



Deep learning in CCTV on Intel platform

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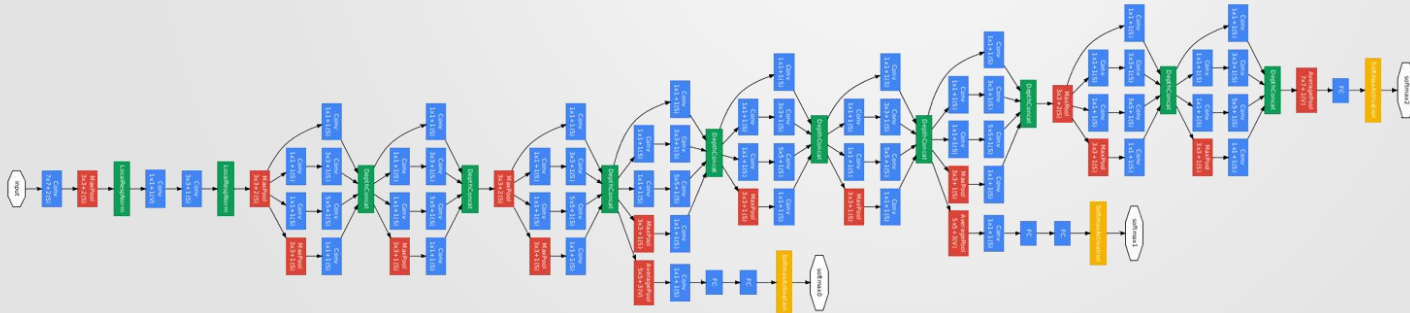
Head of Computer Vision Department



Agenda



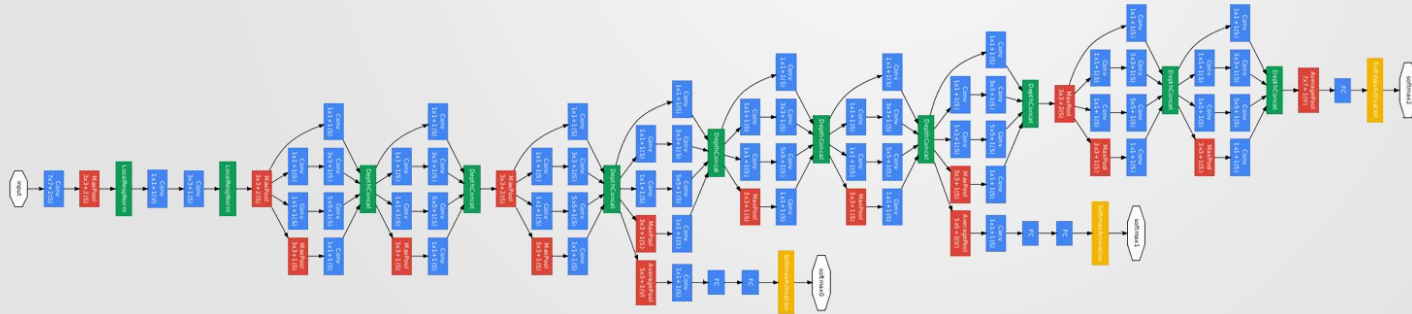
- Deep learning techniques by examples
- Equipment



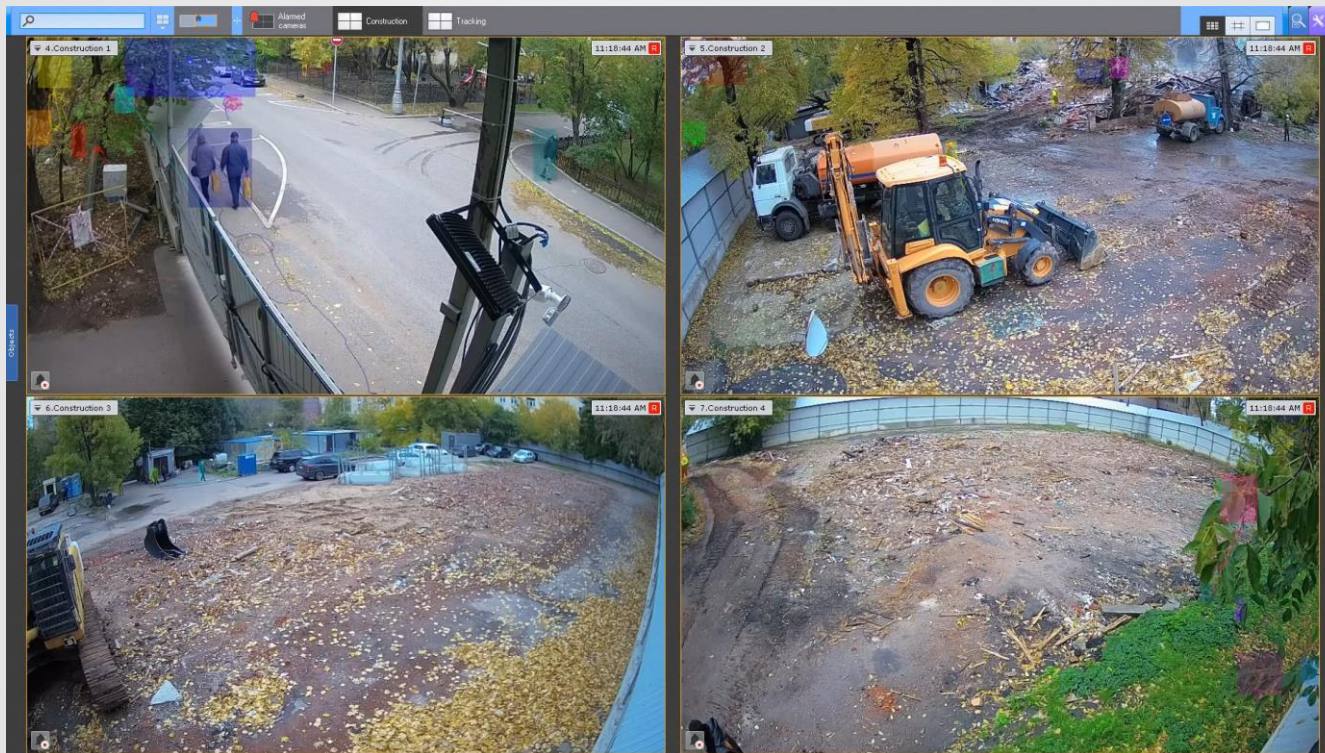
Deep learning techniques



- Classification
- Detection and localization
- Similarity
- Skeletons
- Semantic segmentation



Neural filter Classification



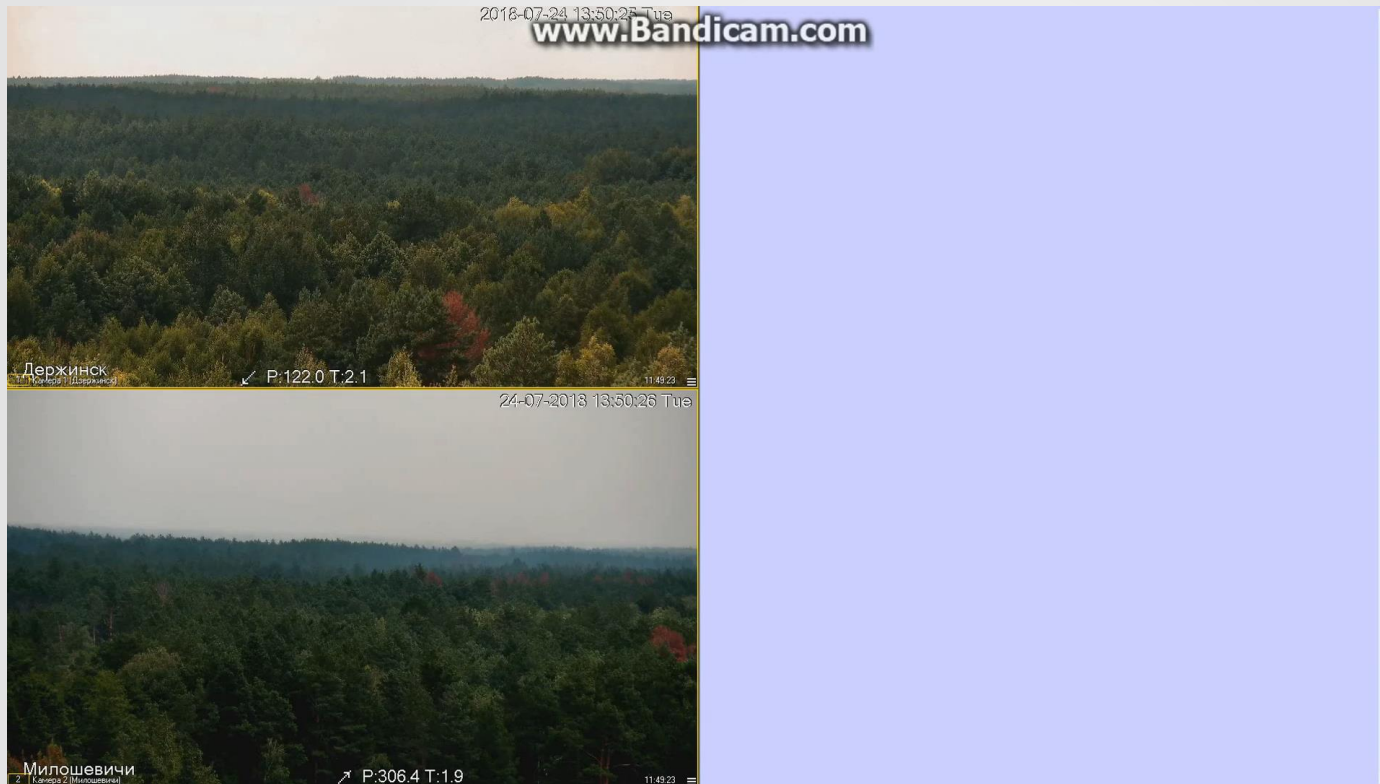
Neural filter

Classification

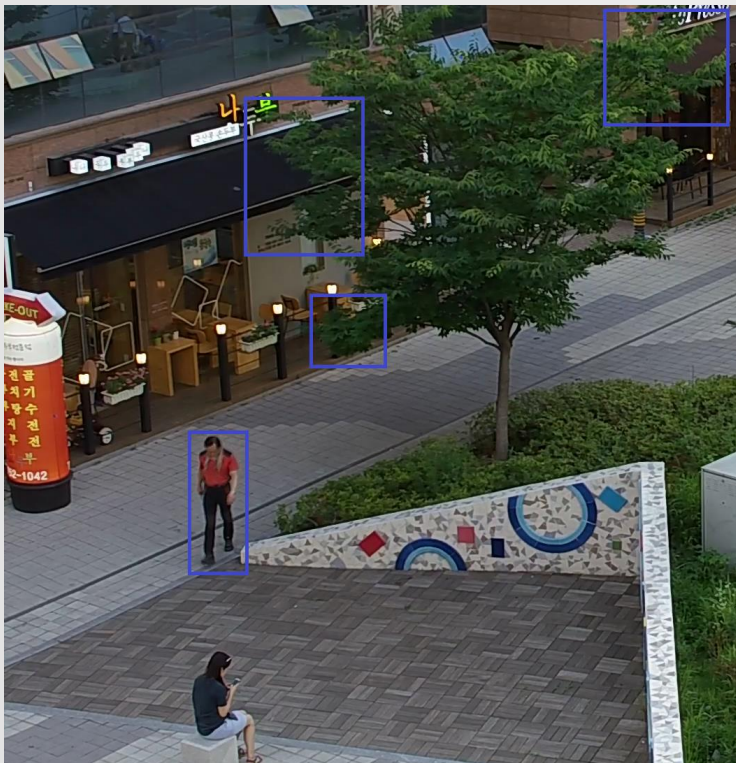


Smoke detection

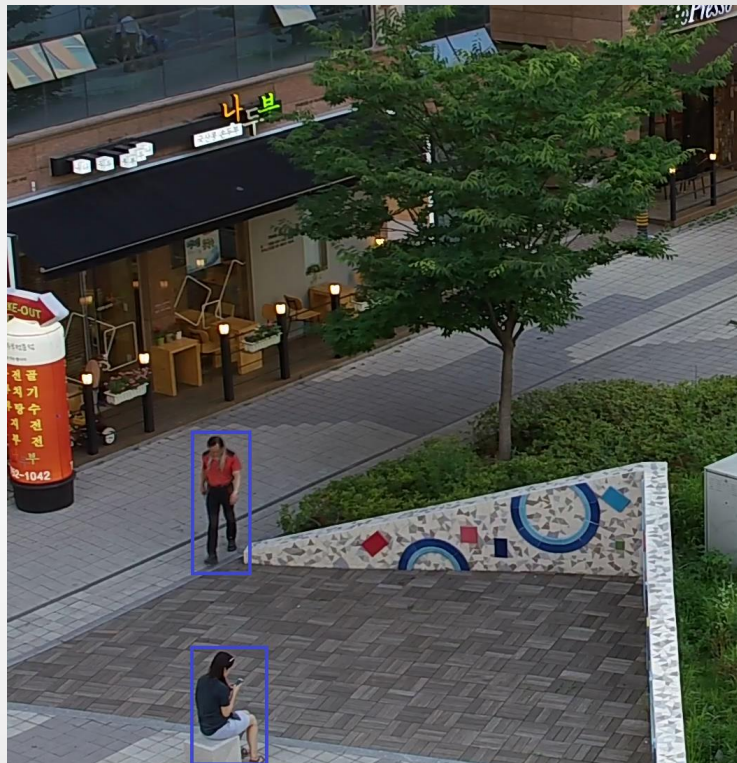
Classification



Detection and localization



Classical computer vision



Deep learning

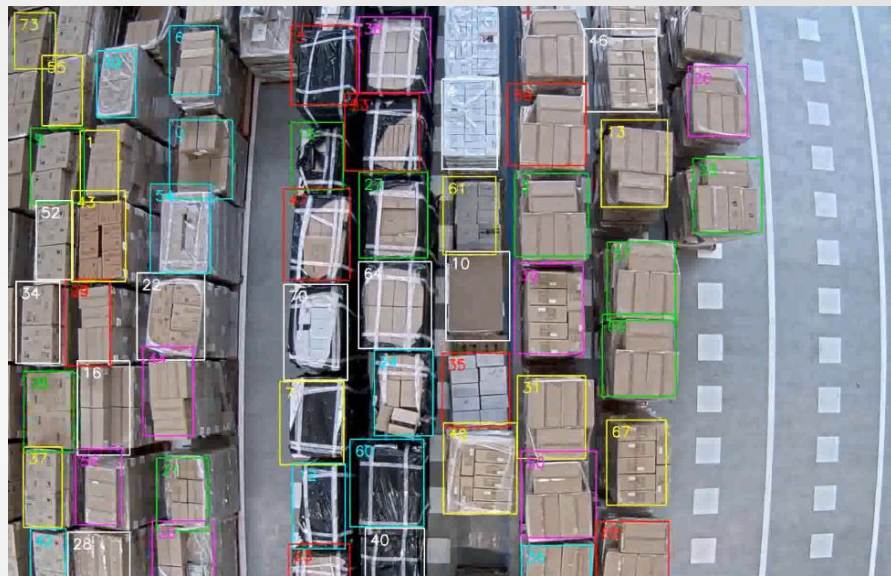
Neural counter

Current count of objects

<NeuroCounter>	
▼ Object identification	
Enable	Yes
Name	<NeuroCounter>
▼ Other	
<A delay between two measurements, s>	3
<AlarmObjectCount>	5
<ANNModelFile>	
<Mode>	<CPU>
<Threshold>	75



Cars counting
Trade center, Belorussia



Pallets counting
Warehouse

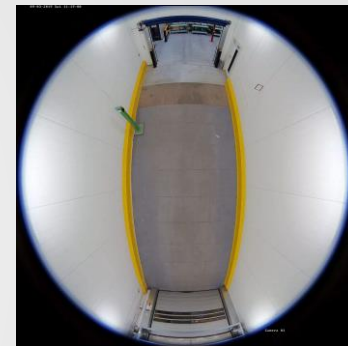
Neural tracker



People counting
Exhibition center, Spain



People detection
Turkey farm, Russia



Enforcement of regulations
Amazon Fresh warehouse,
Germany

Neural tracker



Russia



Russia



Russia

Visor de alarmas

Source	Event	Alert info	Date and time
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\133130_c2_480.xml	16/04/2019 13:31:30
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\132755_c2_485.xml	16/04/2019 13:27:55
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\121230_c2_477.xml	16/04/2019 12:12:30
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\121042_c2_485.xml	16/04/2019 12:10:42
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\111607_c2_485.xml	16/04/2019 11:16:07
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\111130_c2_484.xml	16/04/2019 11:11:30
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\102142_c2_483.xml	16/04/2019 10:21:42
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\094412_c2_482.xml	16/04/2019 9:44:12
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\16-04-18\094412_c2_481.xml	16/04/2019 9:44:12
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\15-04-18\165836_c2_488.xml	15/04/2019 16:58:36
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\15-04-18\165204_c2_487.xml	15/04/2019 16:52:04
● Detectar Cámara 2	Tempo máximo de estacionamiento superado	C:\ALARMS\15-04-18\125464_c2_488.xml	15/04/2019 14:54:40

Spain

Neural tracker



Wagons counting, Russia



Canteen automation, Russia

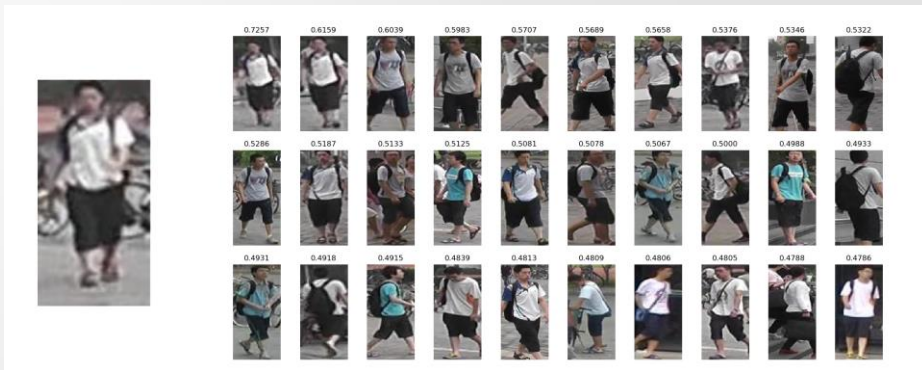


Promo detector, USA



Gas balloons counting,
Kenia

Visual similarity



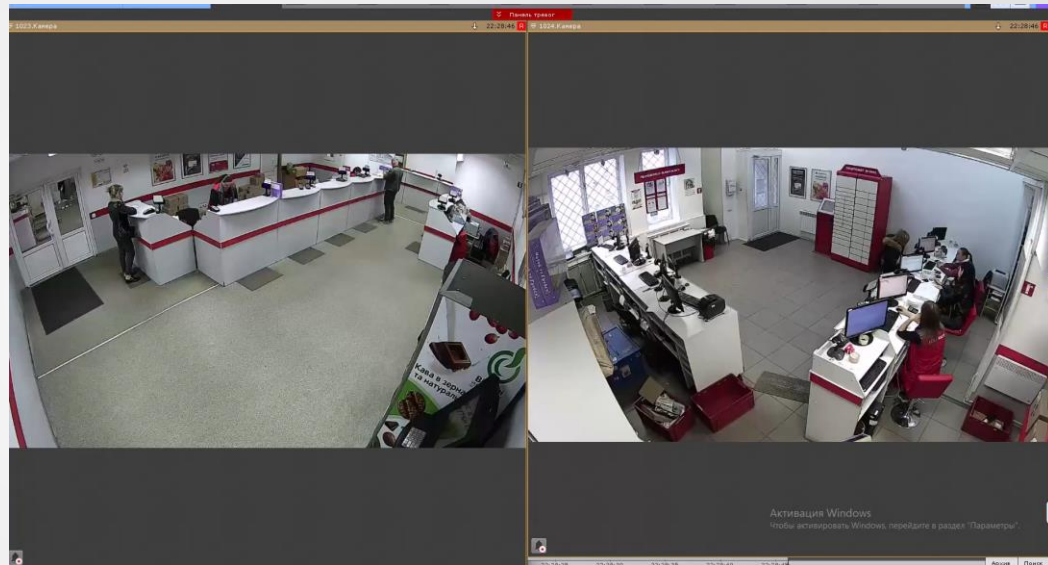
Analytics for retain

Behavior of visitors and employees

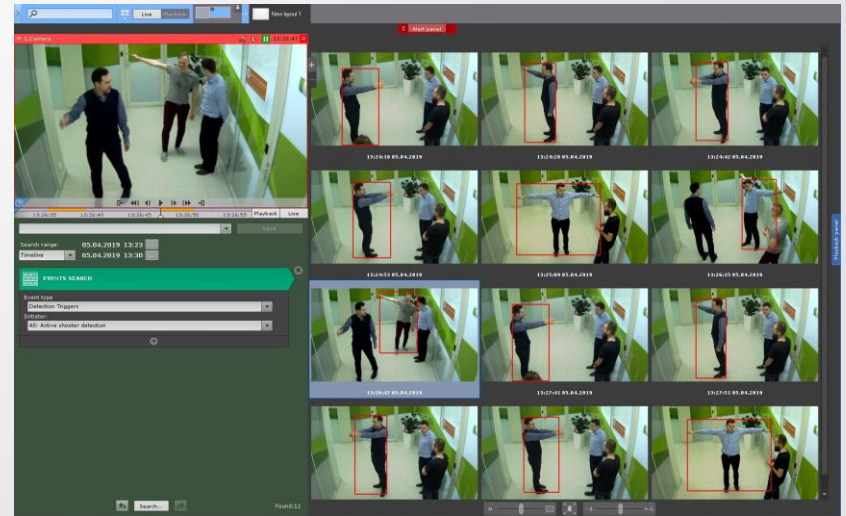
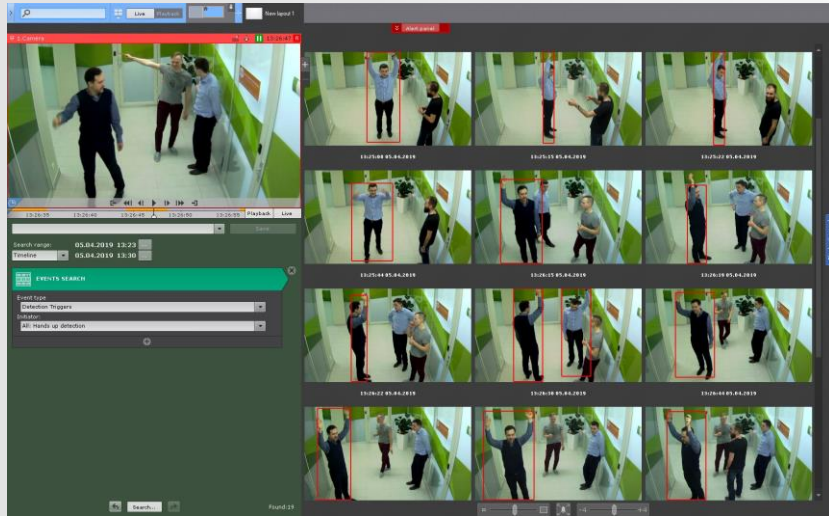


POC projects:

- Prolonged waiting time
- Employee reaction time
- Presence of employees
- Count of employees in show rooms



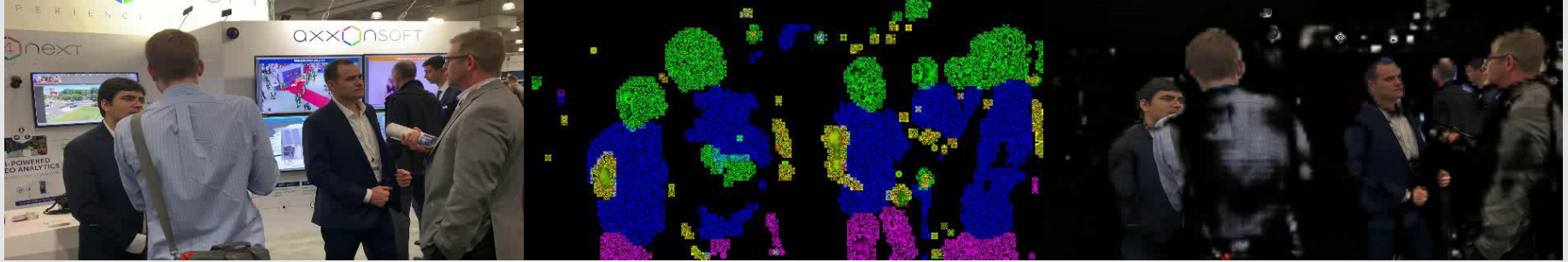
Skeletons



Skeletons

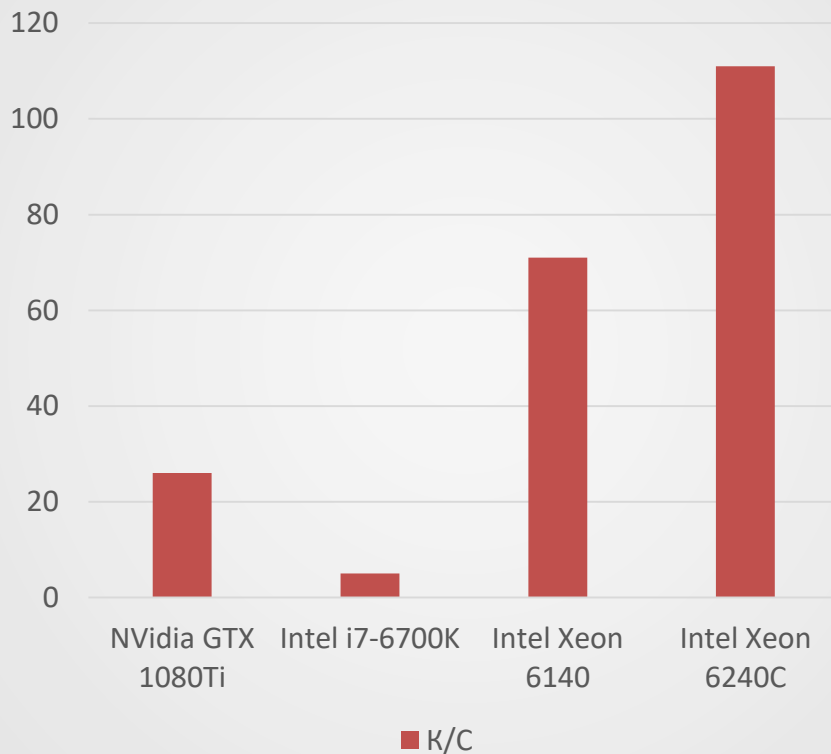


Semantic segmentation



Equipment

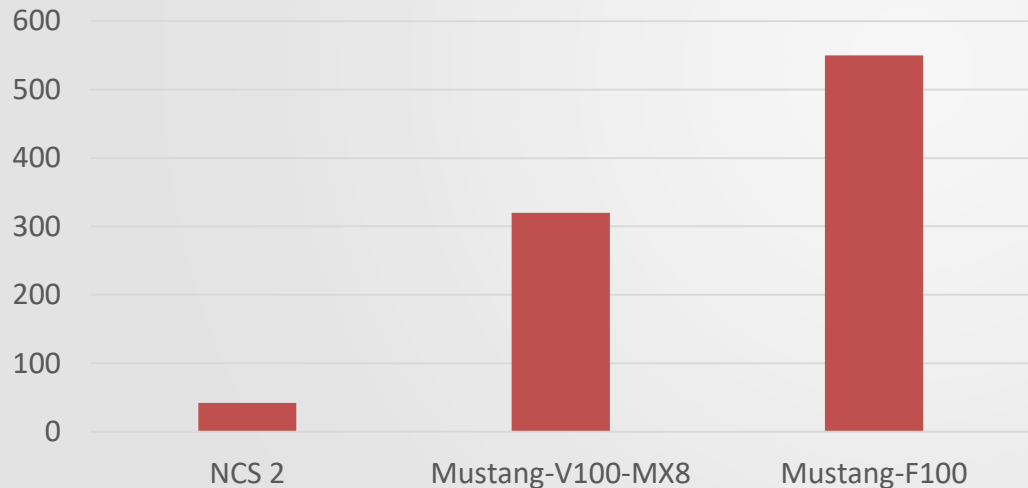
Cascade Lake micro architecture from Intel



MobileNet SSD v.2, FP32 precision

Equipment

- Intel Movidius Miryad X based devices:
 - Intel Neural Compute Stick 2 (~2,5BT, ~\$100)
 - Mustang-V100-MX8 (~30BT, ~\$900)
- Intel Arria 10 (FPGA) based device:
 - Mustang-F100 (~60BT, ~\$1800)



MobileNet SSD v.2, FP16 precision



Equipment

Cascade Lake learning phase



- CPU: 2x Intel Xeon Gold 6240C

- RAM: 256 Gb

- Topology: MobileNetV2

- Batch size: ~1500 images

- Dataset size: \geq 500K images

- Learning time: ~1 week

Thank you!

