

B O T K I N · A I

AI-powered diagnostics and disease risk evaluation
software platform

Intellogic LLC, 2018

Plans

- 2018 – Release of a product for patient pre-screening during clinical trials
- 2018 – Release of a product for disease risk analysis
- 2018 – Extension of the range of nosologies readable by the image recognition software
- April 2018 – Start of pilot projects in Russia of implementation of product for lung cancer recognition
- October 2017 – Contract with Bayer for analysis of medical data to evaluate the effectiveness of cancer treatment
- October 2017 – 2 patent applications for methods of utilizing AI technologies in healthcare
- June 2017 – Seed funding from Primer Capital
- May 2017 – Participation in Bayer's Grants4Apps accelerator. The project entered the top 10 in Bayer's global accelerator rating
- April 2017 – Signing of Cooperation Agreements with the N.N. Blokhin Russian Cancer Research Center
- 2016 – First prototype of the AI platform
- 2015-2016 – Various consulting projects in the field of healthcare
- May 2015 – Foundation of Intellogic LLC

About Botkin.AI. Project team

BOTKIN · AI

	Sergey Sorokin Founder CEO	More than 10 years of work in the field of IT in healthcare. Experience in managing large-scale projects, including the development of the Public Health Information System of the Russian Federation at PJSC "Rostelecom"
	Ivan Drokin R&D Director	Experience in the use of deep learning in biotechnology. Professional and scientific interests: deep neural networks, bioinformatics, computational biology Education: 2011 – Saint Petersburg State University, Faculty of Applied Mathematics - Management Processes, Diploma with Honors 2016 - Saint Petersburg State University, Faculty of Applied Mathematics - Management Processes, postgraduate studies
	Oleg Bukhvalov CTO	Scientific interests: multi-agent, distributed, self-organizing systems. Experience in software development management in international companies. 2009 - Saint Petersburg State University, Faculty of Applied Mathematics - Management Processes 2012 - Postgraduate studies in intellectual systems laboratories.,teaching of Computer Science disciplines.
	Ivan Fedichkin Business Development Manager	Education - Moscow State Institute of International Relations (University). Experience in international projects in the healthcare market
	Pavel Rumyantsev Chief Medical Officer	Author and co-author of 126 scientific works, including 2 monographs and 5 manuals for doctors. 2008-2009 - Visiting professor at the Medical School of Nagasaki University (Japan) Co-author of the National Clinical Recommendations on Oncology, Radiology ,and Endocrinology

The problems that AI can help solve in healthcare:

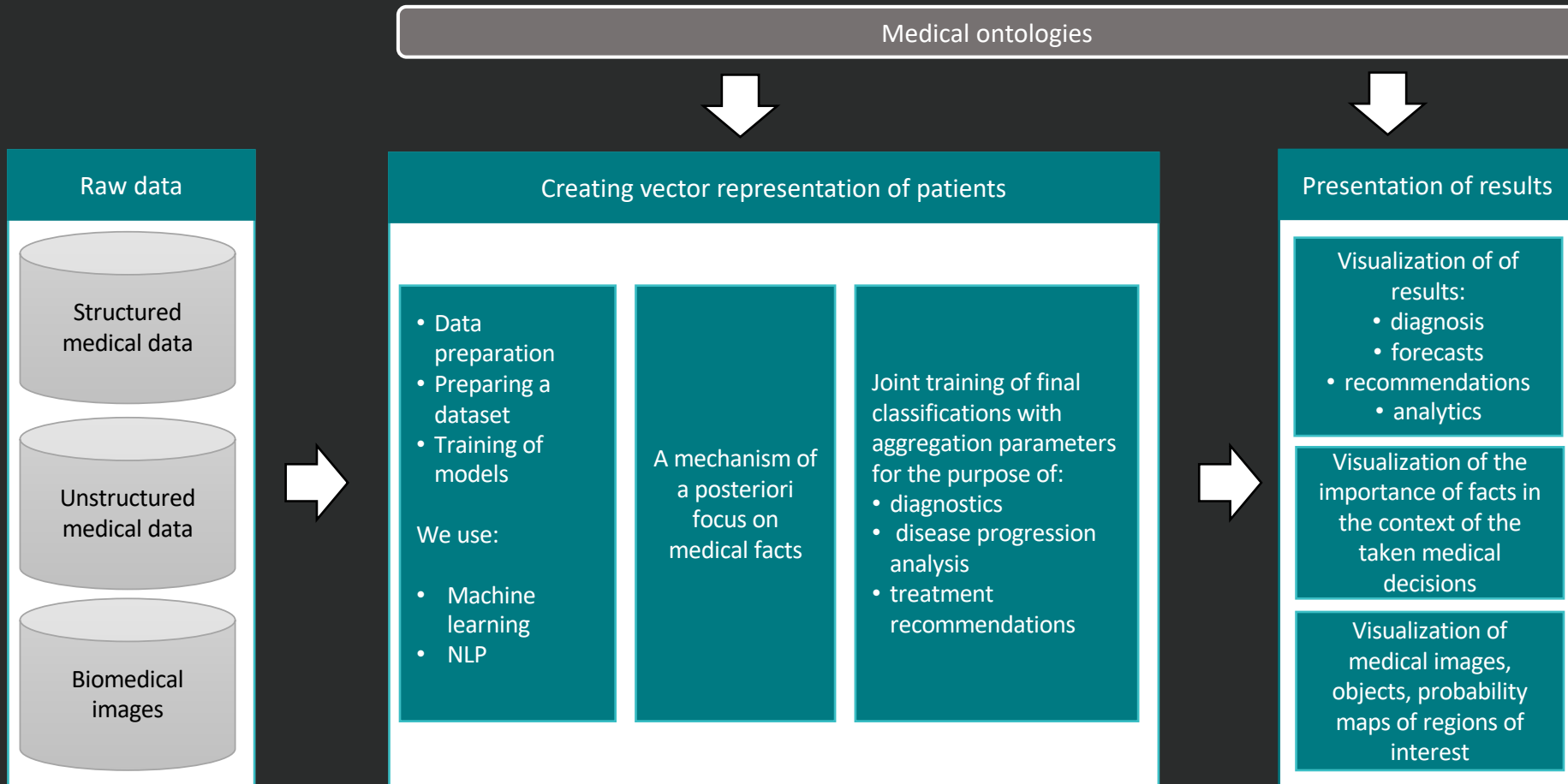
- Shortage of physicians. According to the Association of American Medical Colleges, the number of doctors in USA is not sufficient to meet the increase of healthcare demand.
- Cost of healthcare is increasing faster than the average wage growth (according to Kaiser/HRET Employer Health Benefits forecasts)
- Health Data Volumes worldwide are projected to increase by 48% annually and reach more than 2 Exabytes by 2020 (According to reports from IDC and EMC)
- Drug design and clinical trials are also facing increases in costs

The goal of the project:

Creation of a technology to diagnose and predict the risks of diseases using mathematical patient representation models made with artificial intelligence technologies and medical ontologies

Key features of the technology:

- Automatic preparation of data sets
- Automatic learning of models
- Visualization of results
- Use of medical ontologies



Problems

- Shortage of qualified personnel in radiology
- High cost of describing images

- The cost of providing medical services is growing faster than the income of the population
- Untimely detection of diseases and lack of effective methods for forecasting of risks
- The lack of effective methods to monitor compliance with clinical recommendations

- Increase in the duration of clinical trials due to the long procedure of recruiting patients
- A significant number of patients who do not meet the requirements of pre-screening for clinical trials

Technologies

Technologies of artificial intellect:

- Medical image recognition
- Creation of patients vector representation
- Natural language processing technologies

Medical ontologies

Visualization the results

Products and users



Analysis and recognition of medical images



Hospitals, suppliers of hospital information systems, suppliers of diagnostic equipment



Clinical decisions support systems:

- Disease Risk Assessment
- Monitoring the treatment process and identifying errors



Hospitals, suppliers of hospital information systems, insurance companies



Pre-screening of patients for clinical trials



Pharmaceutical companies, Contract research organizations

Our Approach

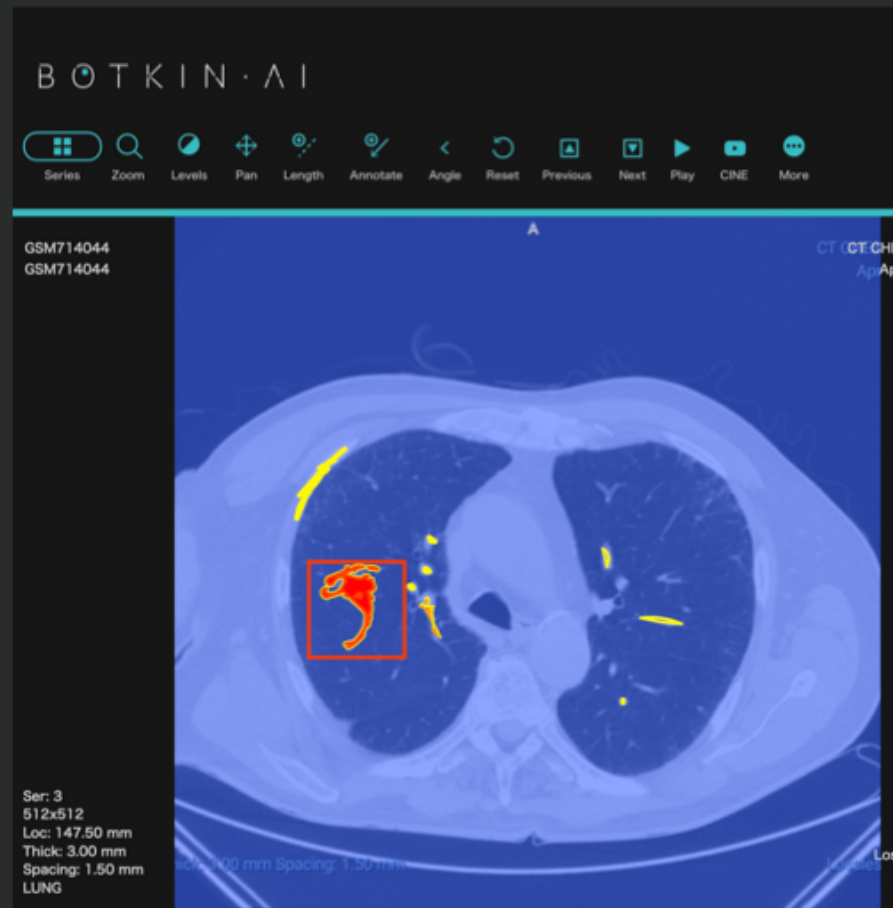
- Processing and recognition of medical images is a part of a larger process aimed at creating the patient's digital model

Main goals in medical image processing:

- Localization of objects
- Image segmentation
- Object/image classification

Result:

- Image Analysis Results Protocol



The purpose of screening is to separate images with high probability of lung cancer



PACS of clinic/
chain of clinics

Selection of
thoracic images



Image Screening

PACS of clinic/
chain of clinics
Integrates with
Botkin.AI

The Botkin.AI
module
automatically
loads all thoracic
images

Automatic
analysis and
recognition of
downloaded
images



Presentation of results

Highlighting of all images
with high probability of lung
cancer

The radiologist can view the
selected images using the
built-in DICOM viewer,
which shows the found
Regions of interest with
high probability of lung
cancer

Clinical Decisions Support System uses the company's technology for creating a digital model of patients.

Key functions of the service:

- Disease Risk Assessment
- Assessment of patients' risk of death
- Monitoring of doctors' compliance to clinical guidelines
- Monitoring of the treatment process and identification of errors

The service can be offered both to medical organizations and insurance companies to assess the risks of developing diseases

Stages of pre-screening for clinical trials using the Botkin.AI technology:

- Build vector representations of inclusion and exclusion criteria for patients used at the clinical trial
- Create vector representations of patients based on data from hospital information systems of the clinics participating in the clinical trial
- Select patients for the clinical trial using the results of comparison between the obtained vectors

Inclusion criteria

Non-squamous Non-small Cell Lung Cancer (T4 N2 M0, mutation EGFR gene/deletion in exon19)

Bone marrow: white blood cell (WBC) count $\geq 4 \times 10^9/L$, absolute neutrophil count (ANC) $\geq 1.5 \times 10^9/L$

Renal: Serum creatinine ≤ 1.5 mg/dL or creatinine clearance ≥ 45 mL/min

Renal: Serum creatinine ≤ 1.5 mg/dL or creatinine clearance ≥ 45 mL/min

Exclusion criteria

Grade 2 or higher peripheral neuropathy NCI-CTCAE Version 3

Any previous history of another malignancy within 5 years of study entry

The following applications for registration of intellectual property rights were submitted:

- October 2017. Application for the patent "Method of creating mathematical models of a patient using artificial intelligence technologies" in the Russian Federation
- October 2017. Application for patent "Method and system of clinical decisions support system using mathematical models of patient presentation" in the Russian Federation
- November 2017. International application PCT for the patent "Method of creating mathematical models of a patient using artificial intelligence technologies"
- November 2017. International application PCT for the patent "Method and system of clinical decisions support system using mathematical models of patient presentation"
- October 2017. Application for state registration of Botkin.AI designation as a trademark in the Russian Federation
- October 2017. Application for international registration of the Botkin.AI trademark under the Madrid Agreement procedure

- Amount of investment in a new round:
 - \$1 000 000
- Start of new round:
 - Estimated time of the round's closure – September 2018
- Key objectives of the round:
 - Business development and international marketing
 - Extension of the platform's key functional elements



N.N. Blokhin Russian Cancer Research Centre

The largest oncology institution in Europe and one of the largest institutions in the world. The Center provides all the existing types of clinical oncological services and performs a wide range of scientific studies. **N.N. Blokhin Russian Cancer Research Centre** possesses one of the largest oncology database in the world.



Bayer

The project has been endorsed by Bayer through the Russian segment of the international Grants4Apps program that supports innovative projects in the field of digital healthcare.



The company is a resident of the **Skolkovo Innovation Center**.

For additional information, please contact:

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