IBS

IT COMPASS

IBM Cloud Pack for Data with Power AI - How to enable your applications with intelligence and computer vision

Изкуствен интелект

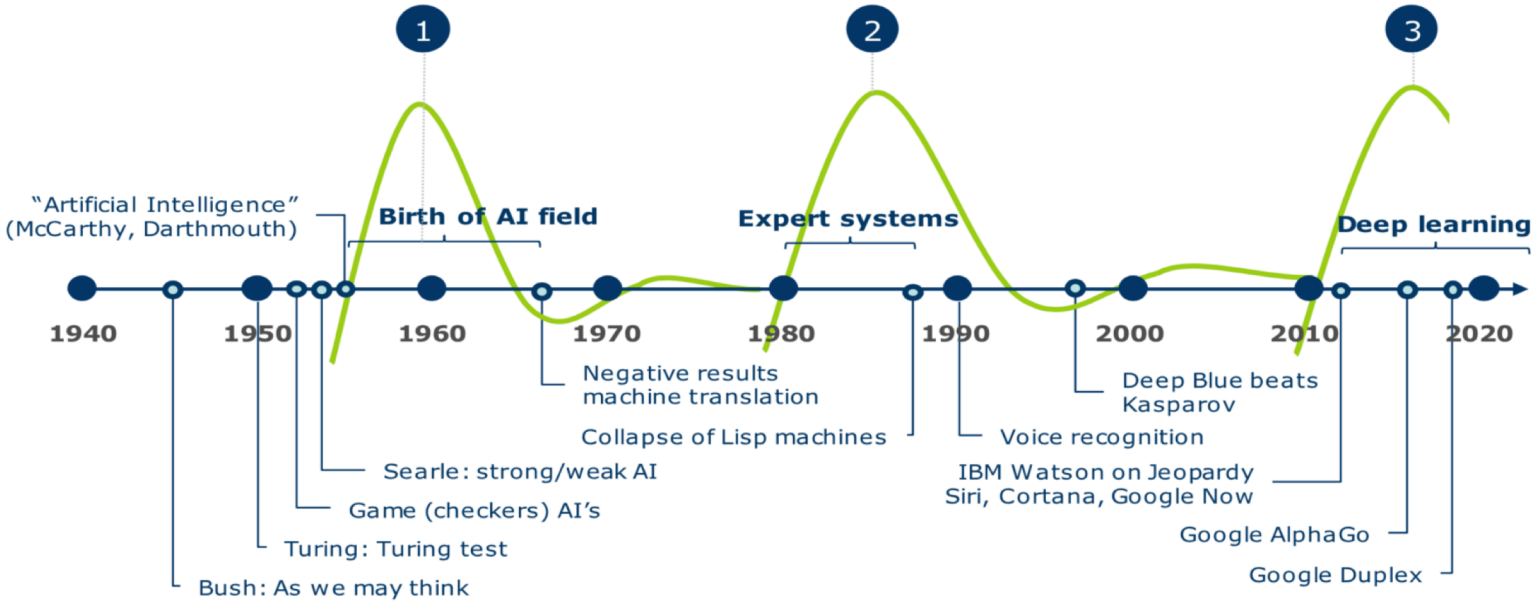
270%
увеличаване на прилагането на ИИ през последните 4 години

ИИ потенциално да генерира допълнителна икономическа стойност приблизително $13 T до 2030

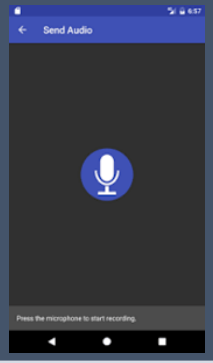
Facebook: 10 000 000 снимки на всеки час. До 2020 цифровата вселена ще достигне 44 zettabytes... 10^{21} "

ИИ Комбинации от технологии които налагат иновации във всички области

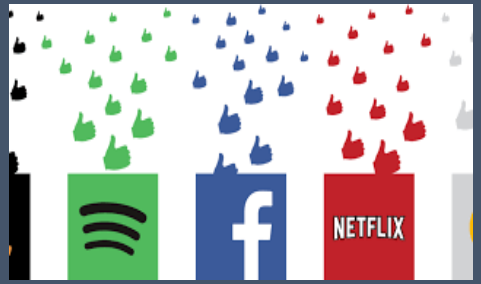
История на ИИ



Virtual Assistant



Recommendation Systems

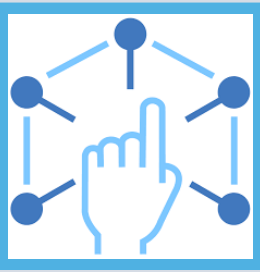


Medical Diagnosis

Navigation systems

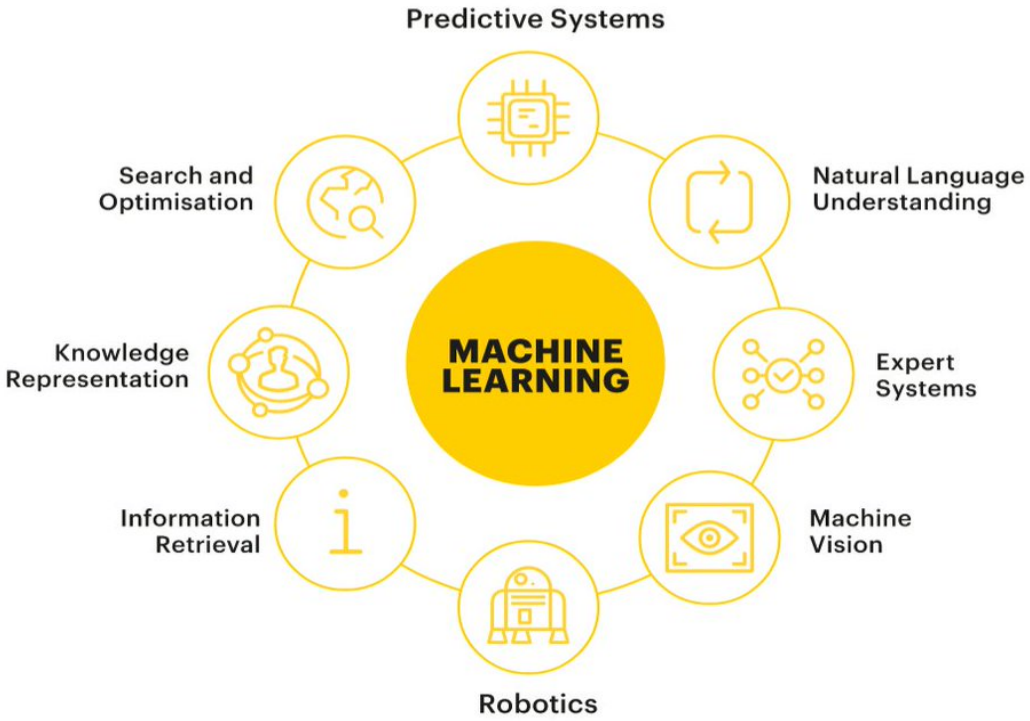
Games

Robotics



Decision Optimization

Възможности на ИИ



Предизвикателсва в ИИ

Sense

- ✓ Различни видове данни изображения, звуци, говор, текст
- ✓ Голям обем и трудна обработка, с неясни концепции
- ✓ Качеството на данни е решаващо за разбирането им и правилното построяване на модела

Comprehend

- ✓ Експертиза за реализация на модел и за специфични знания и опита в конкретната област
- ✓ Бавен процес с много итераци и експериметни

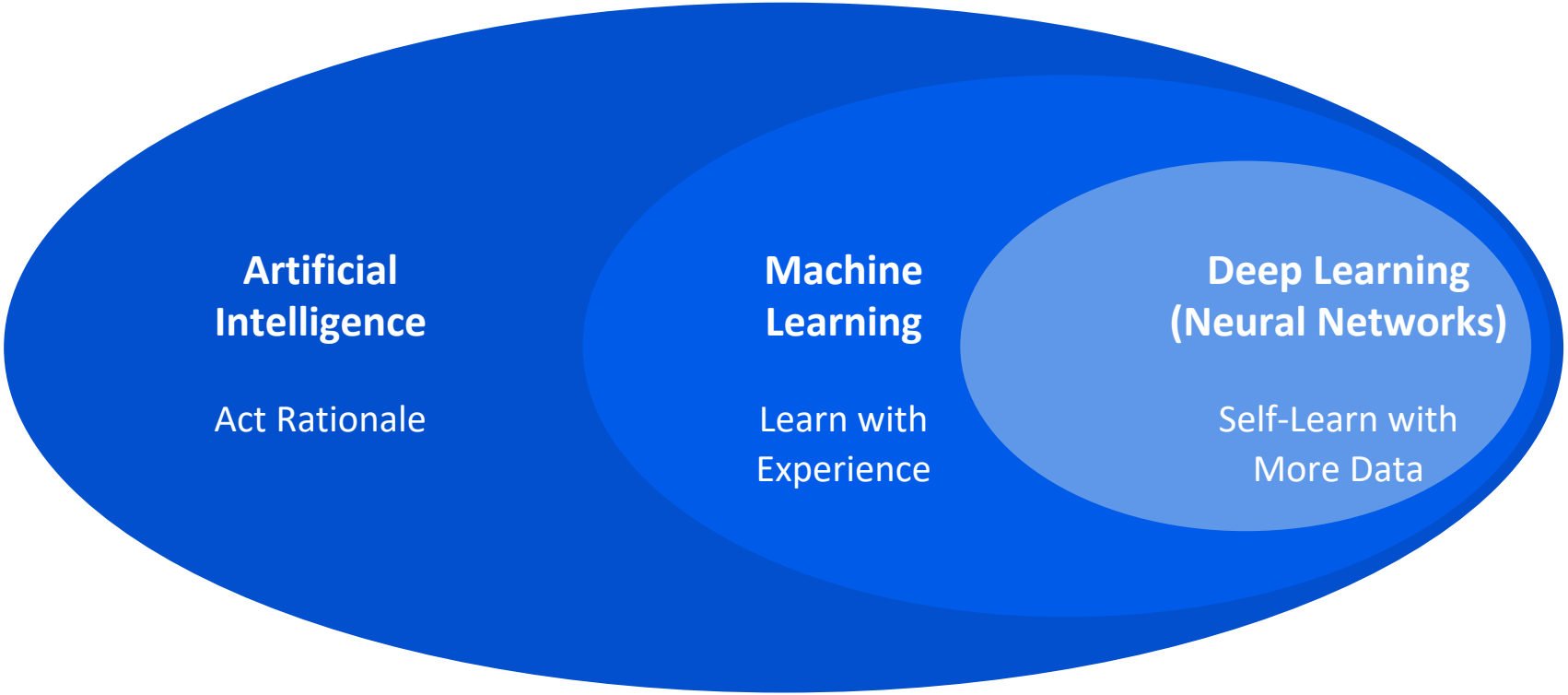
Act

- ✓ Интеграция в цялостно решение
- ✓ Прозрачност и справедливост при извеждане на решението

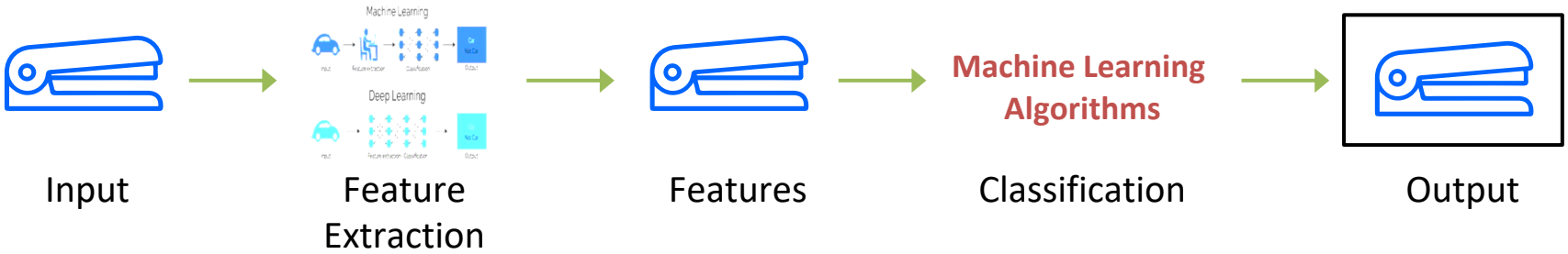
Learn

- ✓ AI непрекъснато оптимизира своята ефективност, като се учи от успеха или неуспеха
- ✓ Непрекъснато наблюдение и идентифициране на отклонението

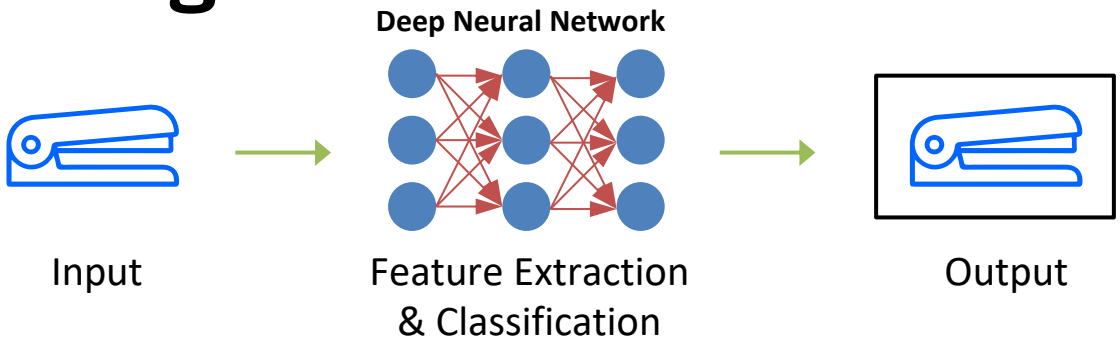
Machine learning основен фокус в ИИ



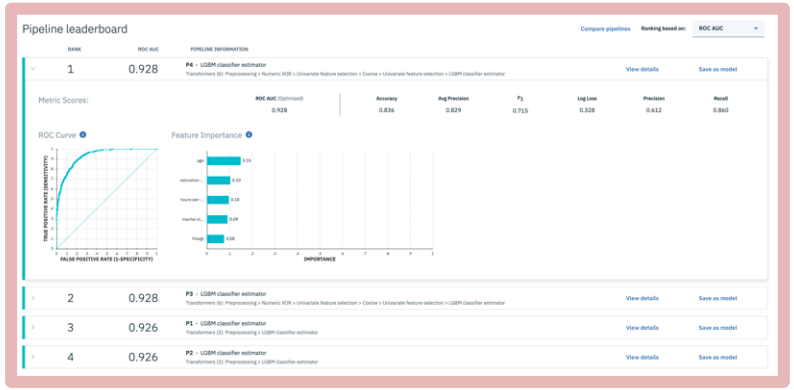
Machine learning vs Deep Learning

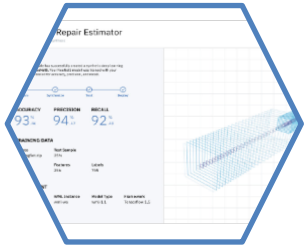


Deep Learning



IBM Стратегия за автоматизиране на ИИ





Transfer Learning

- ✓ Transfer knowledge learning Коефициентите на вече обучена мрежа може да се приложат в друга област, с промяна само в последните слоеве
- ✓ Watson Services,Watson Studio

AutoAI Experiments | Pipeline optimization

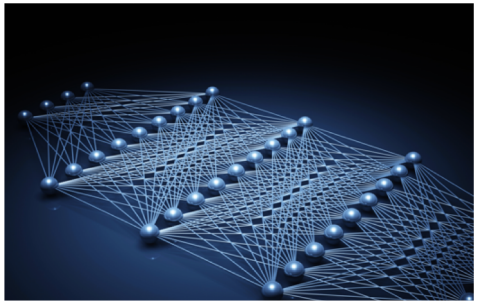
- ✓ Автоматична подготовка на данните, избор на характеристики и оптимизация на параметрите на модела

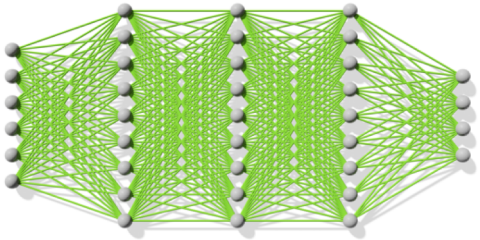
Neural Network Search

- ✓ Автоматично избира подходящата архитектуа на невронната мрежа
- ✓ **NeuNetS**

AI for AI: автоматизиране на ИИ

Designing



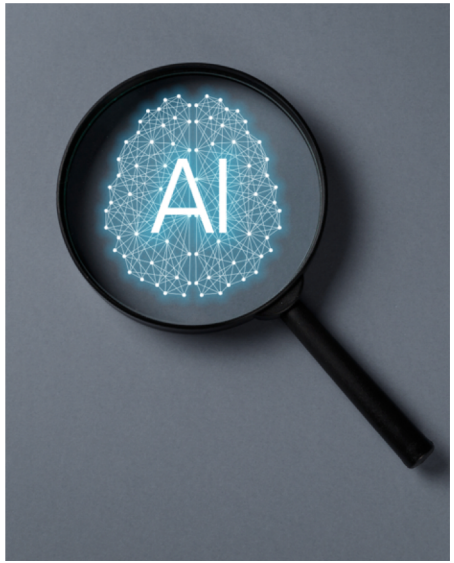


Neural network
architecture and search

Optimizing

pipeline optimization
Decision optimization

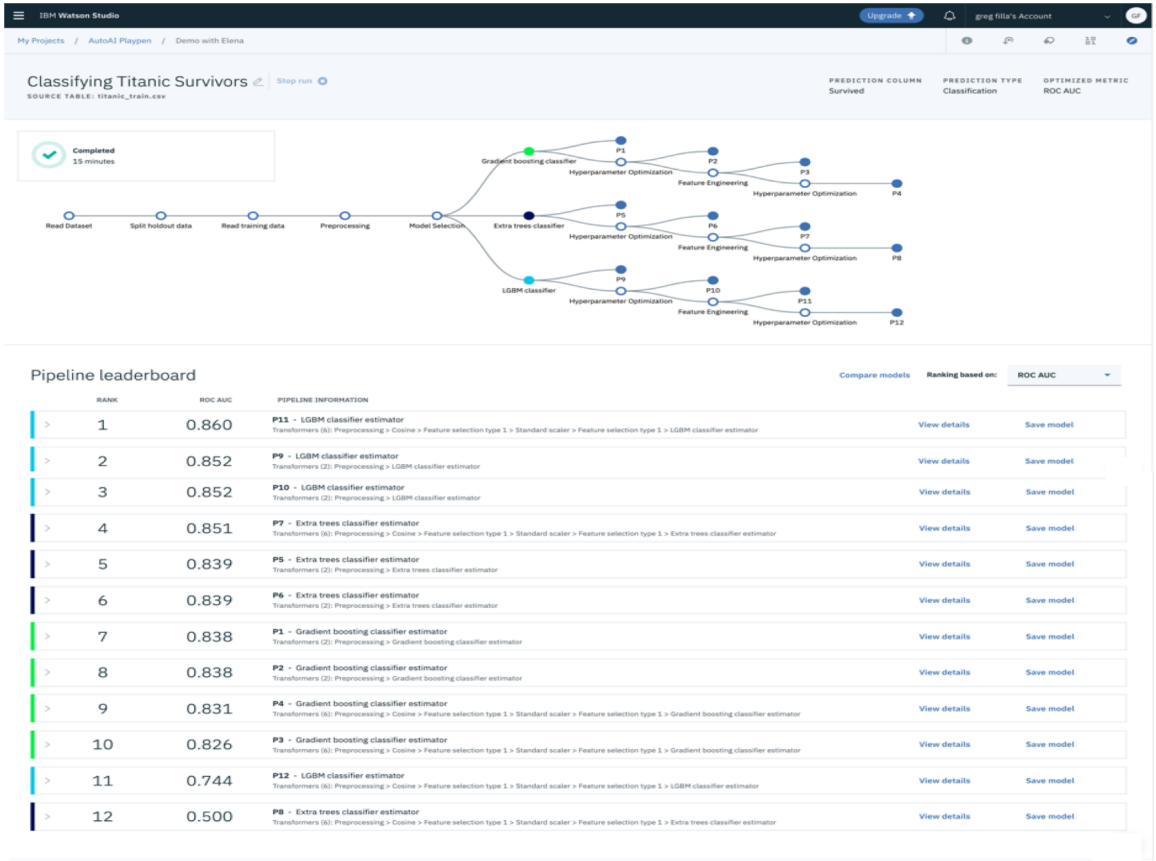
Governing



Monitoring AI outcome with
trust and explainability

AutoAI , IBM Watson Studio

- Интегриран в **Watson Studio** и **Watson Machine learning**
- Автоматично подготвяне, трансформиране и моделиране с оптимизация на хипер параметрите
- Резултати от обучението в реално време, помагащи проследяването на представянето на модела
- Бърз деплой на модела в Watson Machine Learning



Ползи от AutoAI

Build models faster
Автомтизира процесинга на данните и разработката на модела

Jump the skills gap
No coding? Не са необходими специфични умения

Discover more use cases
collaboration с AI everywhere да постави нови предизвикателтва

Find signal from noise
Auto-feature engineering улеснява извличането характеристики

Rank and explore models
Бързо сравнява candidate pipelines ,за да се намери най-добрия модел

Ready, set, deploy
Генерираният процес с AutoAI може да бъде лесно деплойнат с REST APIs с one click

IBM Openscale

- Почти всеки модел, без значение колко внимателно е проектиран, е вероятно да проявяви необективна оценка

- С времето моделите променят своята точност

AI Fairness, Monitoring and Explainability

- Видимост, в реално време наблюдение на точността на модела
- Наблюдение на справедливостта на модела при:

Fairness

Подготовка на данните
Обучение
Работата на модела

- Обяснение за важността на всяка характеристика при извеждане на предвиждана стойност

Наблюдение и редуциране на отклонението

Watson OpenScale

Online Post Processing
(Intercept & Fix Features

AI Fairness 360

In-Processing
(Intercept & Fix Algorithm

AI Fairness 360

Pre-Processing
(Intercept & Fix Training Data)

Какво е“fairness” за Watson OpenScale

IBM Watson OpenScale

Spark German Risk Deployment - Final : Fairness

Select the features to monitor

For each feature you select, Watson OpenScale will monitor the deployed model's propensity for a favorable outcome for one over the other.

Features are monitored individually, but any debiasing will correct issues for all features together.

Find features

With the Lite plan, you can select up to 2 features to monitor. Need more? View upgrade options.

CheckingStatus	LoanDuration	CreditHistory	LoanPurpose	LoanAmount
ExistingSavings	Employment Duration	InstallmentPercent	Sex	OthersOnLoan
CurrentResidenceDuration	OwnsProperty	Age	InstallmentPlans	Housing
ExistingCreditsCount	Job	Dependents	Telephone	ForeignWorker

IBM Watson OpenScale

Spark German Risk Deployment - Final : Fairness

Specify reference and monitored groups [Sex]

Divide values into two groups - reference and monitored. Reference group values are used to calculate disparities of outcomes between groups. Specify the monitored group values that will be compared with the reference group to check for potential bias.

Reference group

Add

male ×

Monitored group

Add

female ×

IBM Watson OpenScale

Spark German Risk Deployment - Final : Fairness

Specify the favorable outcomes

Watson OpenScale will calculate the percentage of records that receive the predictions specified.

If a value is not available in the value list, enter it manually.

Favorable values

Add

No Risk ×

Unfavorable values

Add

Risk ×

IBM Watson OpenScale

Spark German Risk Deployment - Final : Fairness

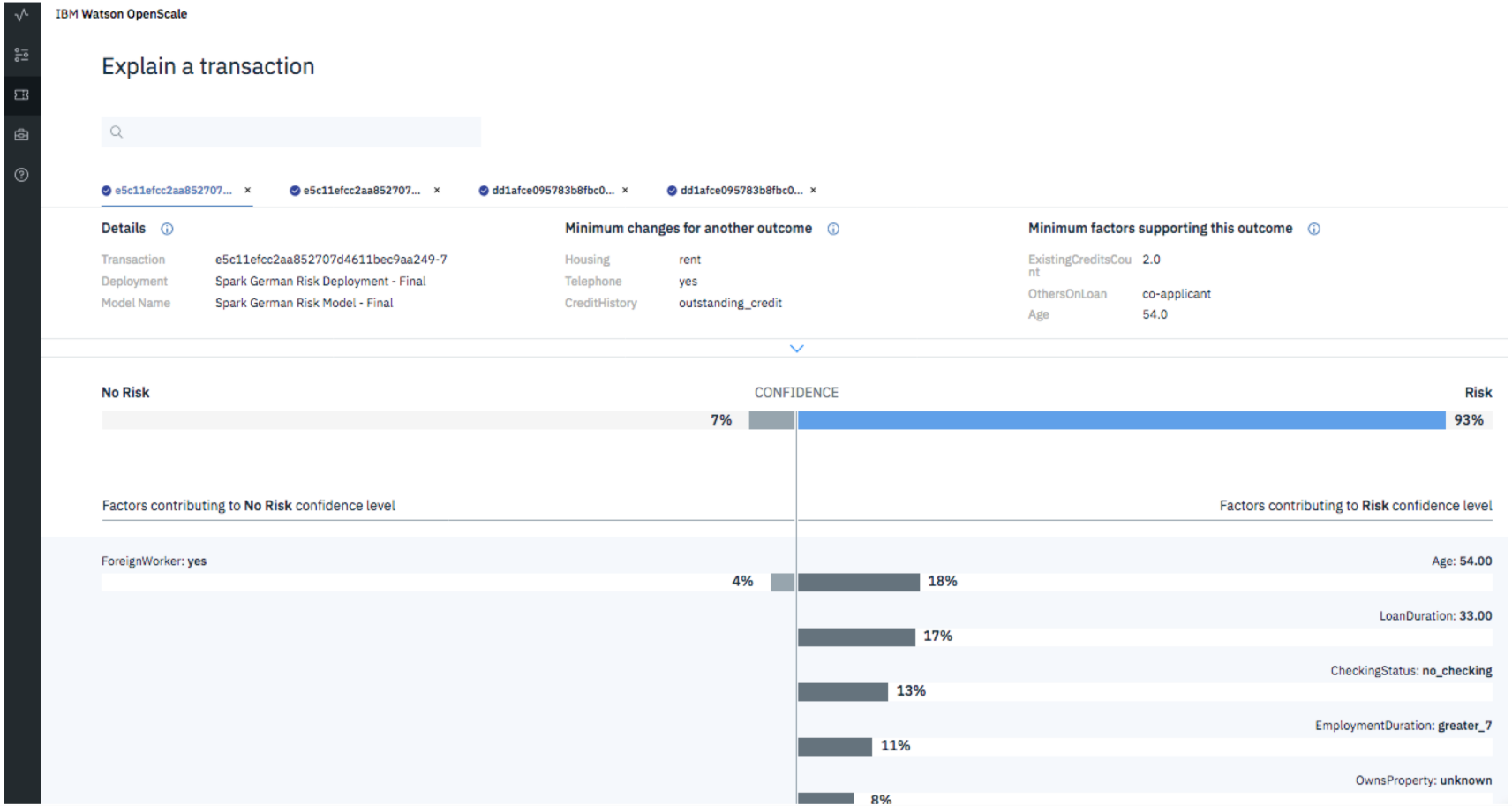
Set fairness alert threshold [Sex]

Track when fairness falls below an acceptable level.

Indicate when fairness falls below this threshold

1% 100% 95% Fair

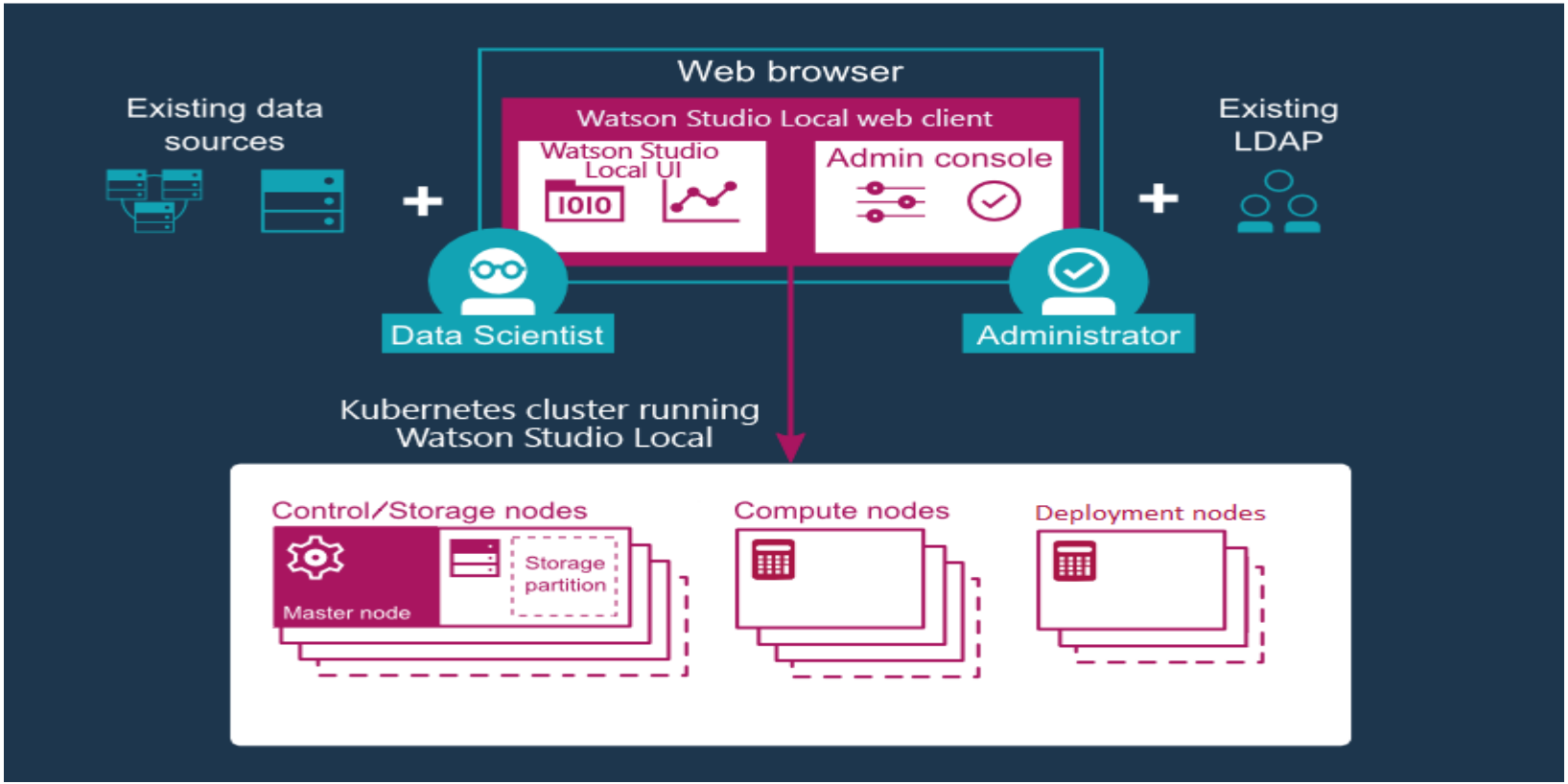
Watson OpenScale Explainability Screen



Защо Power 9 AC922?

- ✓ Бърз I/O - PCIe Gen 4, CAPI 2.0, OpenCAPI и NVLink
- ✓ До 6 NVIDIA Tesla V100 GPU – позволява едновременно трениране на модела и тестване
- ✓ 44 ядра (време за компилация на OpenCV (6m0.187s)
- ✓ Watson Machine Learning Accelerator
- ✓ Всички необходими пакети за разработка – достъпни през Conda.
- ✓ ОС: RHEL 7

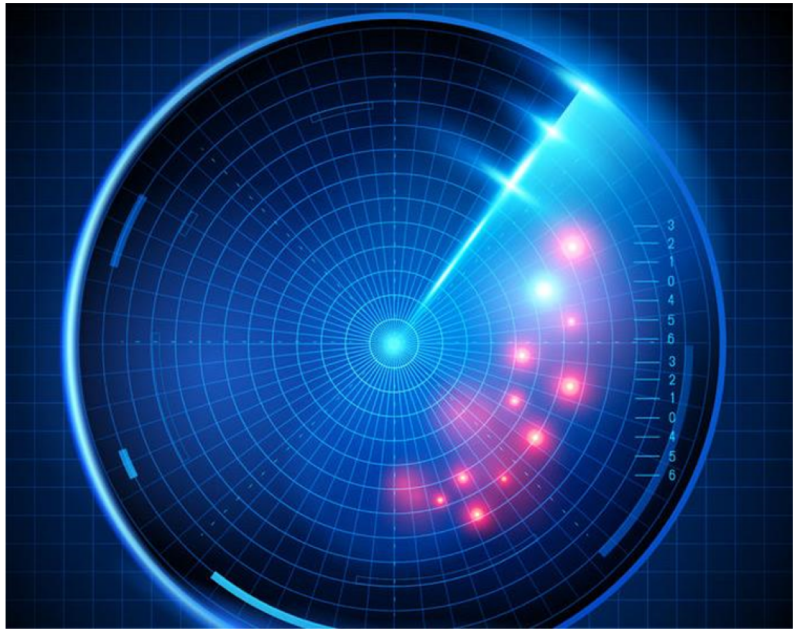
Нашата среда за разработка



Computer Vision IBM Power AI Vision

Image Classification

Object Detection



Computer Vision Problems

Image Classification

64x64

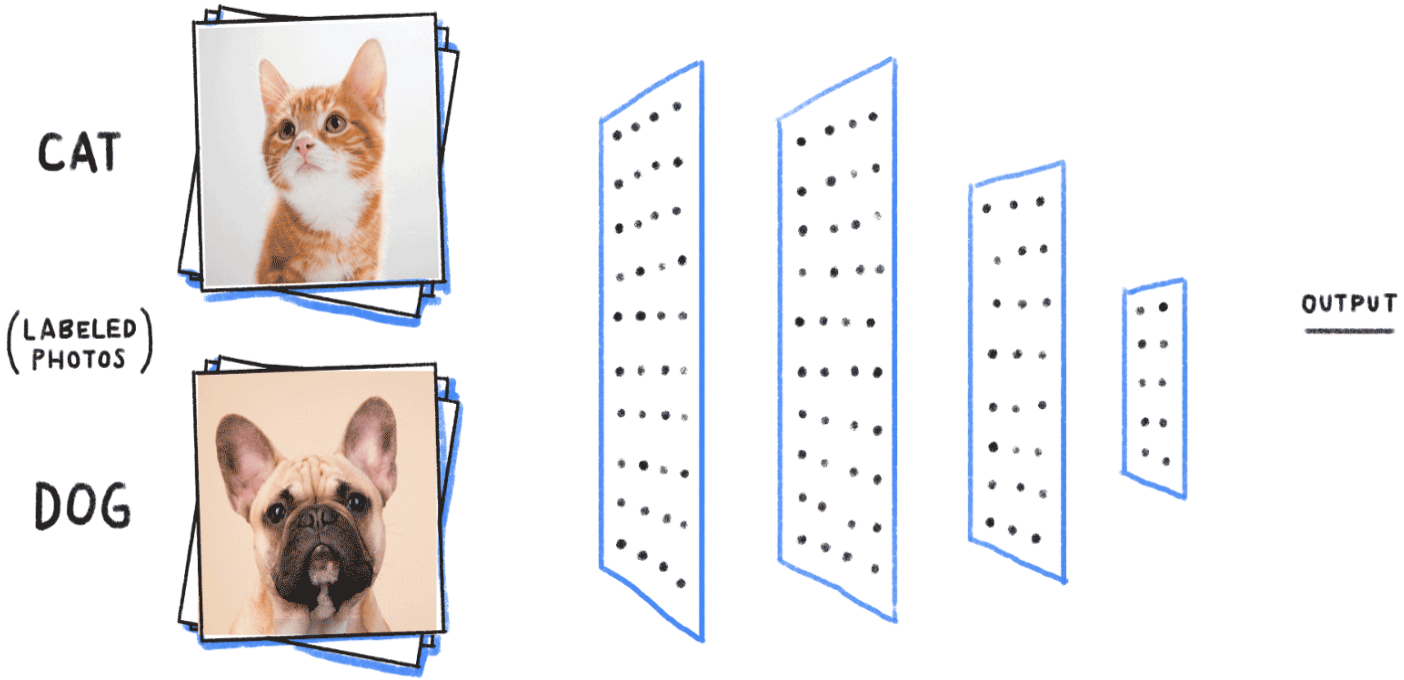
→ Cat? (0/1)

Object detection

Neural Style Transfer

Andrew Ng

Deep learning convolutions



PowerAI Vision core capabilities

IBM **PowerAI Vision** Data Sets Models Custom Models Deployed Models admin **Log out**

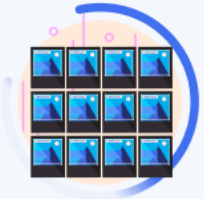
Welcome to IBM PowerAI Vision

Create Dataset

Start by adding images and video files to a data set.

Prepare Data

Label objects or assign categories to images or videos, then use auto labeling to complete the entire data set.

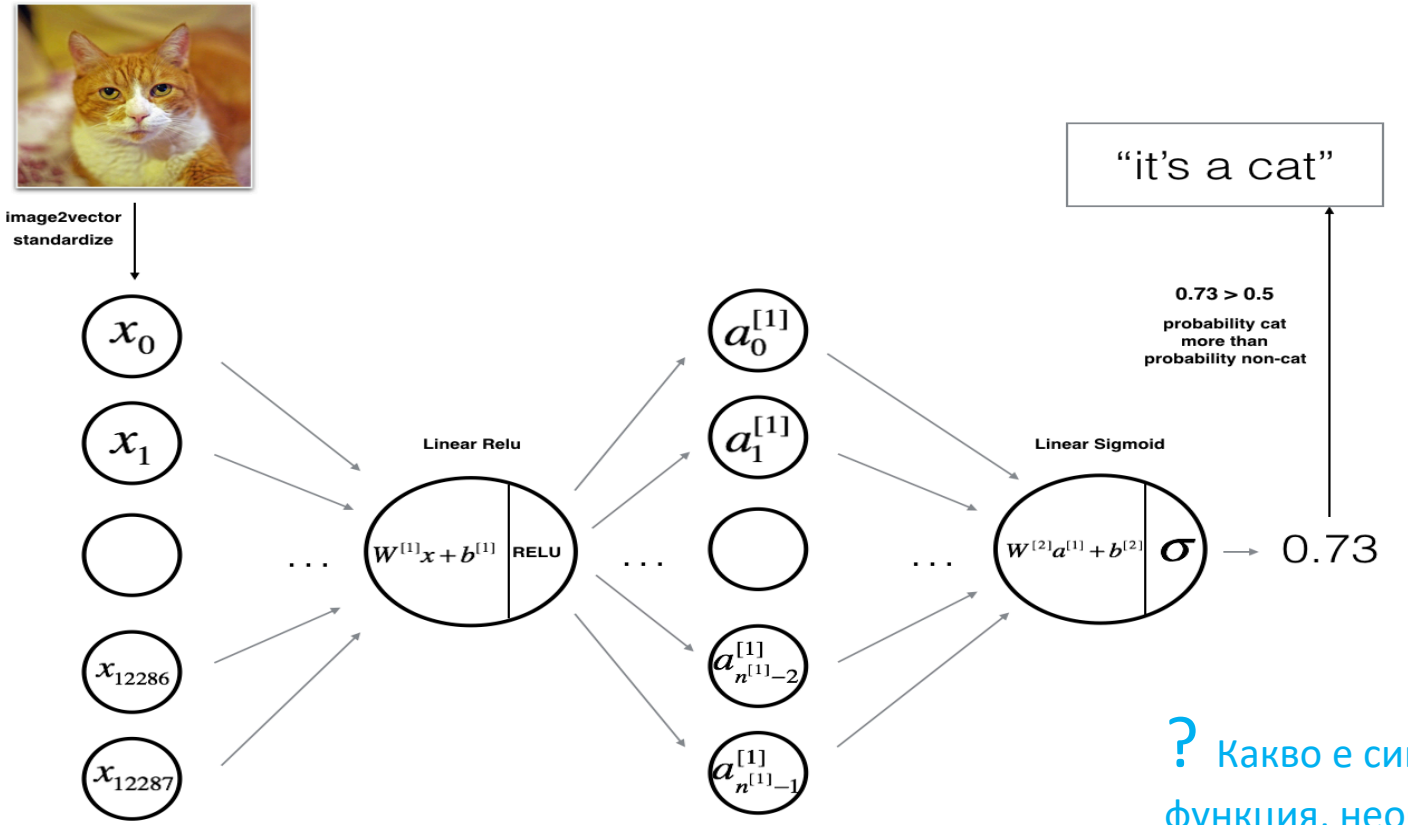


Train Model

Select a few custom options to create your model.

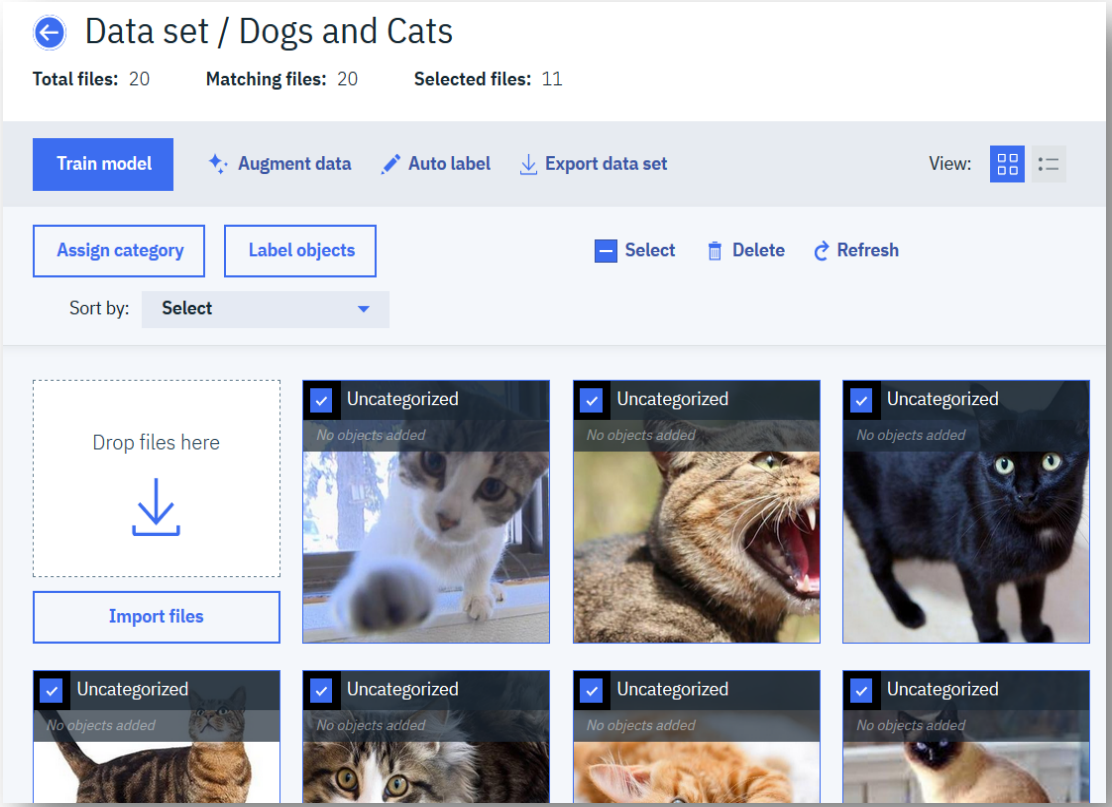
Deploy Model

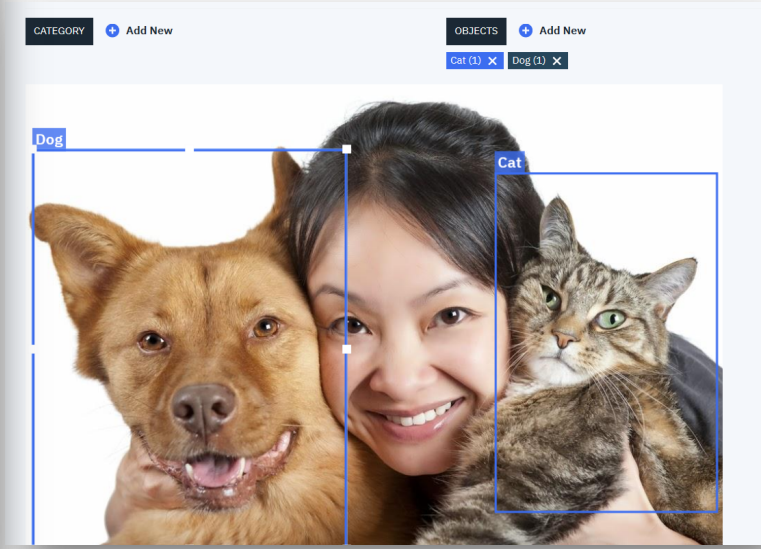
Deploy the trained model and receive an API link for an inference device.



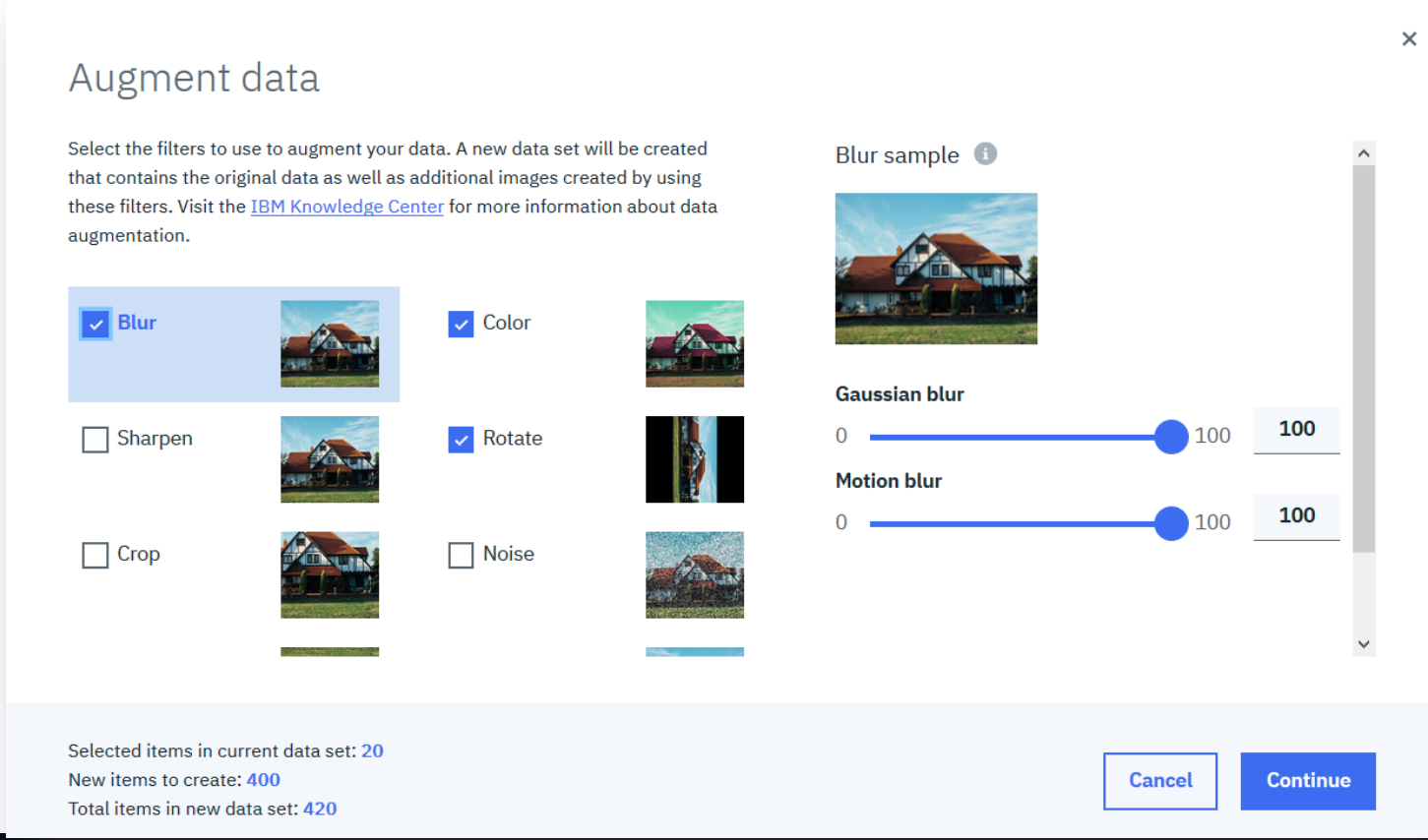
? Какво е сигмоид и релу функция, необходимо ли е да знаем

При **Object Detection**, Дефиниране на обектни етикети и създаване на рамка около обекта с правилния етикет





Генериране на допълнителни данни чрез автоматизирана промяна на изображението

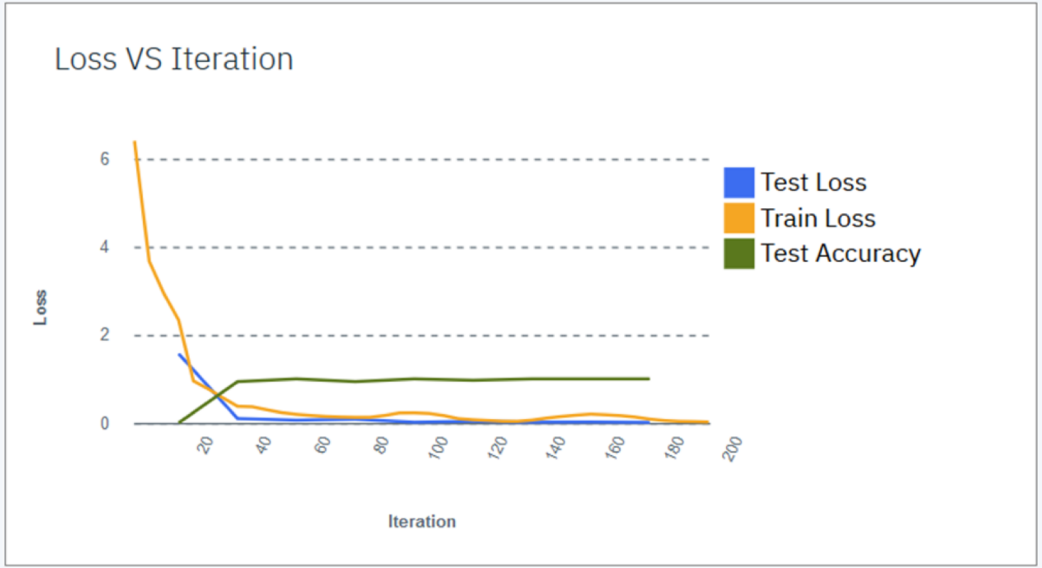


Обучение на модела

Data set / Dogs and Cats

Total files: 20 **Matching files:** 20 **Selected files:** 11

Train model | Augment data | Auto label | Export data set



Train model / Dogs and Cats

Model

Create new model

Dogs and Cats_model

Type of training

- (●) Image classification
- ( ) Object detection

Model selection

- (●) System default (GoogLeNet)
- ( ) Custom model:

CICModel

> Advanced options

Return to data set | Train

След като моделът е обучен, може да се експортира или да се деплойне. Индикатори за качеството на модела

Trained model / Fasteners Augmented_model

Trained models are created from prepared data sets.
The model can be validated, exported, and deployed for production for Graphics Processing Units (GPU).

Object detection
Optimized for accuracy (faster R-CNN)

Created
11/8/2018, 5:39:18 PM

Deploy model | Export model

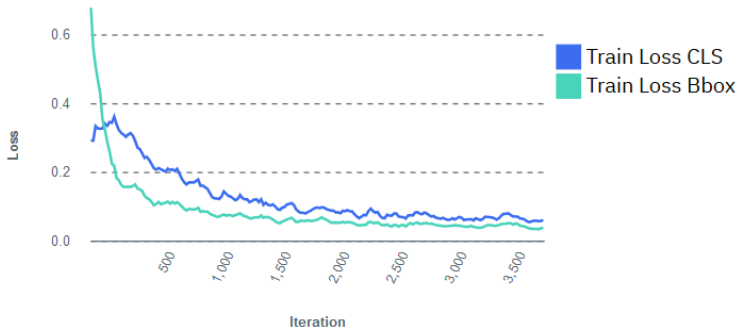
93% Accuracy | 99% Precision | 98% mAP | 95% Recall | 84% IoU

OBJECT	AVERAGE PRECISION	RECALL	IOU
nail 230 objects / 184 images	1	1	1
screw 322 objects / 230 images	0.96	0.879	0.96
bolt 322 objects / 207 images	0.986	0.96	0.986

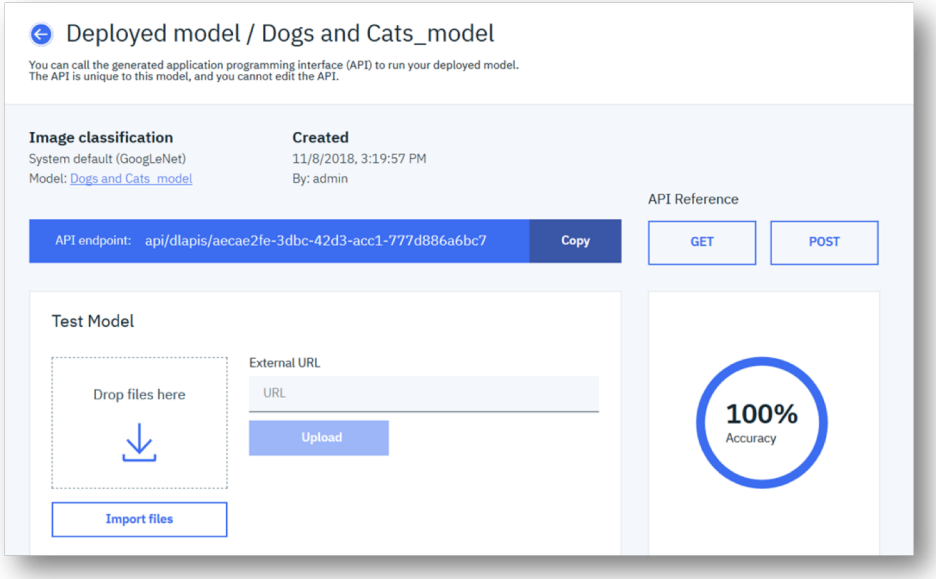
Model hyperparameters

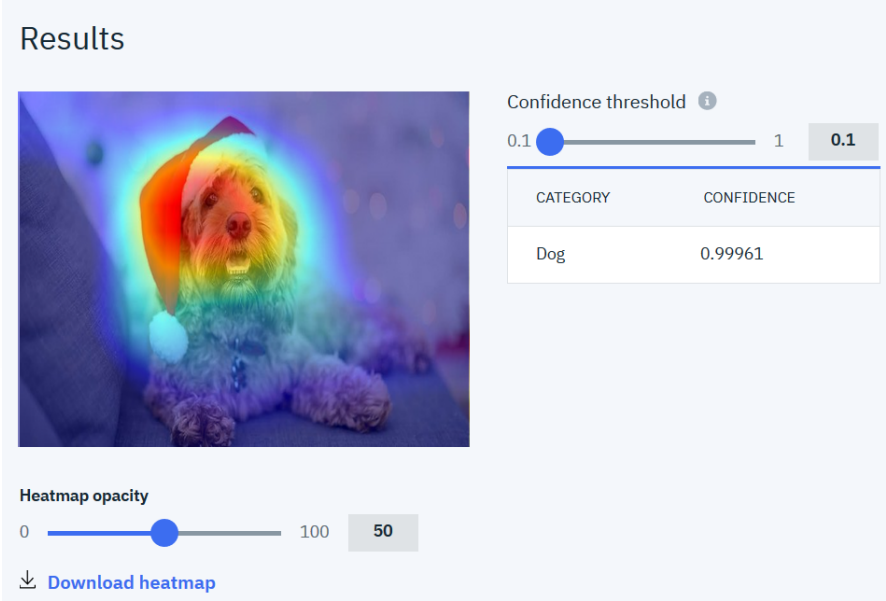
Learning rate	Max iteration	Weight decay
0.001	4000	0.0005
Momentum	**Ratio**	
0.9	0.8	

Loss VS Iteration



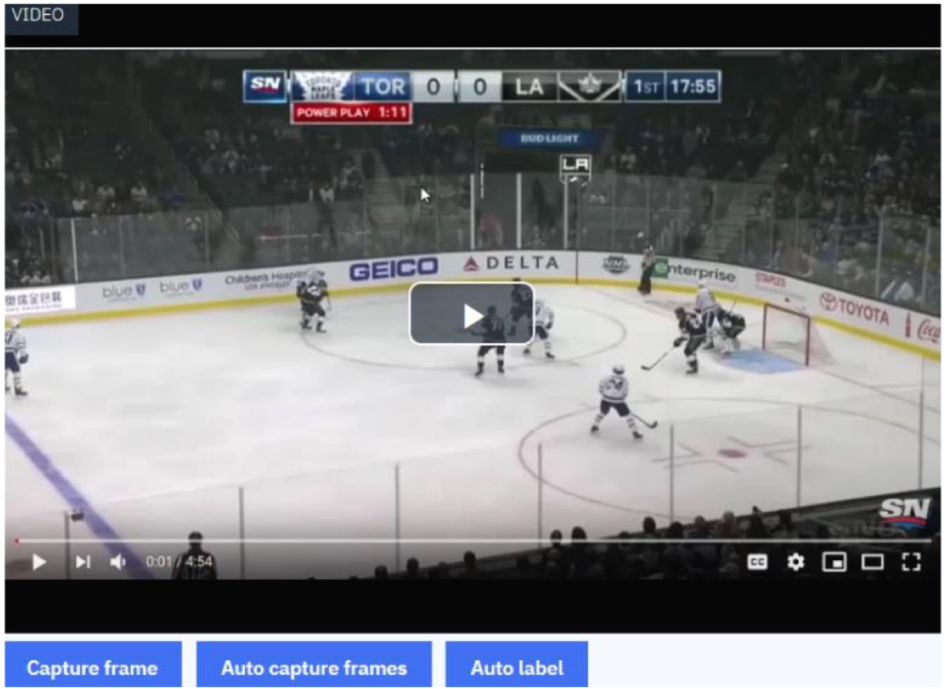
Тестване на модела с примерно изображение - класификация

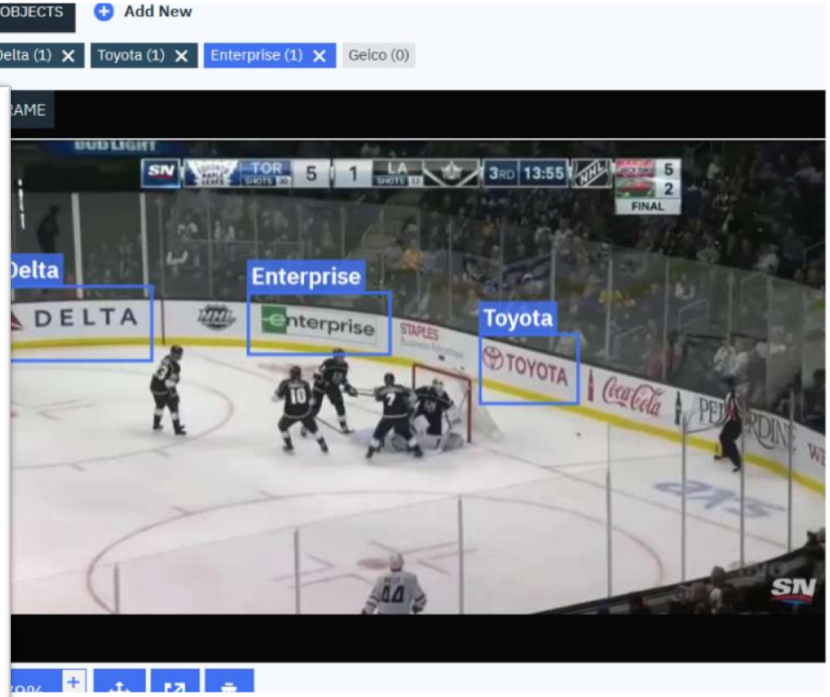




Означаване на кадрите с имена на обекти

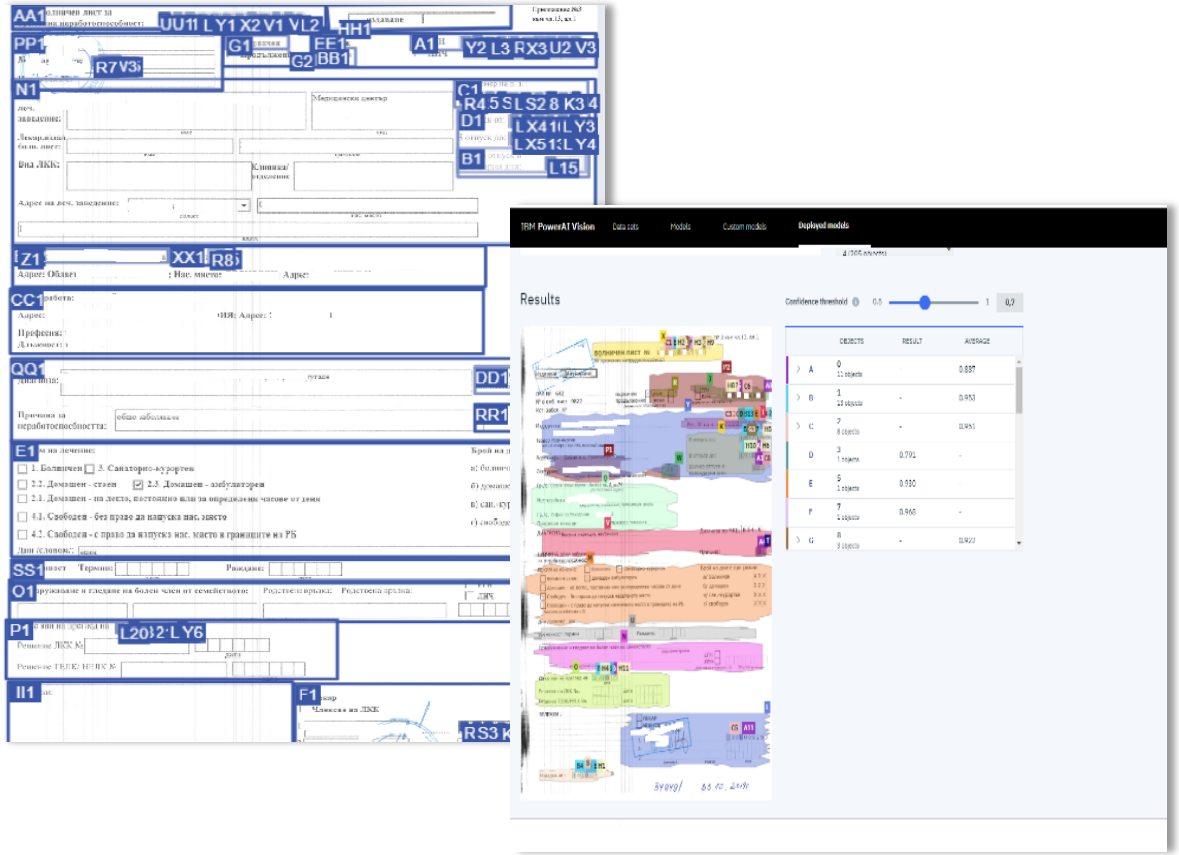
Използване на подмножество на видео рамки, етикет обекти





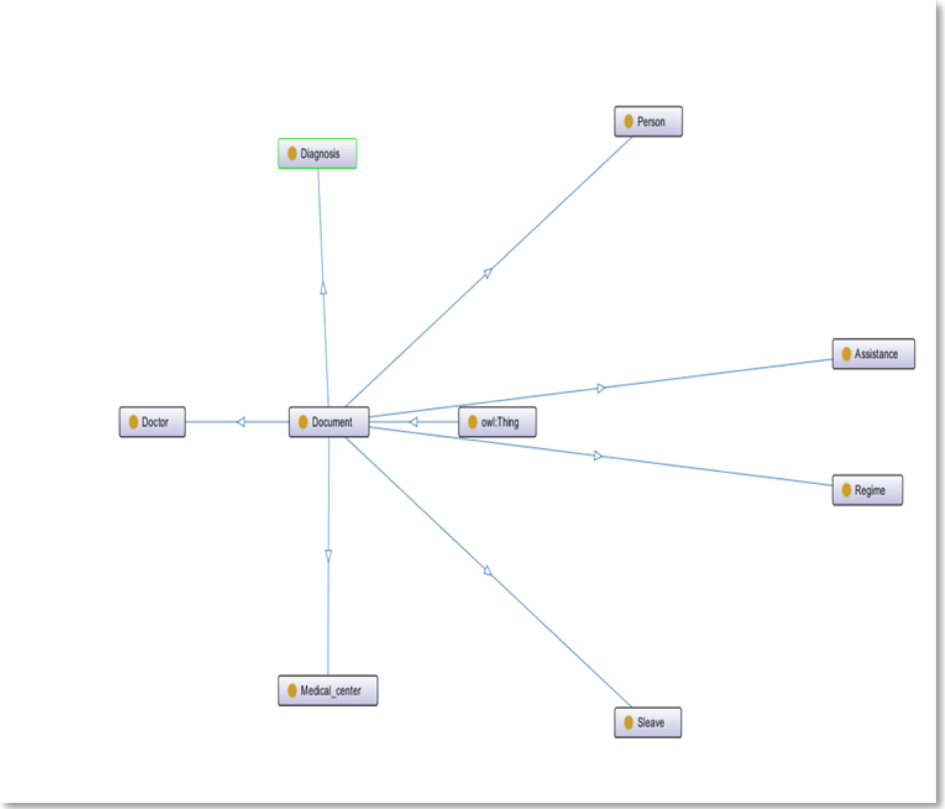
Document Layout analysis Power AI Vision – Болничен лист

- Разпознаване на основни данни от документа, необходими за автоматизиране на обработката
- Object detection and segmentation
- Rest Api

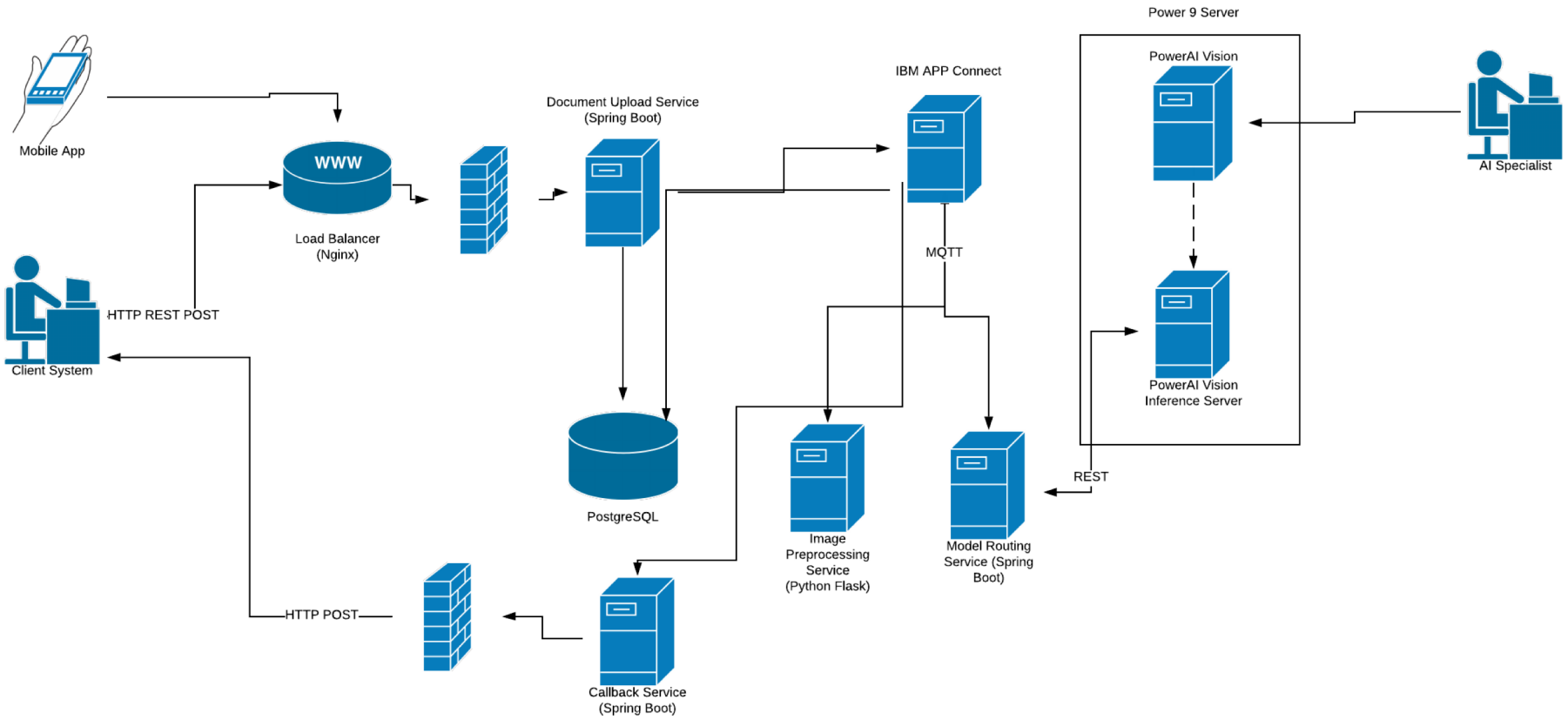


Document Layout analysis предизвикателства

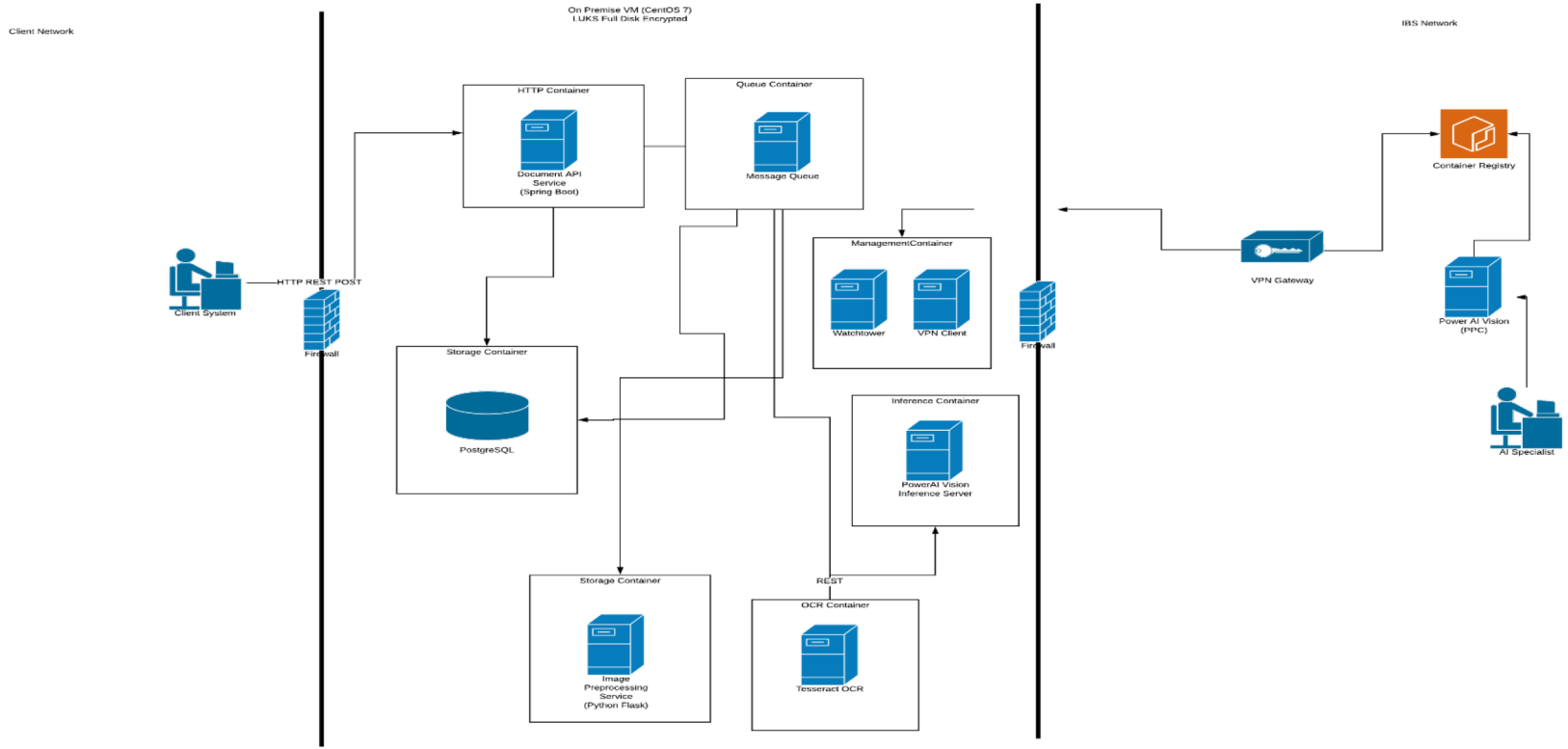
- Затруднение на ocr, поради сегментирания документ и наличието на малки елементи
- Експериментиране с различни мрежи
- Концептуализация на документа



AI в реалния живот (като услуга)



AI в реалния живот (при клиента)



Демо

TIMEOFF.GURU

AI и управлението на отпуски

Как да приложим ИИ бързо и ефективно

- ✓ InformationArchitecture&AI . Без консистентни и качествени данни не можем да развиваме ИИ
- ✓ AutoAI for AI. Намалява времето за разработка и управлява представянето на модела
- ✓ Deep learning tools. Правят възможно бързото построяване и обучение на невронната мрежа
- ✓ Power systems 9. Подходяща архитектура за AI !

Благодарим за вниманието