic Segmentation, CycleGAN, pix2pix; Component: Object Classification

TECH STACK:

TensorFlow, PyTorch, Cuda

MAIN MISSION:

Online fitting the covers on the sofas. To include the solution, which will allow users to load photo of sofa and to try on the cover from the shop, on the website of the company

SOLUTION

- Development of a neuronet for determination of a sofa on the photo
- Development of an algorithm of imposing of textures taking into account depths and shadows of the image
- Transfer and adaptation of the solution on servers
- Including the solution on the webpage

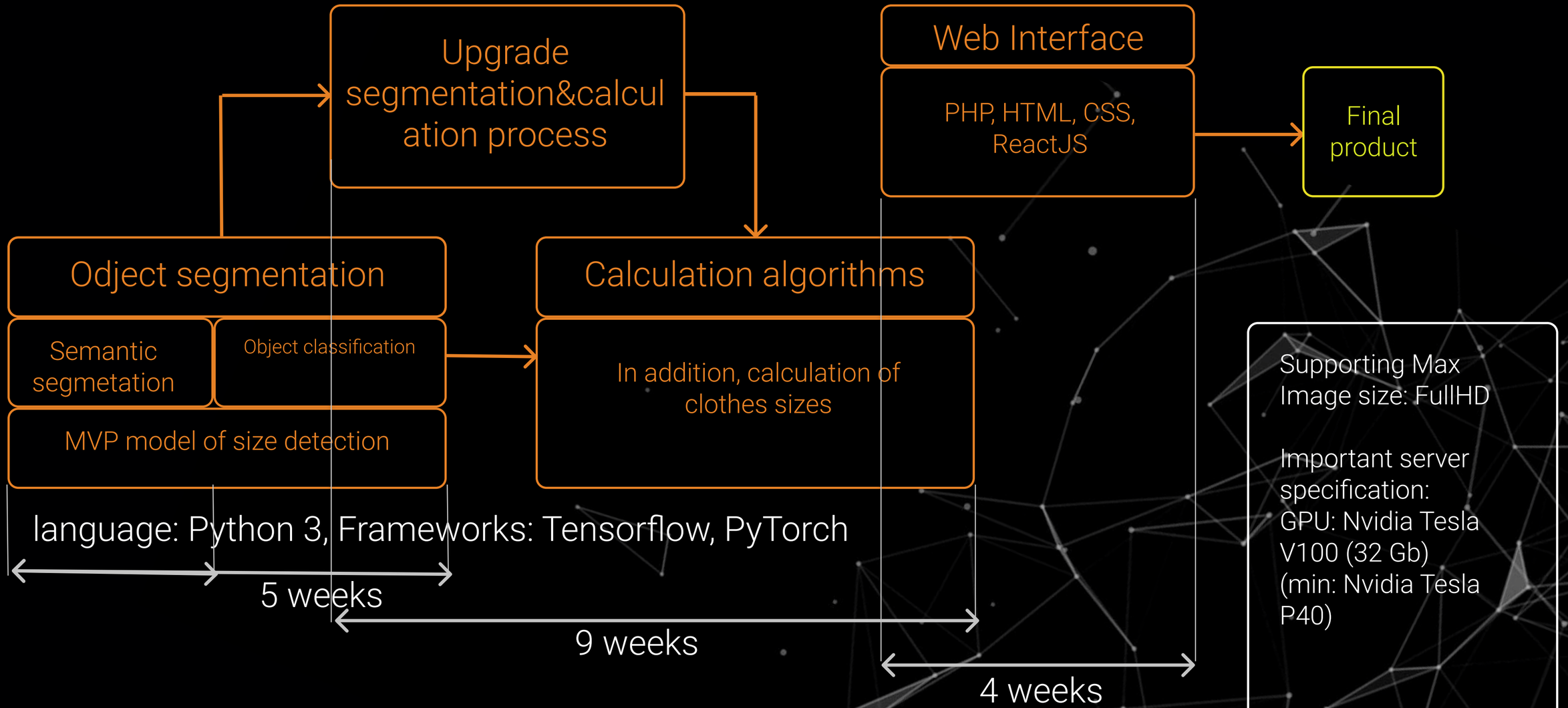
THE RESULT:

- Development of a neuronet for determination of a sofa on the photo
- Development of an algorithm of imposing of textures taking into account depths and shadows of the image
- Transfer and adaptation of the solution on servers
- Including the solution on the webpage

EXAMPLE

The technology card of the development

The technology card of the development

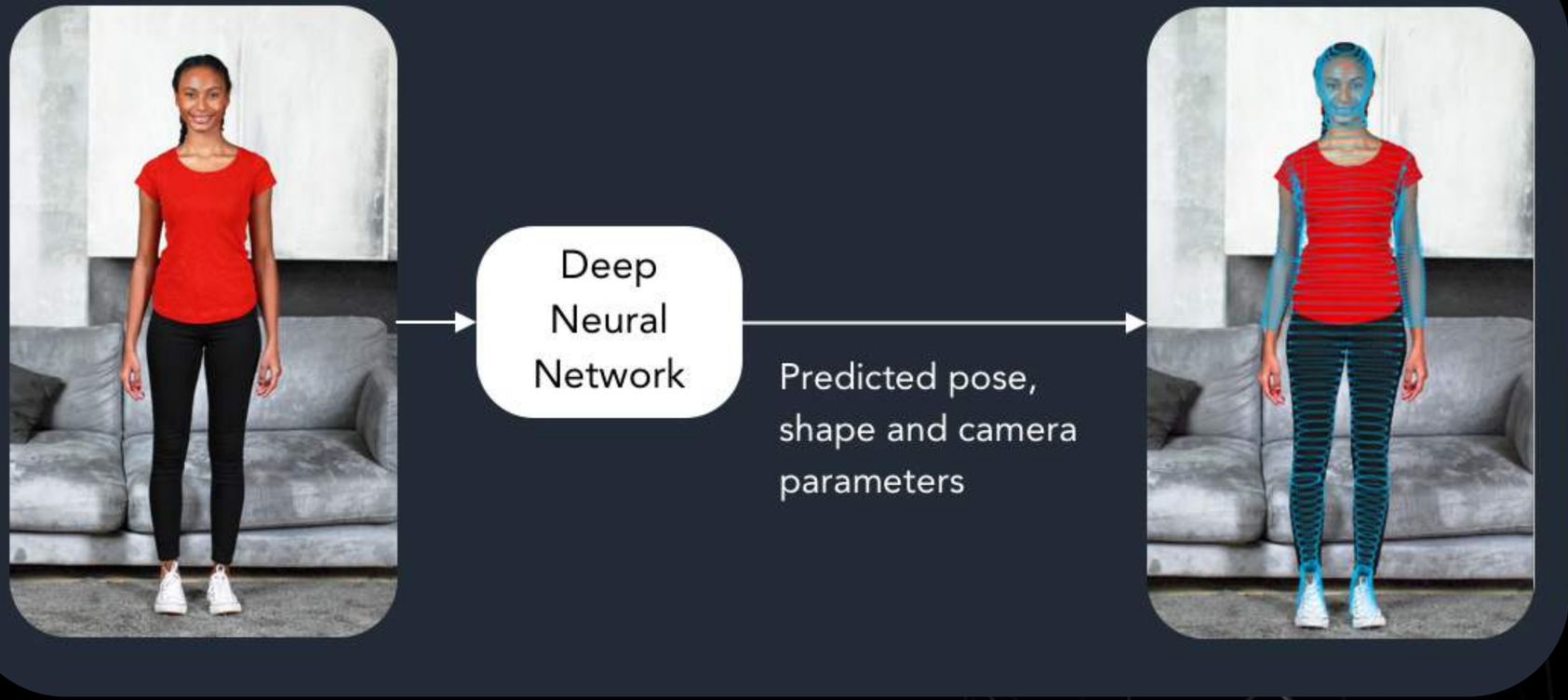


Supporting Max Image size: FullHD

Important server specification:
GPU: Nvidia Tesla V100 (32 Gb)
(min: Nvidia Tesla P40)

Technology

The solutions concept



The solutions concept (concept result)

The task of transferring the artist's style (some results)

Enter customer's data

Unique name: Roman V

Height: 180 cm in

Gender: Female Male

Measurements (cm)

Linear Volumetric

Neck to upper hip length:	54.8	Back neck point to waist:	45.9
Outside leg length:	112.5	Side neck to bust point:	25.2
Inside leg length:	72.0	Side bust point to waist level:	16.4
Straight body rise:	31.1	Side waist level to ankles:	105.0
Outer arm length:	61.0	Side neck point to knee:	106.5
Back neck point to wrist length:	82.3	Side neck point to waist level:	45.9
Upper hip breadth:	32.3	Back neck height:	152.9
Back shoulder width:	42.5	Bust height:	130.0
Chest width:	34.9	Hip height:	91.6

Центр AI & IT решений

EMOTION RECOGNITION

TECHNOLOGIES THAT ARE USED

Neuralnetwork technologies

TASK:

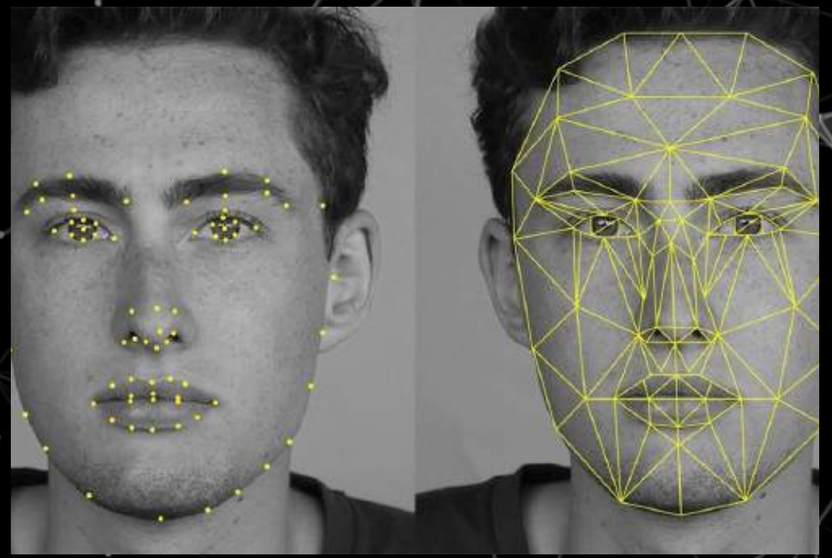
Automated collection of feedback from people regarding an event/product

SOLUTION:

A set of neural network algorithms trained to recognize target emotions in real time based on a video sequence (age, emotions, gender)

RESULT

Automatic processing of the video sequence from the cameras, building an emotional map of the event,



EXAMPLE

Центр AI & IT решений

SYSTEM OF AN AUTOMATIC ACCESS AND VIDEOALALYSIS

TECHNOLOGIES THAT ARE USED

Biometric scanner based on the face and voice identification

TASK

Systematization of the collection and analysis of the emotional loyalty of the customer. To realize a qualitative research of customers (surveys, interviews).

RESULT

Determines the gender identity of the respondent with high accuracy, which allows us to build hypotheses about the correlation of gender and product features
Allows you to make a comparative analysis of products and determine the taste of which product customers often enjoyed

SOLUTION

1. The administrator sets parameters for calculations: data to collect, period of data collection, the task for calculation

2. AI collects data using cameras

3. Sorting and recording data to the database. Calculations based on the received data

4. The system uploads the report into the administration’s pannel

TECHNICAL STACK:

TensorFlow, PyTorch, Cuda

EXAMPLE

Центр AI & IT решений

SMART TASTING - EMOTION RECOGNITION SYSTEMS ONLINE AND ON THE RECORD

TECHNOLOGIES THAT ARE USED

A neural network ensemble consisting of a set of models for classifying the input set of images and audio signals into three main groups

---

TASK

Based on the business task, determine the emotions of the customer at each stage of work to increase the KPI at various stages of the funnel

RESULT

1. Food tasting
2. HR brand development and team level improvement
3. Use in education and development

SOLUTION

1. Collecting and analyzing information about the product under study
2. Defining business goals and business tasks for setting up metrics
3. Design and development of an interactive constuction used for the installation of the system
4. Implementation and configuration of a data collection system: a face recognition system, a system for determining gender, age and emotions

EXAMPLE

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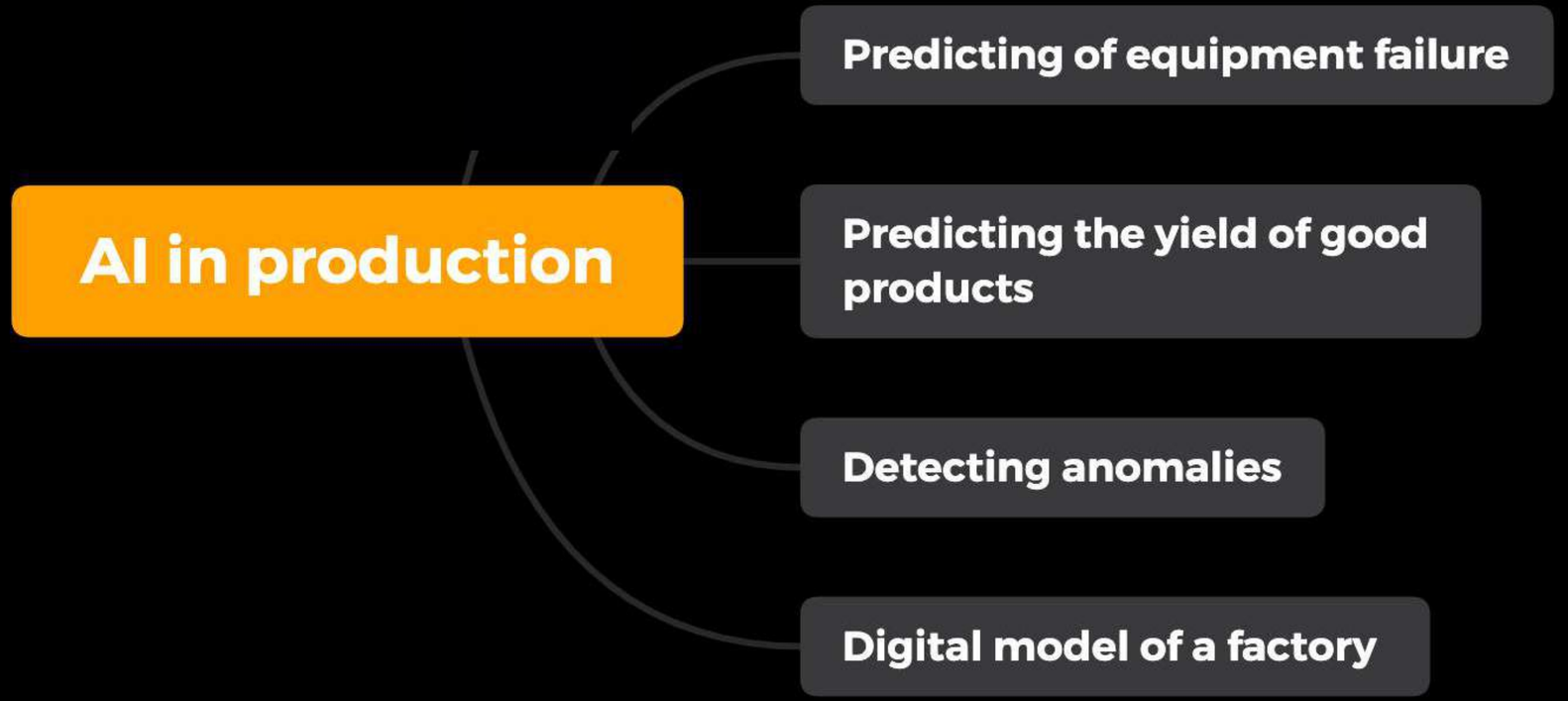
ProdTech (production)

THE MAIN PRODUCTION TASKS SOLVED BY AI



CASE PREDICTING OF EQUIPMENT FAILURE MODEL

TECHNOLOGIES THAT ARE USED

Time series analysis, XGBoost, CatBoost, neural networks

TASK:

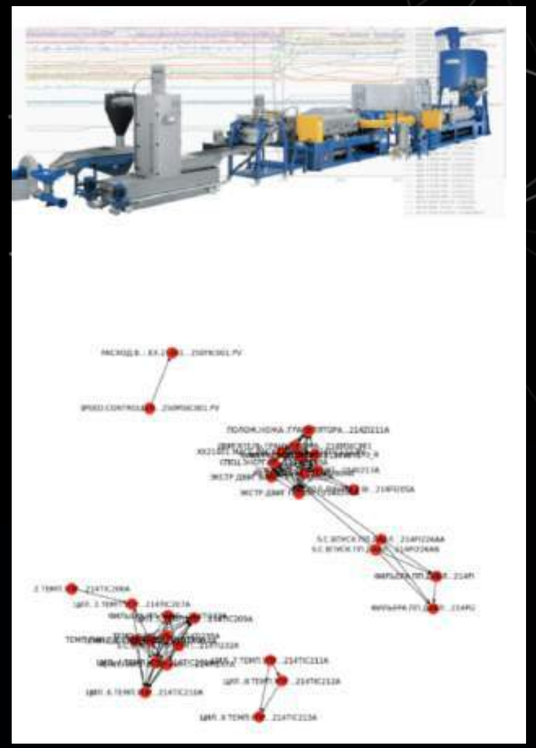
Development of a model predicting problems in the operation of the extruder. Early detection of signs of blockage of the extruder, prevention of downtime for technical reasons. Predicting potential problems in the operation of equipment

SOLUTION:

- Analysis of time series of sensor readings, search for dependencies between sensors;
- Detection of anomalies in sensor readings in historical situations when the extruder was stopped, building the forecast based on the current counter;
- Determination of thresholds indicating an early stop of the extruder. Creating a model that "triggers" and sends notifications to the operator about such situations;

TECHNICAL STACK:

TensorFlow, PyTorch, Cuda



RESULT

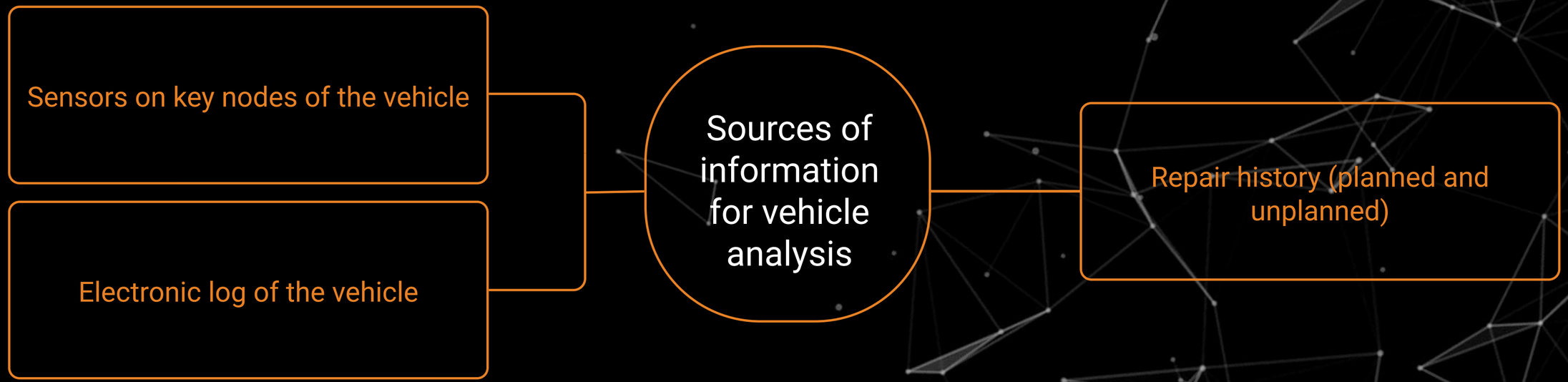
- **The share of predicted problems is about 80%;**
- **Reduction of equipment downtime due to technical reasons;**
- **The horizon for predicting problems is from 10 minutes to several hours (prevention requires from 5 to 30 minutes)**

THE TASK

GOALS

1. Reducing the time for analyzing the key blocks of the considering vehicle without losing the accuracy of detecting problems
2. Realisation of identification and automatic filling of the pre-trip control registration log using machine vision technologies that determine the degree of damage relative to each considering object
3. Increase the useful working time of the vehicle, while reducing the time of unscheduled repairs as much as possible

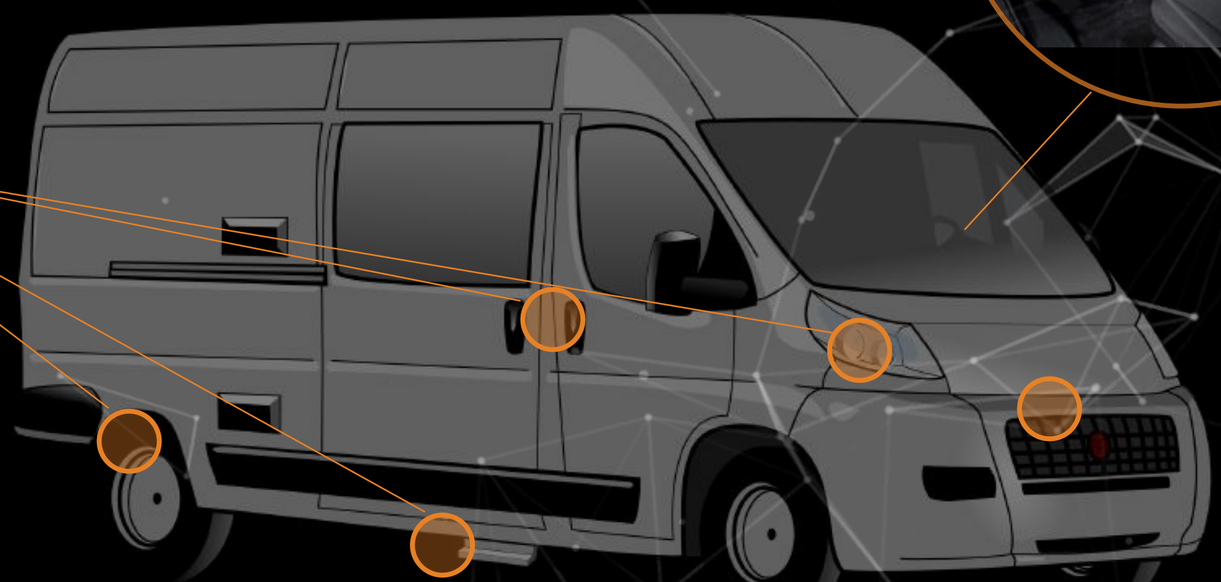
Задача



SOLUTION: MONITORING THE TECHNICAL STATUS OF THE VEHICLE IN REAL-TIME

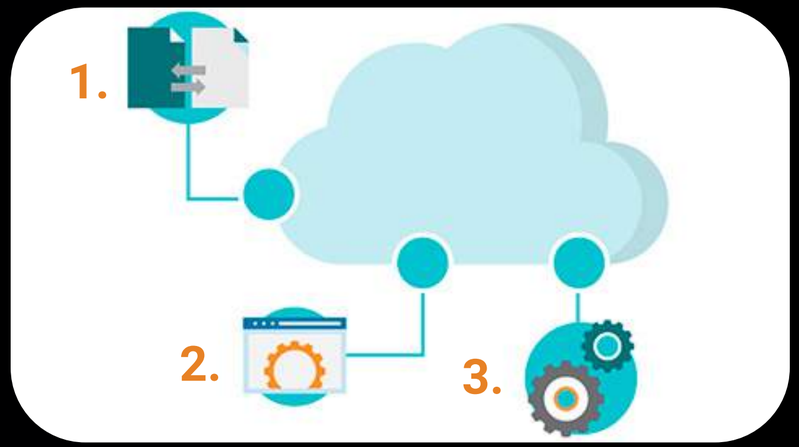
Analysis of images received from the driver before the start of the trip

Integration of acoustic sensors, sensors for collecting the state of key components of the car, an adapter for an already built-in car self-diagnosis system (for collecting information)



* The specified location of the sensors is an example, a more accurate map of the location of the sensors depends on the vehicle model and on the stage of development of the technical task for the project

SOLUTION: ANALYSIS OF TECHNICAL DATA OF THE VEHICLE



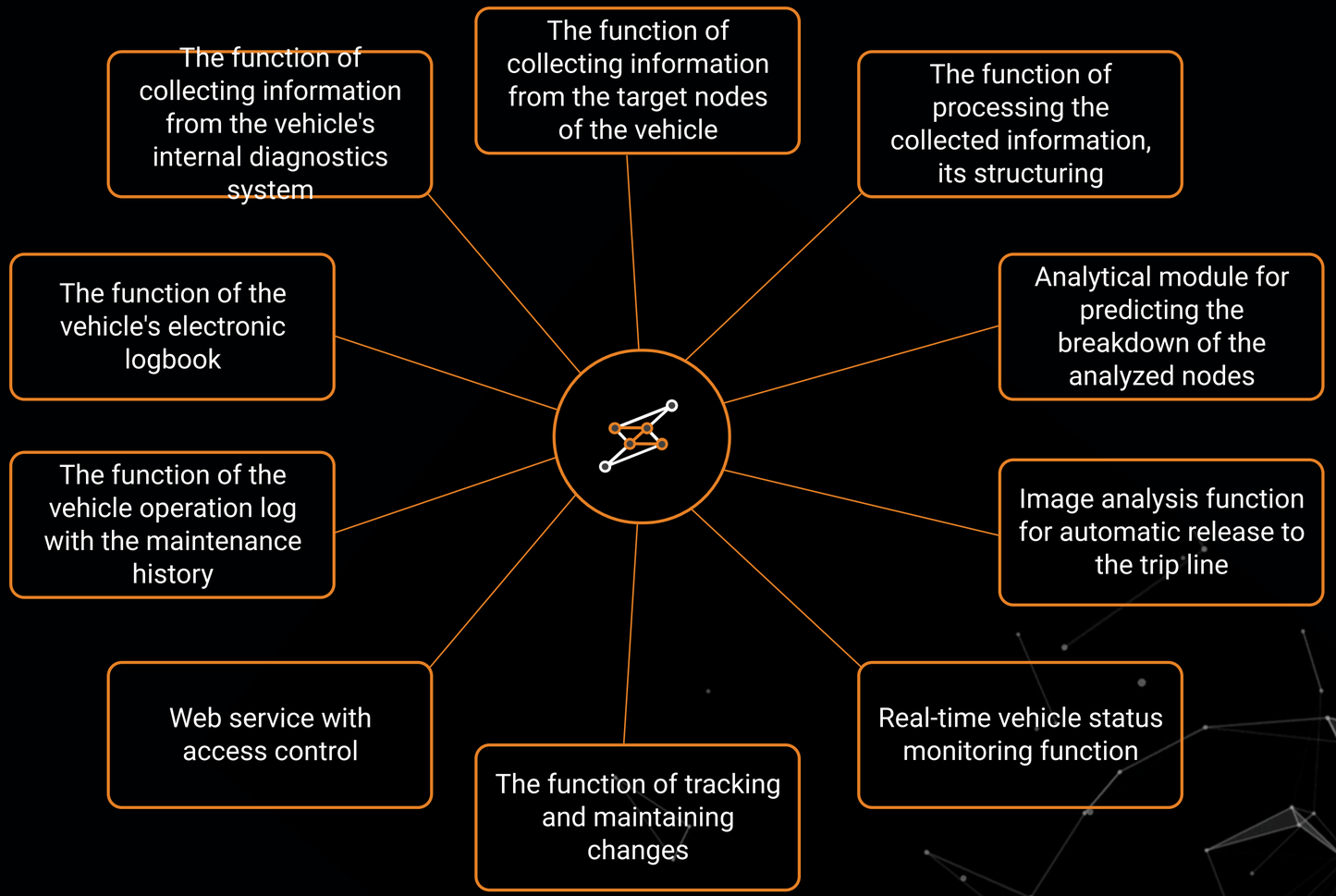
1. History of technical condition and maintenance
2. Real-time sensor data
3. Comparative analysis with other cars

An example of a dynamic dashboard of a vehicle based on the collected information

*The report shown is an example of how the system can be visualized. After the prototyping stage, the format agreed with the customer will be obtained

Функционал разрабатываемой системы

THE FUNCTIONALITY OF THE DEVELOPED SYSTEM



PARTNERS

MIPT Artificial Intelligence Laboratory, Skolkovo Institute of Science and Technology

DEVELOPMENTS

Our own platform for analyzing unstructured information for making forecasts

UNIVERSITIES

MIPT(GU), Skoltech

Центр AI & IT решений

BUILDING A DIGITAL MODEL OF A FACTORY

TASK:

Modeling of business and production processes of existing production, search for "bottlenecks" in production in order to eliminate them, search for parameters that affect the yield of good products

SOLUTION:

• Building a data-centric system for collecting engineering and production information;
• Creation and visualization of a graph of dependencies between processes as well as equipment;
• Construction of a predictive model of the yield of good products. Based on the data of the release of past batches, where we know the input parameters (i.e., the parameters of raw materials, the competence of operators, technologists, the parameters of technological equipment, etc.) and the percentage of the yield of good products after the completion of the production process, the classifier parameters are selected and configured using machine learning algorithms.

RESULT:

• Modeling processes of a factory, reducing defects;
• A decision support system has been made
• Improving the manageability of complex technological production

TECHNOLOGIES THAT ARE USED

Time series analysis, XGBoost, CatBoost, neural networks

TECHNICAL STACK:

TensorFlow, PyTorch, Cuda

Вид информационной модели завода снаружи
(архитектурно-строительная часть скрыта для наглядности)

GO TO THE PLATFORM

Центр AI & IT решений

EVENT RECOGNITION VIA CAMERAS

TECHNOLOGIES THAT ARE USED

Neural network technologies, computer vision

TASK:

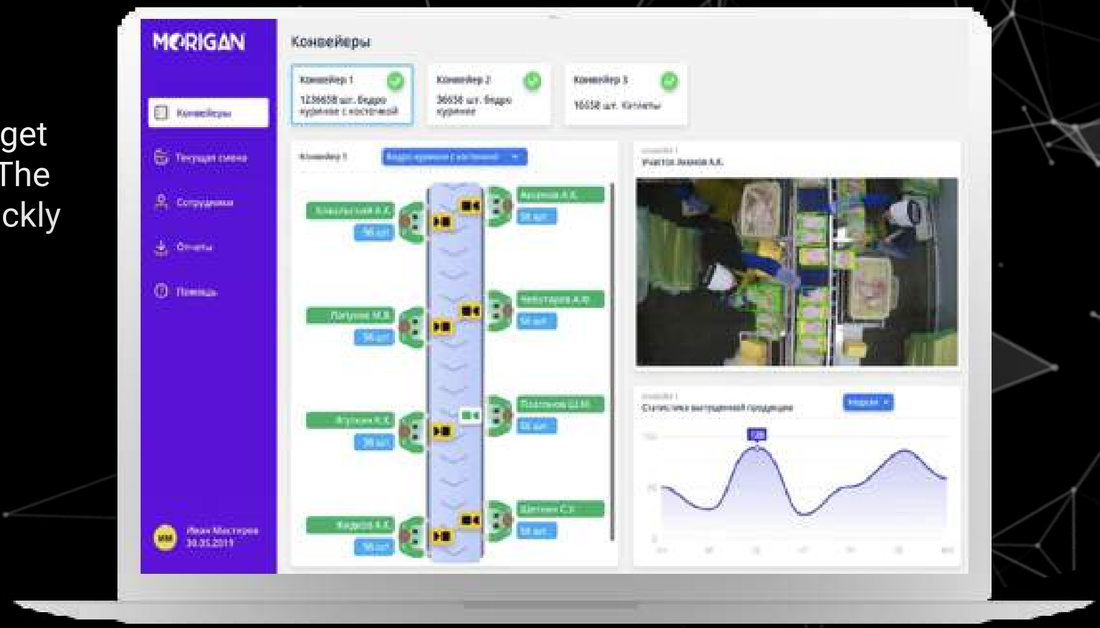
Video analytics system in the production workshop, which allows you to get analytical information aggregated from different parts of the workshop. The system works online and allows you to make management decisions quickly

SOLUTION:

A complex of neural network algorithms trained to recognize target types of events

RESULT:

Increase in labor productivity on average by 15%
Full transition to piecework payment for operators
Improving the manageability of the enterprise



EXAMPLE

Центр AI & IT решений

INTERFACE FOR PREDICTIVE MARKUP OF POWER LINES' PHOTOS

TASK:

Increasing consumer requirements for the reliability of power supply in context of the continuing increase in the material wear out of all elements of power lines.Today, it is necessary to react more quickly both to emerging defects and violations of the operating conditions of power lines, and to eliminate breakdowns that have caused emergency shutdowns.

SOLUTION:

Step 1. Detection (With the help of a retinanet-based detector we will find objects such as wires, supports, garlands of insulators, vibration dampers)
Step 2. Classification (The detected objects (for example, a garland of insulators) are classified using the EfficientNet neural network: whether all insulators are present in the garland or not.)
Step 3. Result (The malfunction is highlighted in red, the absence of problems in green)

RESULT:

1. Exclusion of under-supply of electricity
2. Reducing the cost of the payroll by reducing / eliminating crawlers
3. Saving of fuel and lubricants
4. Increase in the percentage of power lines diagnosed in time

GO TO THE PLATFORM

Центр AI & IT решений

AR-MODELING OF SPACE

TECHNOLOGIES THAT ARE USED

Mobile development, ARKit

TASK:

Augmented reality in the city:
demonstration of new buildings, events, reconstructions, tourist attractions, historical events

SOLUTION:

Platforms for AR-presentations Z-UNION based on the platform for the presentation of construction projects

RESULT:

Increasing the tourist traffic through the main places of the city by 20%, gamification, an additional advertising ability for business

EXAMPLE (AIR)

EXAMPLE (CRAFT)

Центр AI & IT решений

PRESENTATION OF CONSTRUCTION PROJECTS

TECHNOLOGIES THAT ARE USED

Biometric scanner based on facial and voice identification

TASK:

Create a catalog of 3D houses projects

SOLUTION:

- Using and writing libraries of mobile applications for placing 3D models
- Creating a mobile application
- Transfer of 3D house projects to the mobile application catalog

RESULT:

- An application that allows builders to demonstrate an object without a stand
- The opportunity for the client to walk around the house with a mobile device in his hands, before the start of its construction
- The ability to estimate the finished result by projecting it on the building site

GO TO THE PLATFORM

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MedTech

PROBLEM

More than 30% of false negative COVID-19 test results

The test result can take up to several days

Analysis of medical images (CT, fluorography) is one of the most sensitive methods of diagnostics COVID – 19/cancer, the time of CT/fluorography research takes 25-30 minutes, **we can do it for the 60-90 sec**

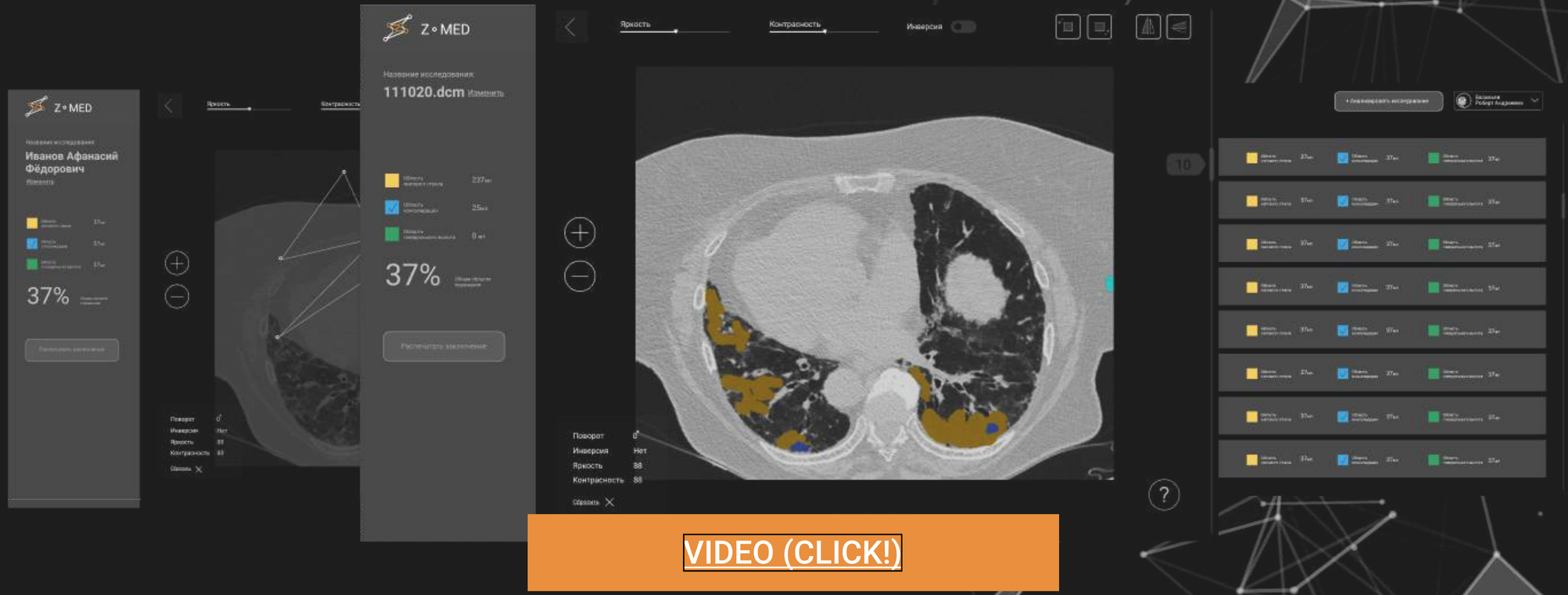
AI DETERMINES THE DIAGNOSIS OF DISEASE

AI recommender systems based on medical analysis
data obtained from CT / fluorographic

Radiography are one of reliable way to diagnose COVID-19, cancer and others disases

AI DIAGNOSTIC MODULE (INTERFACE)

AI diagnostic module (Interface)



Центр AI & IT решений

AI DETERMINING THE DIAGNOSIS OF LUNG DISEASE BY X-RAY IMAGE

TASK:

Based on the input X-ray images of the human chest, determine the diagnosis with an accuracy of at least 80%, identify the area of pathology with an accuracy of at least 70%

SOLUTION:

A recommendation system that offers its own versions of conclusions based on the entered features, which are filled in during the finalized descriptions of each specific study

RESULT:

• Increasing the capacity of medical institutions
•Increasing the accuracy of diagnosis
• Possibility of remote diagnosis (introduction of telemedicine functions)

GO TO THE PLATFORM

Центр AI & IT решений

AI RECOMMENDATION SYSTEMS FOR DIAGNOSTICS DISEASES (COVID-19)

TASK:

Establishing connections between the highlighted colored area and the real area of pathology. The main task is to investigate the correlation between the selected segment of grayscale in the image and the pathology itself in order to achieve fast high-precision marking independent of the human factor in terms of the accuracy of the selection and detection of the pathology segment

MARKUP MODULE:

Web application (DICOM image markup, DICOM attribute markup (metadata))
DICOM image processing(based on grayscale (256-65536 shades))

RESULT:

Frosted glass area: 180.770 ml
Consolidation area: 11.472 ml
Pleural effusion area: 53.084 ml
The volume of the affected area of the lungs to the total volume of the lungs: 66%

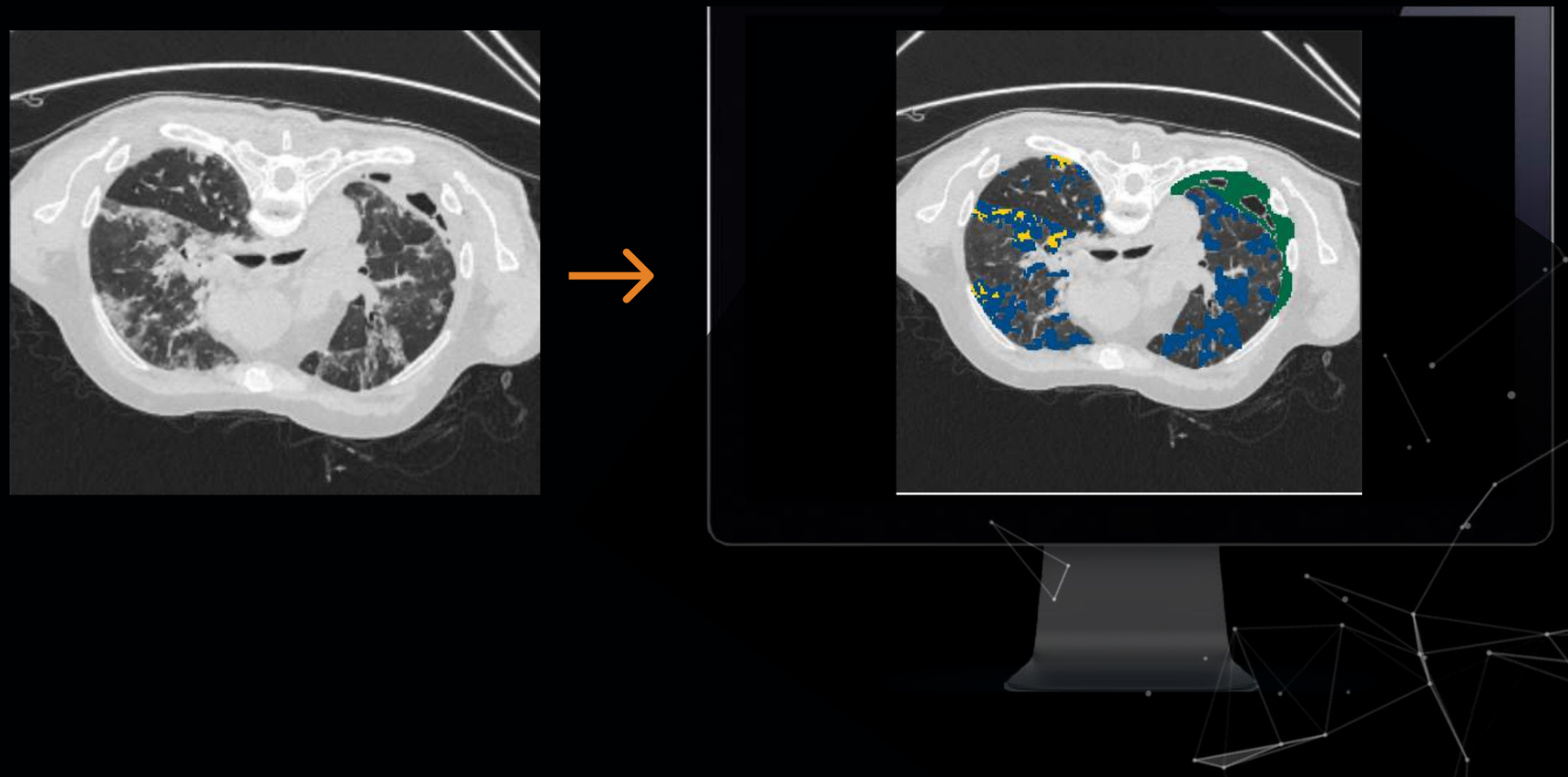
TECHNICAL STACK:

DICOM Viewers, PACS, a mathematical algorithm for coloring gray areas on DICOM images

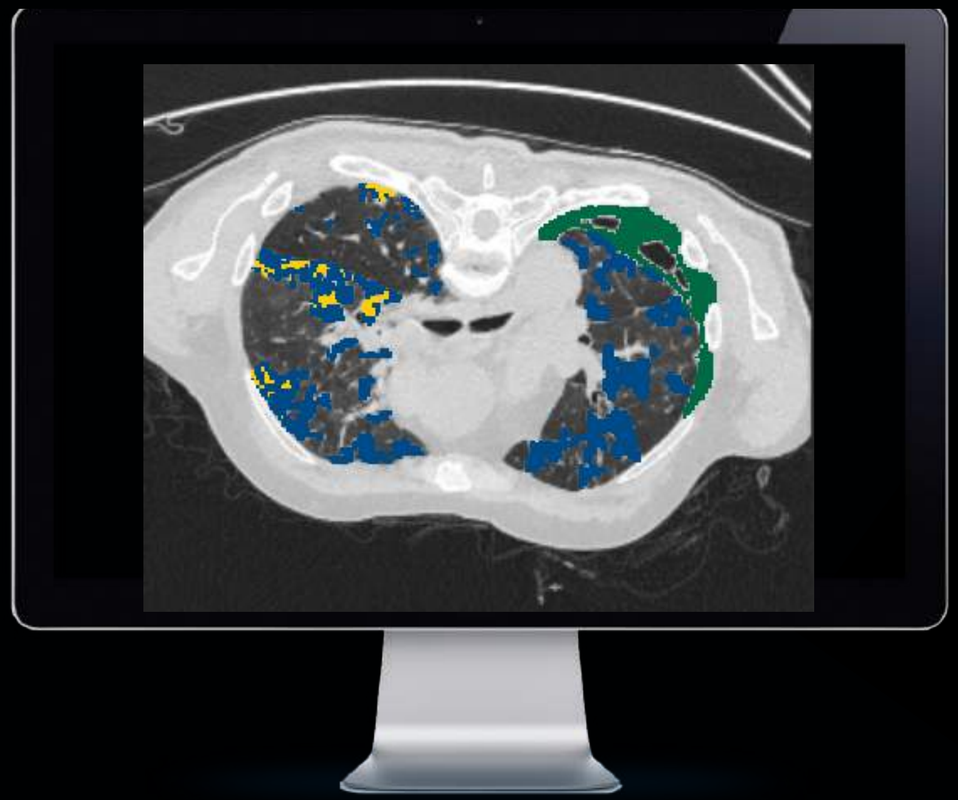
GO TO THE PLATFORM

VISUALIZATION OF THE FIELD OF PATHOLOGY (COVID-19)

Automatic recognition of pathologies and their algorithm interpretation in the form of segmentation in the picture



AI-REVEALS THE PATHOLOGY FROM MEDICAL DATA (COVID-19)



Frosted glass area: **180.770 ml**
Consolidation area: **11.472 ml**
Pleural effusion area: **53.084 ml**

Volume of the affected area of the lungs to the total volume of the lungs: **66%**

Центр AI & IT решений

AI RECOMMENDATION SYSTEMS FOR DIAGNOSTICS DISEASES (MALIGNANT TUMORS)

TASK:

- Develop, train and integrate into a common ensemble of algorithms for processing medical data (including DICOM images, DICOM tags, patient metadata (including finalized protocols)
- Achieving classification accuracy of at least 95% per category (for the task of classifying images/studies)
- Achieving the accuracy of the pathology segment selection in the image is higher than 90% (for the segmentation task)

AI MODULE FOR THE DIAGNOSIS OF DISEASES

A model based on an artificial neural network for processing metadata(based on the analysis of DICOM tags, based on the analysis of patient metadata (finalized protocols))
A model based on an artificial neural network for processing DICOM images(segmentation of pathologies in the image, studies,diagnostics (classification of the image))

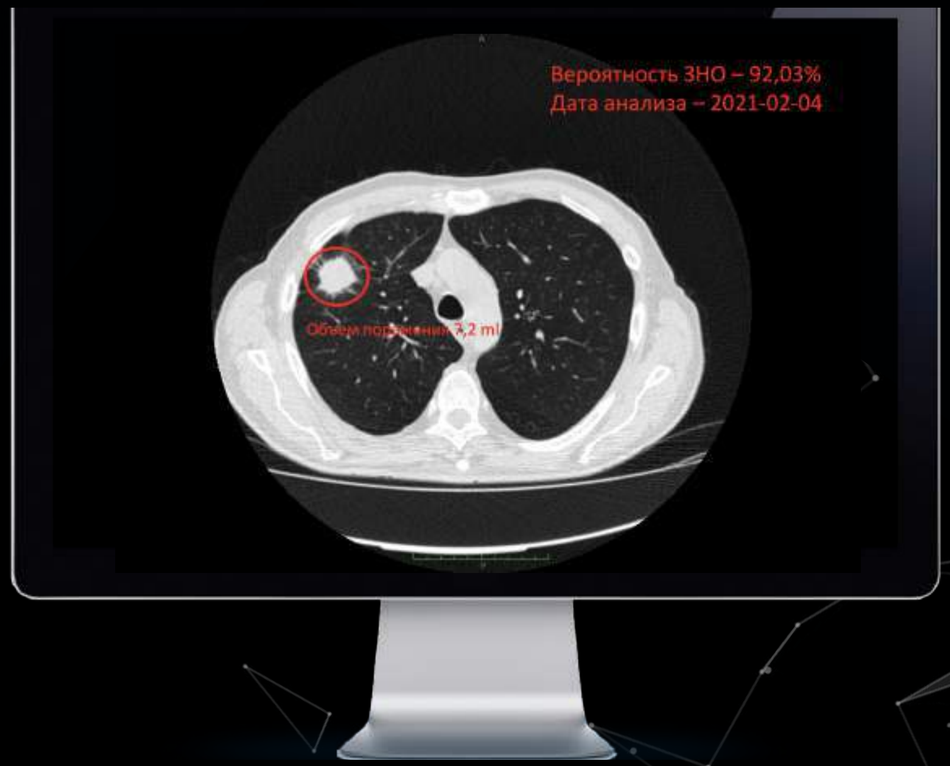
RESULT:

The probability of malignant tumors throughout the image is 92.03%
Found 1 hearth with a volume of: - 7.2 ml
Date of analysis - 2021-02-04

TECHNICAL STACK:

Frameworks: Tensorflow, PyTorch
Segmentation NN: U-Net, W-Net, Mask R-CNN, MeshNet, CNN+CRF
Language: Python 3

VISUALIZATION OF THE FIELD OF PATHOLOGY



ИИ-выставление диагноза по медданным

AI-REVEALS THE PATHOLOGY FROM MEDICAL DATA (CANCER)

Probability of cancer over the entire image - **92,03%**
Found 1 hearth with a volume of: 7,2 ml
Date of analysis - 2021-02-04

Центр AI & IT решений

ANALYSIS OF DOCTORS' DIAGNOSES AND MAMMOGRAPHY

TASK:

1. Development of a recommendation system that issues a diagnosis based on the data completed about each patient

2. Program analysis of mammography

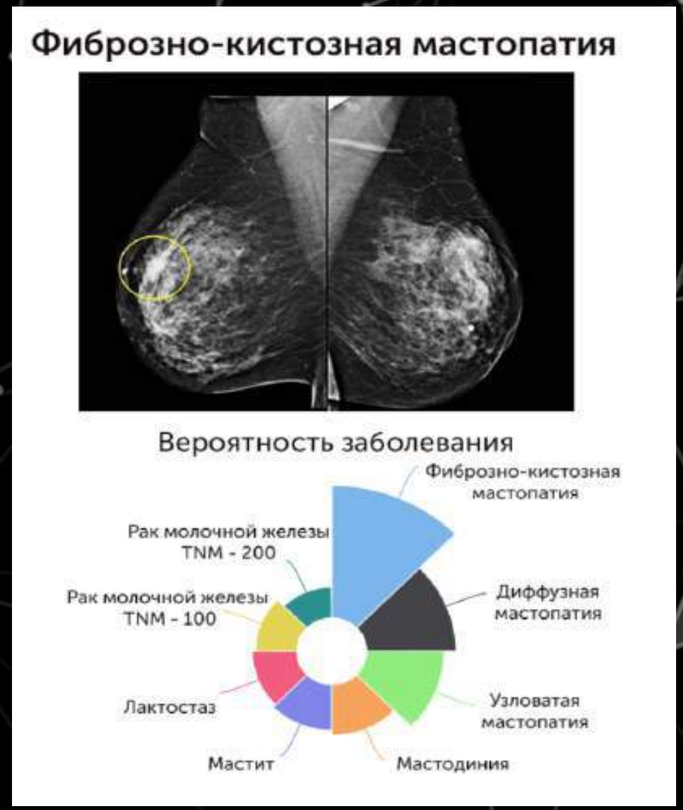
RESULT:

Increasing the accuracy of differential diagnostics in the process of daily practical work of radiation diagnosticians

SOLUTION:

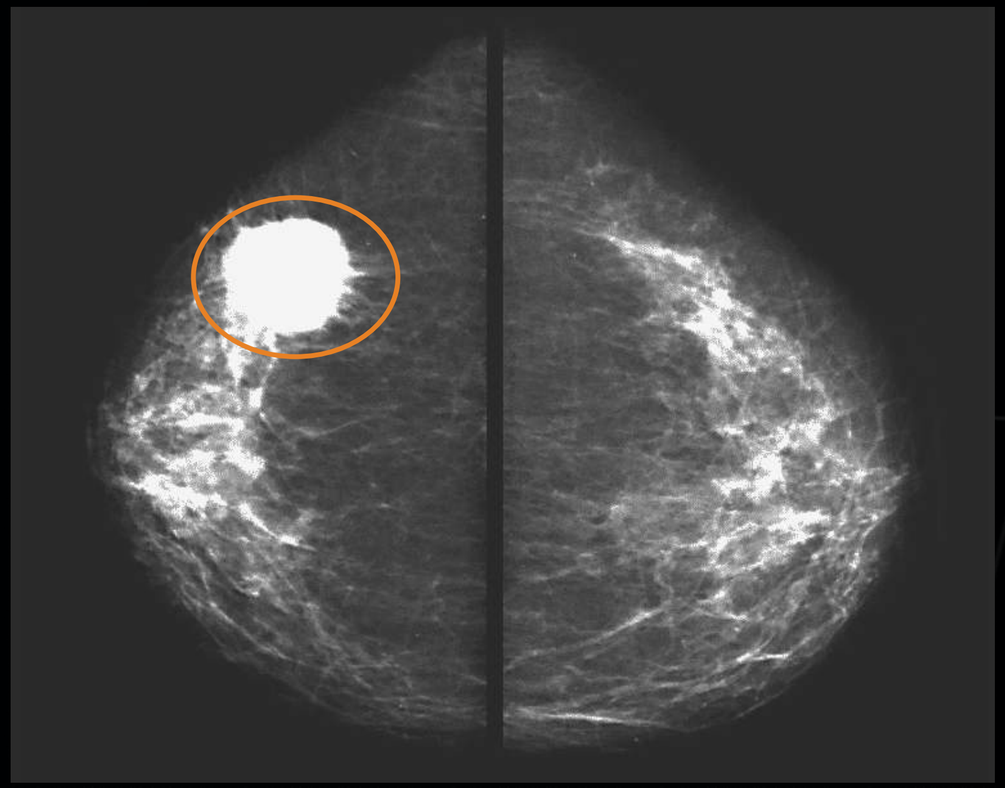
1.A recommendation system that offers its own versions of conclusions based on the entered features, which are filled in during the finalized descriptions of each specific study

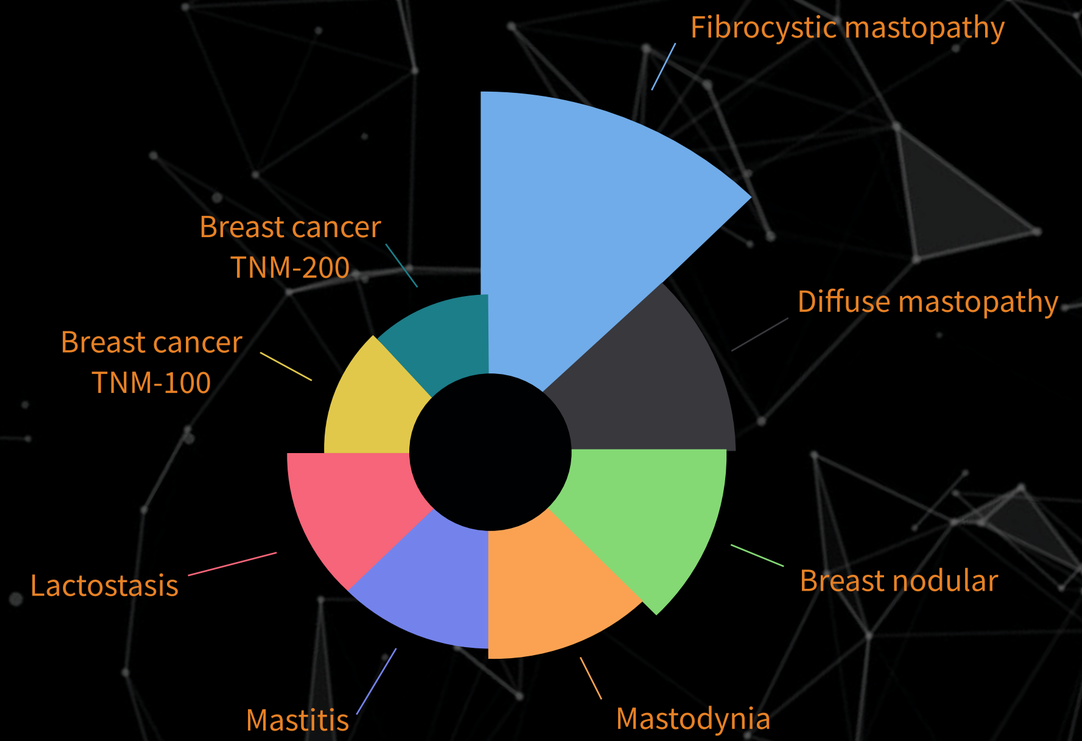
2. Automatic image analysis systems perform an autonomous analysis of images obtained in the process of different studies by methods of radiation diagnostics. Based on the analysis, the systems offer their own versions of conclusions for each specific study.



MRI segmentation of brain areas

AI-REVEALS THE PATHOLOGY FROM MEDICAL DATA (MAMMOGRAPHY)





Classification of pathologies of the chest cavity / mammography, also recomendation systems for doctors

SOLUTION ARCHITECTURE

Diagnostic devices (X-ray, mammography, MRI)

AI-Services (processing and recognition)

Doctor workplace (DICOM Viewer)

Statement of the final diagnosis by the doctor

Prescribing treatment by doctor / recommendation to the patient

We build our solution into the software modules of medical information systems, screening system, web-application **to automate the process** of analyzing and processing medical / clinical data

GOAL AND NEEDS

MAIN GOAL

Introduce the practice of using artificial intelligence to diagnose diseases in medical institutions of the Russian Federation to obtain an objective independent opinion

VALUE PROPOSITION

We are looking for support of the constituent entities of the Russian Federation, Medical equipment manufacturers and an partners for launching pilots and the possibility of further development of the project in the development of AI algorithms for the diagnosis of other diseases.

Technical team of expert developers >10 years of experience in machine learning, deep learning with a set of pre-trained models on various topics

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LegalTech

Центр AI & IT решений

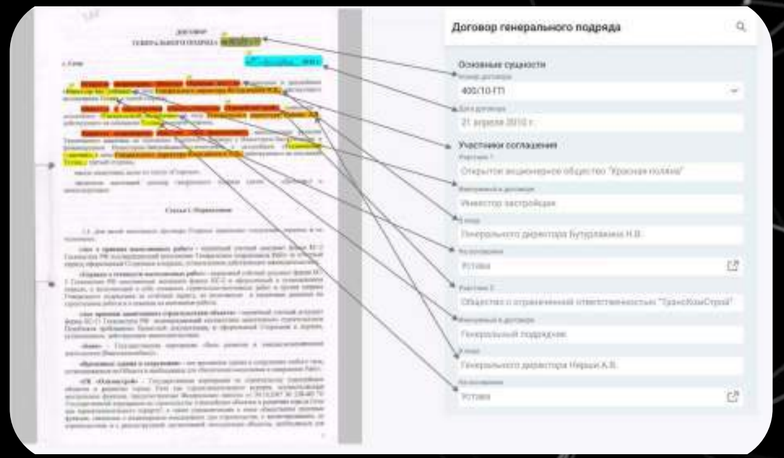
DEVELOPMENT OF A MODEL FOR RECOGNIZING AND HIGHLIGHTING THE CONTENT PART OF A DOCUMENT

TASK:

A set of monotone documents is submitted to the system for input. It is necessary to build a system that can fill out the electronic version of these documents with high accuracy. You need to build both a markup tool and a recognition model based on TD and OCR technologies

SOLUTION:

There has been created a software package that allows you to mark up and store this information about the document in the system, recognize the type of document and fill out its electronic form for a given type of document.



GO TO THE PLATFORM

RESULT:

- OCR: 96%
- Text Detection: 98%
- Document Classification: 99%
- Document Recognition: 94%

Центр AI & IT решений

LEGAL TECH. AI DOCUMENTS - KOSYNKA PLATFORM

TECHNOLOGIES THAT ARE USED

A set of algorithms for text recognition and processing based on AI technologies.
Natural language processing

TASK:

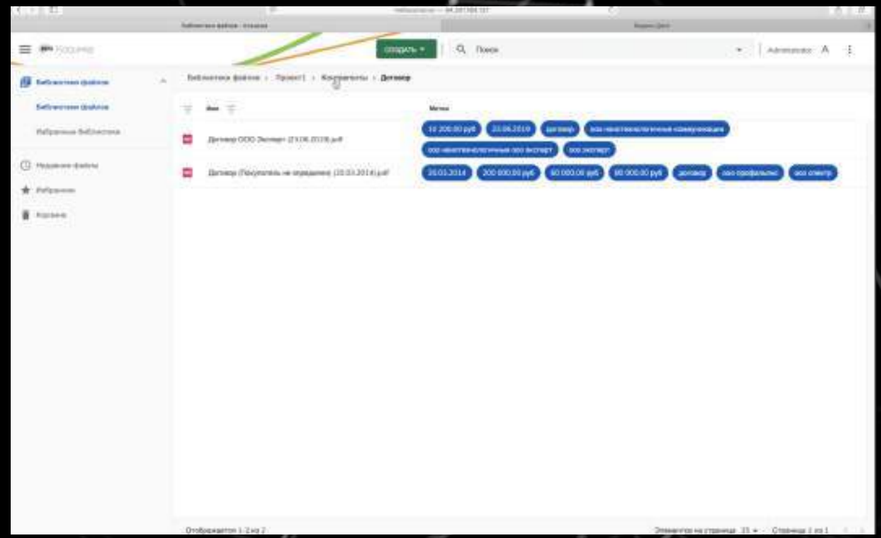
The company's contracts provide a number of conditions. At the same time, a significant part of the conditions are not taken into account and are not controlled automatically.

RESULT:

The efficiency of the execution of the terms of contracts is increased, the risk of liability is decreased, and there is a clear control over the execution of the terms of contracts.

SOLUTION:

To develop a model for the recognition and semantic evaluation of each contract in order to determine, distribute and fix the terms, responsibilities, responsible parties, events that affect the execution of the terms of the contracts



GO TO THE PLATFORM

PRODUCT APPLICATION AREA

VIDEO OF THE PLATFORM'S OPERATION

«Kosynka platform»

is an innovative system of communication and document management, offering a new approach to the organization of work with documents

Applied technologies

A set of algorithms for text recognition and processing based on AI technologies

Natural language processing

Target consumers in the national market

B2C

Individual entrepreneurs

Small businesses

B2B

Accounting, audit, finance

Law and consulting

PRODUCT APPLICATION AREA

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TECHNOLOGICAL BASE OF THE SERVICE

The «Kosynka» service is the result of a symbiosis of advanced digital data processing and analysis technologies that allow working with information at a completely new level.

Semantic core

Linguistic dictionaries
(databases of entities and concepts)

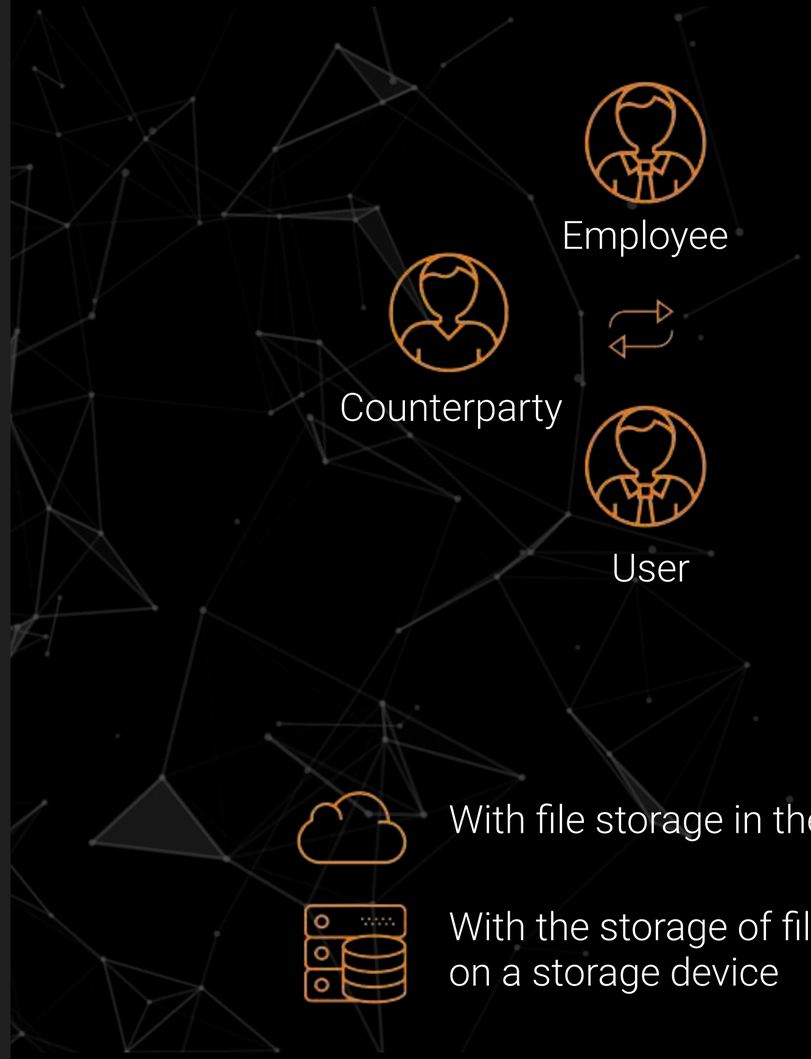
Knowledge graph
(a formalized description of the logic of the subject area)

Linguistic rules
(sets of natural language text processing rules)

Neural networks and machine learning
(data analysis and processing tools)

Benefit of the solution:
The developed and applied semantic core allows you to extend the set of supported complex semantic relationships with the help of additional training of the system.

CURRENT CONSUMER PROBLEMS



Disparate incoming data traffic (mail, messengers)

Storage management (structure definition, manual sorting)

Search for files and information for verification (search for the necessary document, identification of data)

Self-uploading files (completing the storage according to the accounting policy)

The classical document management model

With file storage in the cloud

With the storage of files on a storage device

Key problem:
waste of time resources for performing routine operations, namely, saving / downloading files, sorting by files, searching for the necessary document and data from the file.

HOW THE SERVICE WORKS

Creating virtual data room

Uploading documents
(e-mail, Telegram, file in the storage)

Identification of the document type
(contract, power of attorney, invoice, payment order or financial report)

Data identification
(dates, amounts, names
legal entity / sole proprietor, full name)

Identification of connections
(the contract and the act/invoice/payment order to it)

A new approach to communication and document management

Special address or filter
(for forwarding or autofiltering emails with attachments from counterparties)

Telegram Chatbot
(to interact with the storage without using the web interface)

Automatic systematization
(the file sent in the chat is saved and processed in the storage)

Creating group chats
(for multi-user access to documents in the chatbot)

SERVICE FUNCTIONALITY

Artificial intelligence and linguistic tools for processing text in natural language create the foundation for a new format for working with documents and data

1. Obtaining documents
(auto-upload from e-mail, Telegram or manual upload to a shared file)

2. Classification and sorting
(determination of the type of each document and distribution by libraries and files)

3. Semantic analysis
(analysis of the document content and highlighting of key data)

4. Identifying relationships
(identification of logically related documents)

Storage organization options

B2C

providing the necessary amount of cloud storage and regular backups

B2B

Storage placement on the client's servers (full control over documents and data)

USER INTERACTION

The ease and convenience of the interface is the key to effective work with documents and data

1. Administration of the service
flexible storage settings, role management and setting access levels for employees

2. Access from mobile devices
interaction with the storage from a mobile phone and / or a browser window

3. Search for data
by name, by date, by user, by tags, by types, by relations

4. Working with relations
building a unified graph and the relationship of documents

Центр AI & IT решений

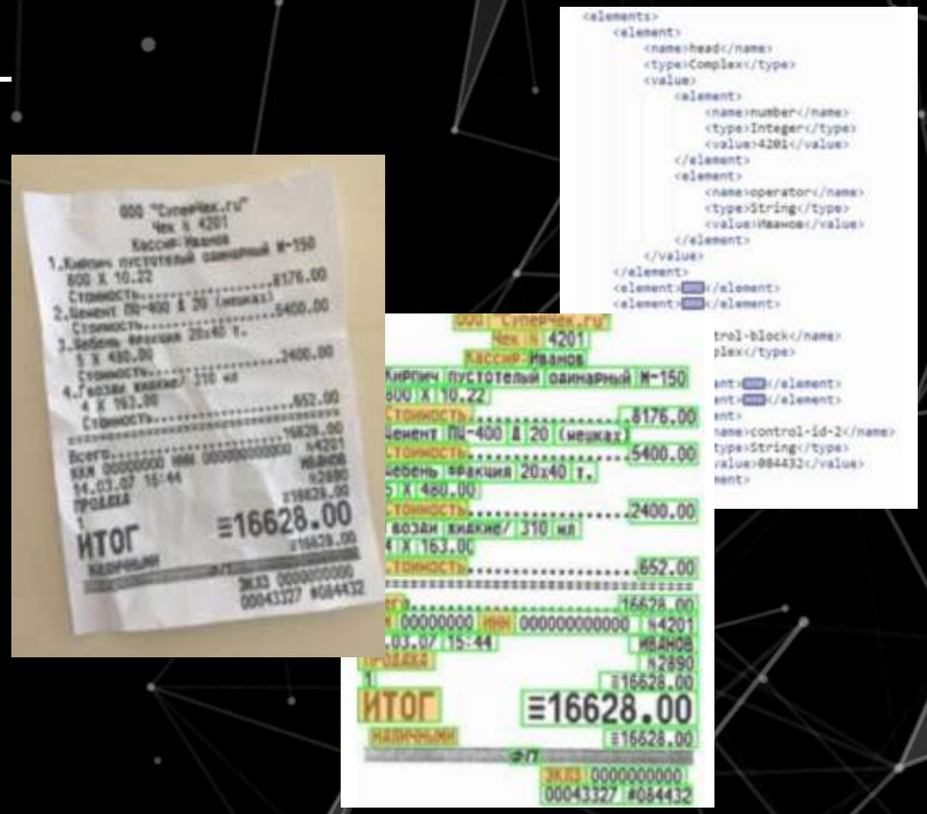
OUR OWN DEVELOPED OCR MODULE
(DEVELOPMENT OF A MODEL FOR RECOGNIZING AND HIGHLIGHTING THE CONTENT PART OF A DOCUMENT)

TASK:

A set of monotone documents is submitted to the system for input. It is necessary to build a system that can fill out the electronic version of these documents with high accuracy. You need to build both
a markup tool and a recognition model based on TD and OCR technologies

SOLUTION:

There has been created a software package that allows you to mark up and store the information about the document in the system, recognize the type of the document and fill out its electronic form for a given type of the document



RESULT:

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VIDEO
OF THE ALGORITHM OPERATION

z·union®

MediaTech

Центр AI & IT решений

DEMO EXAMPLE OF BLOCKING A TARGET OBJECT ON A VIDEO STREAM

TECHNOLOGIES THAT ARE USED

Semantic detection and segmentation;
Component: object detection and classification

TASK:

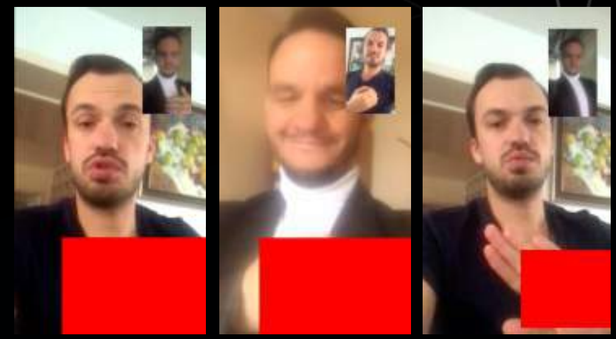
When solving various problems of hiding the target object, it is necessary to solve the problem of detecting the object in the image and stylizing it in real time.

SOLUTION:

- The ability to use it on any objects.
- Quick use on a small number of items
- Transfer-training on the detection of objects of different types
- Segmentation of the object by the boundaries of the object
- Recognition of the object's movements (for example, for recognizing the object's movements and actions)
- Recognition and blocking of unwanted content during an online broadcast

TECHNICAL STACK:

Tensor stream; OpenCV;
Python; Cuda, iOS, WebTech, mobile technologies



EXAMPLE

RESULT:

- Average quality of object detection in the image is 95%
- Average quality of object detection in the image 93%
- Average quality of object pathway tracking in the video stream 97%
- Average quality of the recognized object in the video stream 89%

Центр AI & IT решений

ADS INTEGRATED INTO THE VIDEO STREAM

TECHNOLOGIES THAT ARE USED

Semantic detection and segmentation;
Component: object detection and classification, GAN / CycleGAN

TECHNICAL STACK:

Tensor stream; OpenCV;
Python; Cuda, iOS, WebTech, mobile technologies

TASK:

We can recognize every object in the video stream, and this gives us the opportunity to integrate any media content in the post-processing format.

SOLUTION:

• Our special technology based on artificial intelligence analyzes the content to find the most effective places for ads.
• Brands can target an interested audience with cinematic-quality advertising campaigns on all devices.
• Brands can easily scale campaigns by series, impressions and networks.

RESULT:

•Increasing brand awareness
• Increasing attractiveness of the brand.
• Increasing attention to the brand
• A new way to present information about your product.

EXAMPLE

Центр AI & IT решений

ANIMATION OF PHOTO AND VIDEO CONTENT

TASK:

Creating universal media and entertainment content for transforming photos and videos of any format

RESULT:

- Лёгкая доступность создания контента с GAN
- Снижение затрат на графические измнения
- Реалистичный результат в отличие от существующих технологий

SOLUTION:

Using scanning of face sensors via telephone devices with the help of DeepFake technology, which allows users to animate a still image of a face

VIDEO OF THE ALGORITHM OPERATION

Центр AI & IT решений

TOUCHPAD PANELS OF ANY SIZE

TECHNOLOGIES THAT ARE USED

Infrared technologies, Web technologies

TASK:

Attract the attention of tourists and the public, achieve a WOW effect, increase tourist and human traffic, increase the involvement of offline traffic, increase sales

SOLUTION:

A technology that allows you to make any surface touchable

RESULT:

Increase conversion and awareness, an additional way for attracting buyers/customers

EXAMPLE

Центр AI & IT решений

EDUCATIONAL APPLICATION BRAINY 21

TASK:

To make the process of studying and memorizing theoretical material more understandable and interesting for schoolchildren and students, to increase involvement in the educational process

SOLUTION:

- Development of an online AR and VR educational platform with an explanation of the educational material;
- Gamification of the educational process through a system of scoring points and rewards

RESULT:

The percentage of information assimilation is over 90% ;
More than 95% of students weren’t distracted from the educational process ;
In the group with the traditional approach to explaining the material, the indicators were 2-3 times lower

EXAMPLE

Центр AI & IT решений

AR NAVIGATION

TASK:

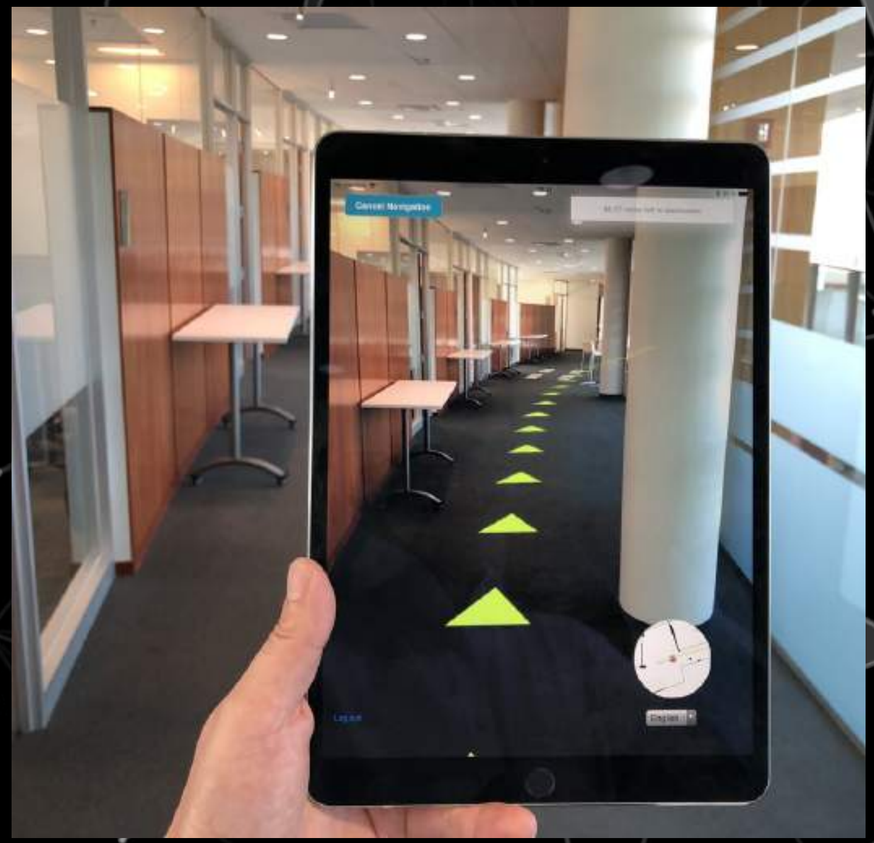
Creating augmented reality in the city (internal user navigation)

SOLUTION:

Mobile applications for AR placement of key points linked to a specific place in the real world for AR navigation on the area

RESULT:

Increased engagement, increased traffic, user-friendliness, timesaving



Центр AI & IT решений

AR IN THE TOURISM’S FIELD

TECHNOLOGIES THAT ARE USED

Mobile development, ARKit, ARCore

TASK:

Increasing the tourist attractiveness of the area and increasing the tourist traffic

SOLUTION:

Develop a mobile application in augmented reality, in which you can enrich the real environment by adding a list of virtual audiovisual effects, such as videos, 3D models, animations and custom sounds.

RESULT:

A bright informational occasion; a positive public opinion regarding the tourist season and the professions of the tourism and hospitality industry.

Центр AI & IT решений

EVENT RECOGNITION VIA CAMERAS

TECHNOLOGIES THAT ARE USED

Neural network technologies

TASK:

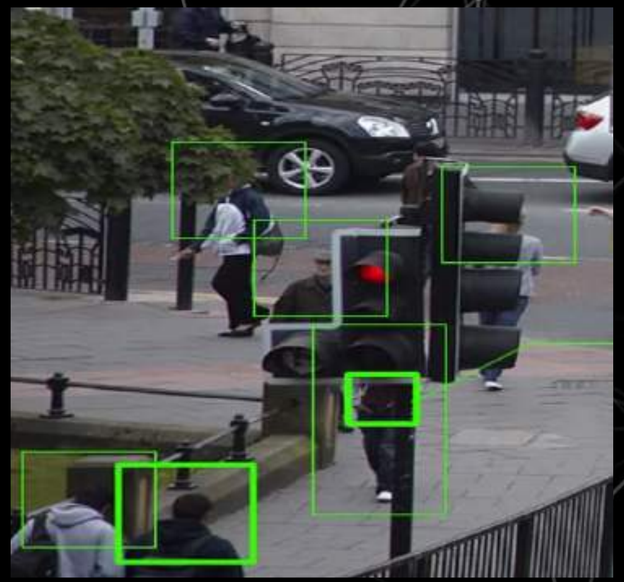
Using the city video surveillance system, the relevant services should signal about illegal events (a fight, garbage thrown by a person, garbage that wasn't cleaned by communal services, an accident, etc.)

SOLUTION:

A complex of neural network algorithms trained to recognize target types of events

RESULT:

Automatic processing of video sequences from video surveillance cameras, increasing the accuracy of event detection by 80%, increasing the response time of services by 60%



EXAMPLE

Центр AI & IT решений

CONVERTING A VIDEO INTO A CARTOON (STYLIZATION)

TECHNOLOGIES THAT ARE USED

GAN, neural networks, style transfer, face detection

TASK:

Creating universal media and entertainment content for transforming video into a digital avant-garde/art or watercolors

TECHNICAL STACK:

Tensorflow, PyTorch, Cuda

SOLUTION:

Using different styles for better and more attractive content:
- Digital Art,
- Colored Avant-garde,
- Portrait
- and others.

RESULT:

•Creating a unique video content that causes a WOW effect
•Attracting new subscribers and customers

VIDEO OF THE ALGORITHM OPERATION

Центр AI & IT решений

ART PHOTO PROCESSING ONLINE

TECHNOLOGIES THAT ARE USED

GAN, neural networks, style transfer, face detection

TECHNICAL STACK:

Tensorflow, PyTorch, Cuda

TASK:

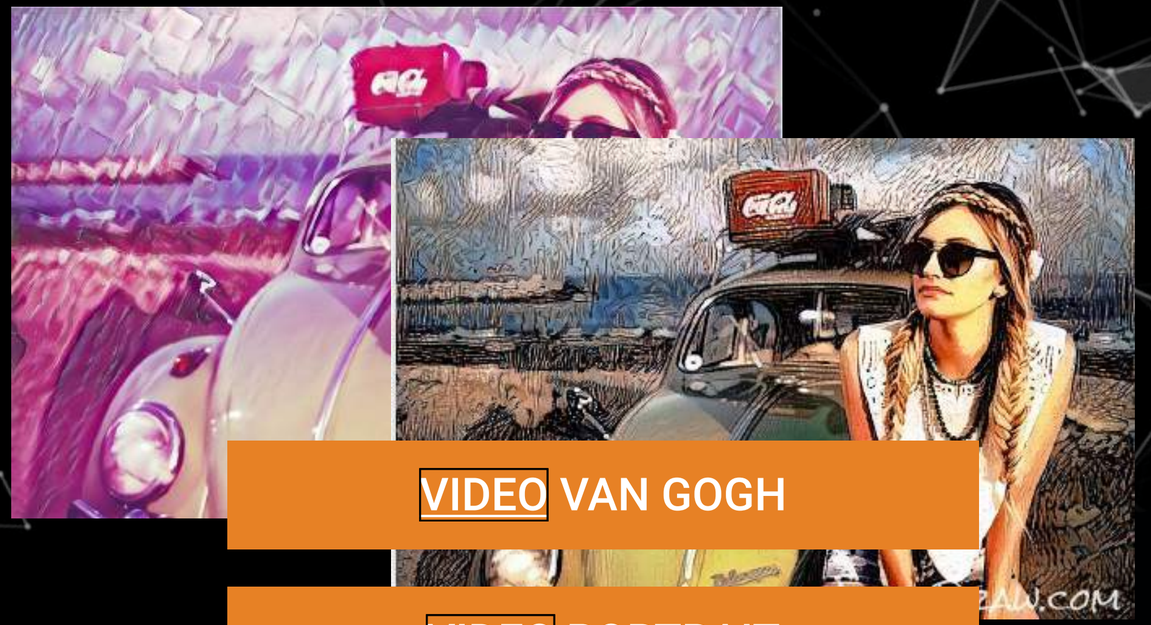
Creating content using a large collection of styles of different artistic trends. It is also possible to use an arbitrary style set in the form of a custom sample image.

SOLUTION:

Styling is done using an original neural network algorithm that allows you to control the power of preserving the foreground.

RESULT:

Original photo filter with detailed visualization
A diverse collection with more than 120 styles.
Apply a custom style from any uploaded image.



VIDEO VAN GOGH

VIDEO PORTRAIT

Центр AI & IT решений

TRANSFERRING FACES (DEEPFAKE TECHNOLOGIES)

TECHNOLOGIES THAT ARE USED
GAN,neural networks, face detection, deepfake

TECHNICAL STACK:
Tensorflow, PyTorch, Cuda

TASK:

Transfer of the selected face to the specified video sequence (both in the video and in the photo). Generating new faces and voices

SOLUTION:

Based on the deepfake technology and the input image of the face, the specified face is transferred to the selected video sequence to the found faces in the frames (you can use one or several). The overlay occurs frame-by-frame, both on the photo and on the video.

RESULT:

- Easy accessibility of content creation with deepfake technology
- Reducing the cost of working with graphics, production, video editing
- Realistic result of transferring faces to any video

VIDEO
OF THE ALGORITHM OPERATION

z·union®

FinTech

PROBLEM

Availability of overdue loans (NPL) for business

The work of credit managers on the analysis of companies is **performed manually** - they can not fix the fact that the company is close to delinquency in time

You need a tool that **tells** credit managers that the **company is close to delinquency**

SOLUTION: AI MODEL BASED ON TWO DATA SETS

The key value in scoring is the availability of data!

When building a scoring model, the determining factor for success is the availability of data. To build a model, a large number of different attributes/factors are used, which can be divided into two groups: General economic and individual factors

Центр AI & IT решений

FORECASTING OF OVERDUE LOANS OF CLIENTS-COMPANIES

PROBLEM

At the moment, in most banks, credit risks (the client's inability to fulfill loan obligations) of companies are analyzed manually on a monthly basis, and selectively for some of the companies from the entire list.

TASK

At the moment, in most banks, credit risks (the client's inability to fulfill loan obligations) of companies are analyzed manually on a monthly basis, and selectively for some of the companies from the entire list.

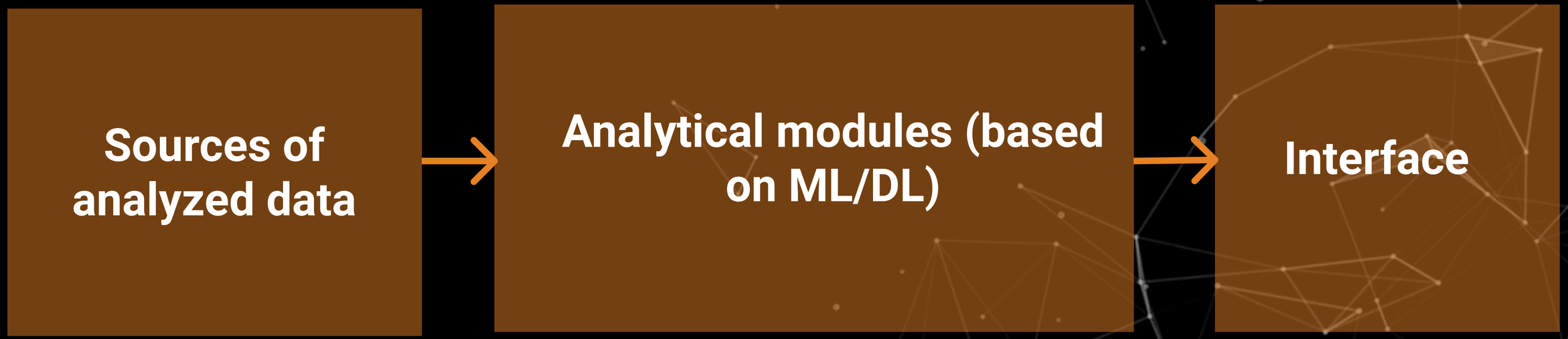
RESULT

Early detection of companies (clients) that are closest to the risk of the overdue loan (even before the fact delay).

BENEFIT

The forecast of the model is aimed at helping monitoring specialists to find companies with increased credit risk more effectively and quickly notify the owners and management of companies about possible risk in order to minimize it.

GENERAL ARCHITECTURE OF THE METASCORING Z-UNION SOLUTION



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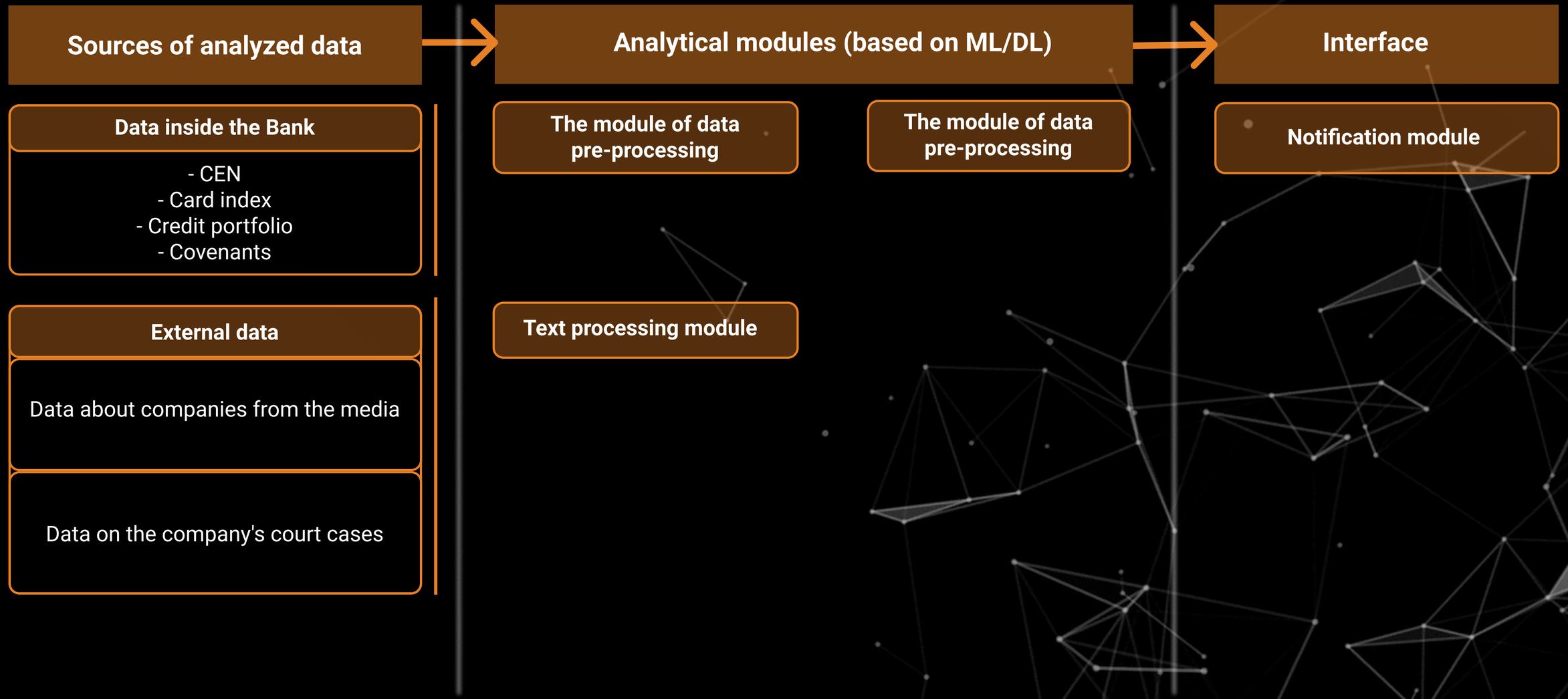

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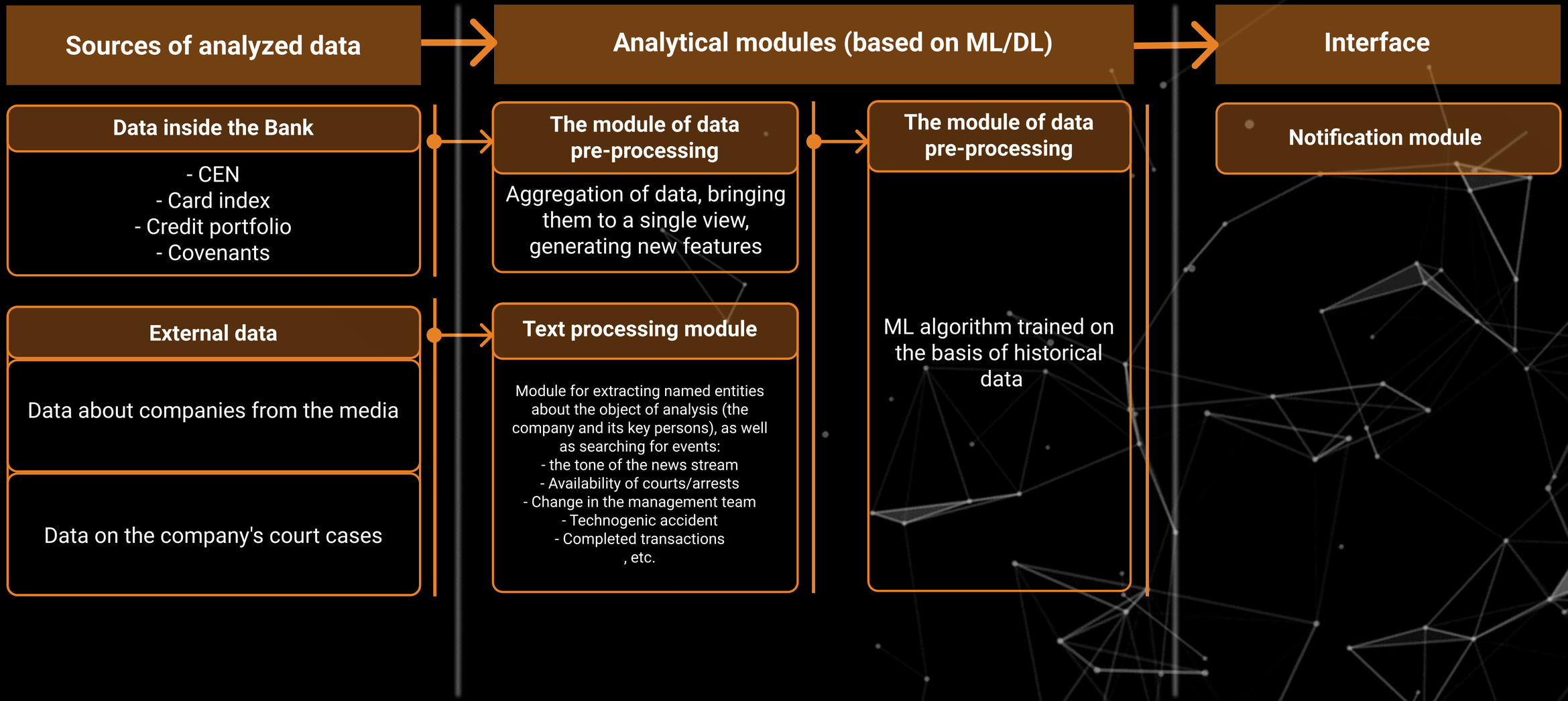
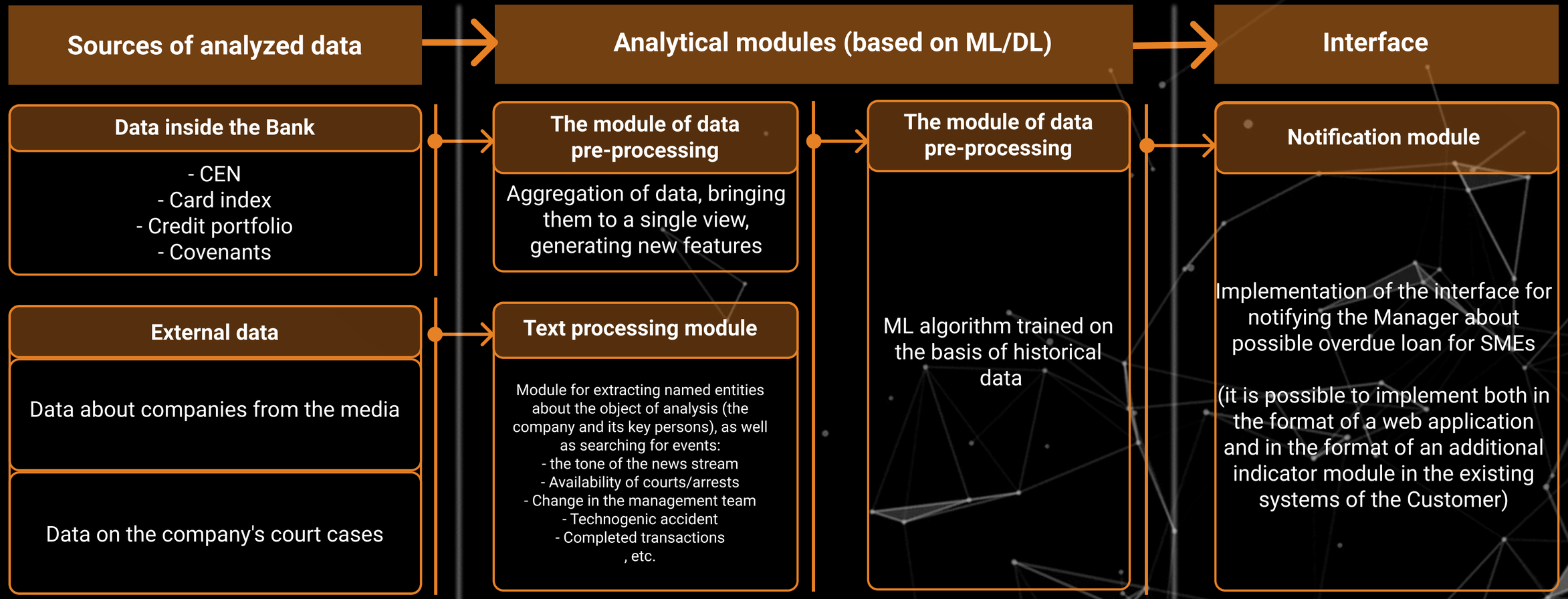


GENERAL ARCHITECTURE OF THE METASCORING Z-UNION SOLUTION



GENERAL ARCHITECTURE OF THE METASCORING Z-UNION SOLUTION

Sources of analyzed data

Data inside the Bank

- CEN
- Card index
- Credit portfolio
- Covenants

External data

Data about companies from the media

Data on the company's court cases

Analytical modules (based on ML/DL)

The module of data pre-processing

Aggregation of data, bringing them to a single view, generating new features

Text processing module

Module for extracting named entities about the object of analysis (the company and its key persons), as well as searching for events:
- the tone of the news stream
- Availability of courts/arrests
- Change in the management team
- Technogenic accident
- Completed transactions

, etc.

The module of data pre-processing

ML algorithm trained on the basis of historical data

Interface

Notification module

Implementation of the interface for notifying the Manager about possible overdue loan for SMEs

(it is possible to implement both in the format of a web application and in the format of an additional indicator module in the existing systems of the Customer)

Technologies

Data mining (Web technologies, opening and closing external resource APIs)

NLP technologies (a set of pre-trained neural network models), ML algorithms (gradient boosting over decision trees)

Web-technologies (backend, frontend)

KEY FEATURES AND BENEFITS OF THE Z-UNION MODEL

The target metric for training the model has been developed

A well-defined set of features that are used in the training process of the model

Using machine learning tools

Based on a number of experiments, a **clear methodology for conducting** training and building a model has been developed

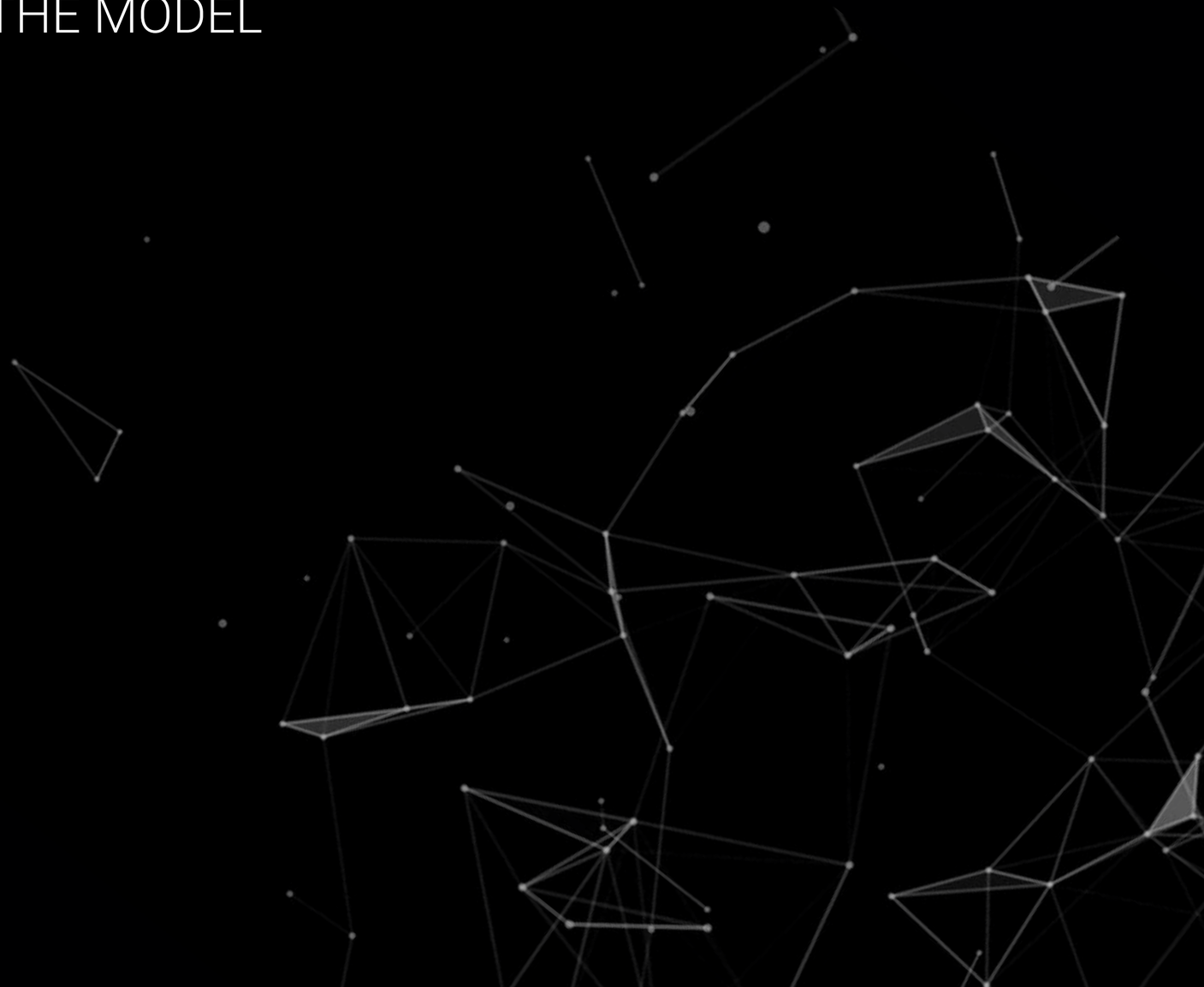
Gini index up to 0.8 (depends on the volume and quality of the data used)

Based on the **already conducted pilot implementation** in the Customer bank and testing for 12 months.
The delay prediction range is up to 6 months

BRIEFLY ABOUT THE QUALITY OF THE MODEL

1000 →

Companies in the loan portfolio



BRIEFLY ABOUT THE QUALITY OF THE MODEL

1000 → **100**

Companies in the loan portfolio

Companies go into monthly arrears

BRIEFLY ABOUT THE QUALITY OF THE MODEL

1000 → **100** → **80**

Companies in the loan portfolio

Companies go into monthly arrears

Of these, the NPL-developed model predicts in advance!

THE MAIN ADVANTAGES OF THE SOLUTION AND THE TARGET RESULTS OF IMPLEMENTATION

Integration into the bank contour

A convenient dashboard for managers that allows you to reduce the time to work with data about the borrower (especially from the media)

Risk reduction

The main goal and result of the NPL model is early detection of companies with a high probability of falling into arrears

Центр AI & IT решений

SERVICES AND PRODUCTS IN THE BANKING SECTOR

Analysis of customer churn

Forecasting customer spending in the future

Clustering of the customer base, recommendation system of banking products

Forecasting of overdue loans of clients-companies

A model for automatic classification of texts and customer requests

Development of chatbots/voice bots

Центр AI & IT решений

CUSTOMER CHURN ANALYSIS

PROBLEM

High churn of customers, expressed in the absence of purchases and payments for a certain period of time.
The reasons for churn are not always obvious, and customer retention programs are ineffective.

TASK

Develop a model to assess each client's churn propensity and take appropriate measures
by holding it.

RESULT

Data on customers ' payment transactions, socio-demographic characteristics, and information describing the Bank's products are analyzed. As a result of the analysis, using machine learning technologies, an algorithm was developed that predicts the probability of churn and shows the most likely factors that affect the termination of each client's use of the Bank's services.

BENEFIT

Increase the company's revenue by effectively retaining existing customers and maintaining loyalty

Центр AI & IT решений

FORECASTING CUSTOMER SPENDING IN THE FUTURE

PROBLEM

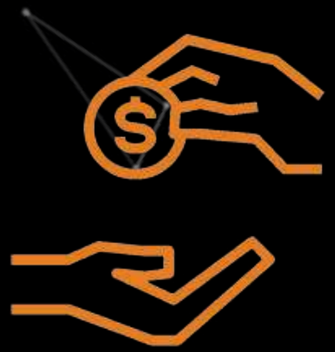
Low efficiency of the loyalty program, which leads to the problem of timely delivery of a specific product to the target audience. Low accuracy in predicting customer behavior.

TASK

Development of a model for predicting the spending of selected clients for a certain period of time.

RESULT

Based on the history of past transactions and additional information about users, a model is built that predicts customer spending in the future by specific categories (MCC codes).



BENEFIT

The model forecast helps to optimize financial flows, and also allows you to predict some facts from the client's life (for example, the fact of a trip abroad). Using the model allows you to improve the quality of recommendations and further increases the accuracy when identifying customers who are prone to churn

Центр AI & IT решений

CLUSTERING OF THE CLIENT BASE. RECOMMENDATION SYSTEM FOR BANKING PRODUCTS

PROBLEM

The ineffectiveness of the ad campaign. These clients do not return for additional services, or they return, but after a very long period of time

TASK

To develop an algorithm for the segmentation of the customer base. Build a recommendation system for the Bank's services.

RESULT

A system has been developed based on the recommendation of the Bank's services, the input of which is provided with information about the client's transactions, income, socio-demographic characteristics, etc. Recommendations are issued based on the behavioral characteristics of one person or group of people (groups are determined as a result of the customer segmentation algorithm).

BENEFIT

1. Increase the profitability of banking products.
2. Reduce the cost of marketing campaigns and increase their effectiveness.
3. Increase sales through cross-sell and up-sell.

Центр AI & IT решений

DEMAND FORECASTING AND OPTIMAL ATM UTILIZATION

PROBLEM

ATM downtime due to the end of cash in them.
Funding the money supply to cover the risks of late expiration of cash in the ATM

TASK

Predict cash withdrawals/deposits at ATMs and Bank offices. Minimize the cost of funding and cash collection services for all objects of cash turnover

RESULT

We have developed a model based on time series analysis that allows us to predict the degree of ATM congestion for certain time periods.
The ATM loading model allows you to solve problems of optimal loading and cash supply. In comparison with the forecasts of a specialist analyst, the model produces more accurate results, besides removing labor costs from analysts and providing them with support in decision-making

BENEFIT

Reduced funding and collection costs
Reduced ATM downtime
Reducing analyst labor costs

Центр AI & IT решений

MODEL FOR AUTOMATIC CLASSIFICATION OF CUSTOMER REQUEST TEXTS

PROBLEM

A large amount of time required for processing the flow of input text information (business mail) intended for different persons (departments) of the company. Managers produce a classification of the addresses manually

RESULT

A model has been developed that classifies incoming customer requests received via email. Classified requests are automatically sent to the appropriate persons

TASK

Automate the process of classifying the input stream of text information into thematic sections

BENEFIT

1. Reduce labor costs for processing emails
2. Reduced request processing time

Центр AI & IT решений

THE DEVELOPMENT OF CHAT-BOTS/VOICE-BOTS

PROBLEM

High load on customer support operators and call center operators. A large number of requests that require fast processing

RESULT

Development of an intelligent chatbot/voice bot based on an artificial intelligence algorithm. Interaction usually takes place via Internet chat/phone call. An intelligent chatbot/voice bot advises the user when visiting the site, forming the most targeted response for it (links to the necessary sections, drawing up documents, etc.)

TASK

1. Development of a smart chatbot/voice bot for prompt solution of a client's question
2. Covering a wide range of user requests, redirecting them to target sections to resolve the issue

BENEFIT

1. Reduced costs for contact center operators
2. Reduced processing time for customer requests
3. Customer retention

Технологии

time series analysis algorithms (arima, e.t.c.
catboos
xgboost
random forest
convolutional neural network
recurrent neural network
logistic regression
bayes methods
svm
bert
elmo
h20.ai
blockchain fullnodes
advanced state machines
advanced explorer on nodejs, reactjs

hadoop ecosystem
multifactor scoring system
search system
technical analysis
image analysis
data analysis
text analysis
blockchain analysis

postgresql/mysql
opencv
reactjs/backbone.js, html5
python (django)
saas/scss/less, twig, es6, gulp, npm, gulp
ruby, php, laravel
c, c++, c#, java, go
arkit, arcore

dbms
processing
frontend
data visualization (bi tools)
web development
backend
applications ios, android

methodology
classical algorithms
data warehouse
deep learning (neural network)
tools & languages
machine learning
data mining
blockchain

OUR COMPETENCE

Neural network

Recognition of people;
Anomaly detection;
Event detection;
Image and text recognition

Machine learning

Development of predictive models (predicting traffic congestion, analyzing sentiment in social networks on the Internet);
Development of scoring and delinquency models

Web-and mobile development

Mobile app development (iOS, Android);
Creating high-complexity web projects;
3js (WebGL) technologies)

Z-UNION - a team of developers in the field of neural network technologies and machine learning

10+

Years of experience
in software development

> 300

Real projects with the use of AI made

15 +

Key specialists in AI

OUR KEY CLIENTS AND PARTNERS

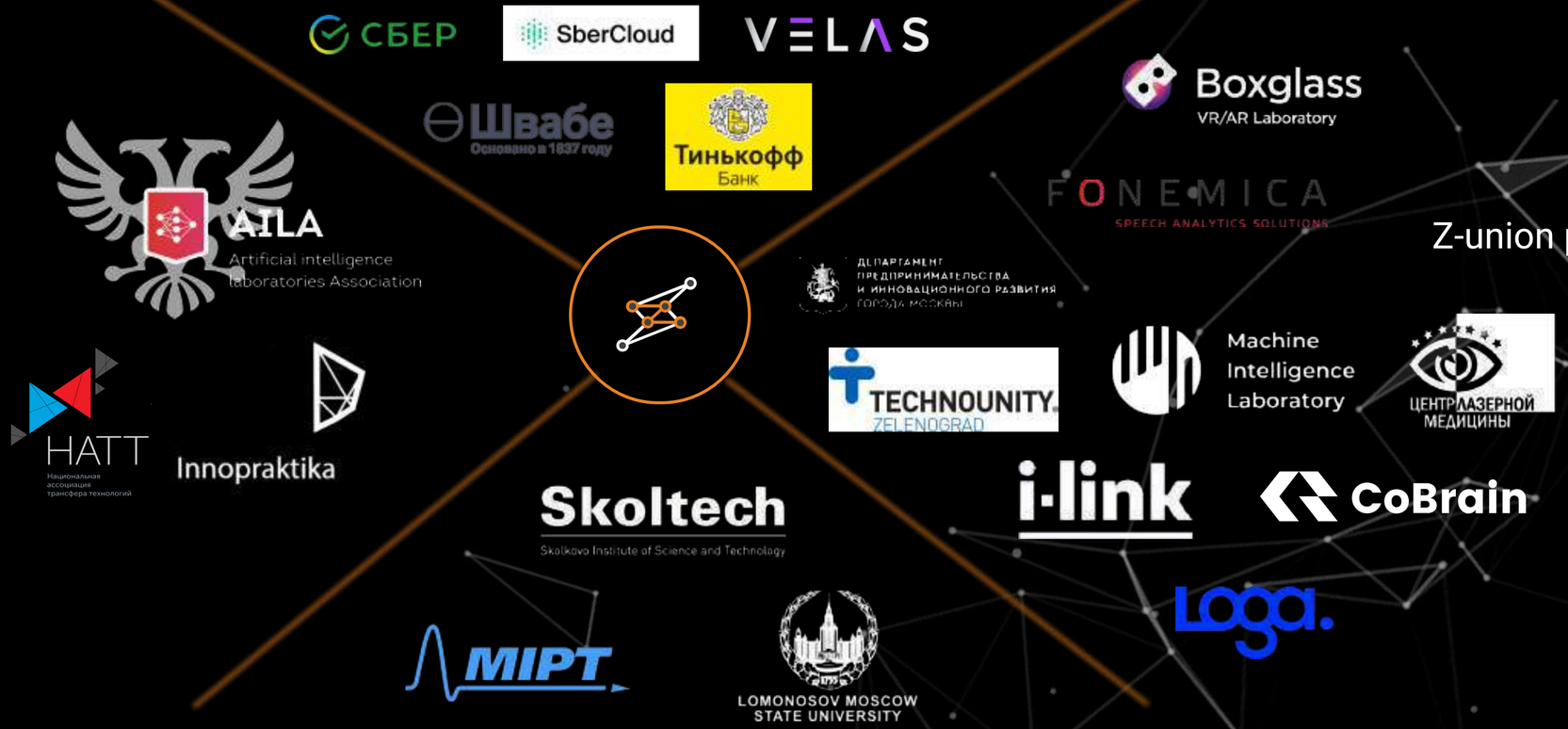
Наши ключевые клиенты и партнеры

Key clients of the Z-union team

Social activities, Membership in associations and development institutions

Z-union partners

Partner institutions and educational activities



WE INVITE YOU TO THE PILOT!

We invite you to the pilot!

3 months

Duration
of the pilot

6 members

Dedicated project
team

1. Let's make your Data Science even stronger
2. Let's train and run the model
3. We will get a business result

BASIC PILOT PARAMETERS

The crew of the performer's team:

ML-team:
Project Manager,
Data Engineer,
Senior Data science,
Middle Data science x 2,
Analyst
+ team of assessors

Main project's stakeholders

- CEO;
- CDSO;
- CAIO;
- CFO

Resources per project:

Implementation period: from 3 to 6 months;
Integration period: from 2 to 8 months;
Specialist rate: from 40-50 dollars/hour
Average project budget: 10 million rubles

Economic impact

- Reduction of the number of overdue loans
- Reduction of risks of non-return, prevention of non-return
- Increase in profit
- Cost reduction

THANK YOU FOR YOUR ATTENTION!

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