Embedded Neural Network Technology By Expasoft

GROW

REAL-TIME LEVEL

Operation Time

10x

Accuracy

5x

1x

0   completing   100%

Expasoft Embedded Neural Network Technology

Neural networks processes huge data arrays using vast hardware capacities
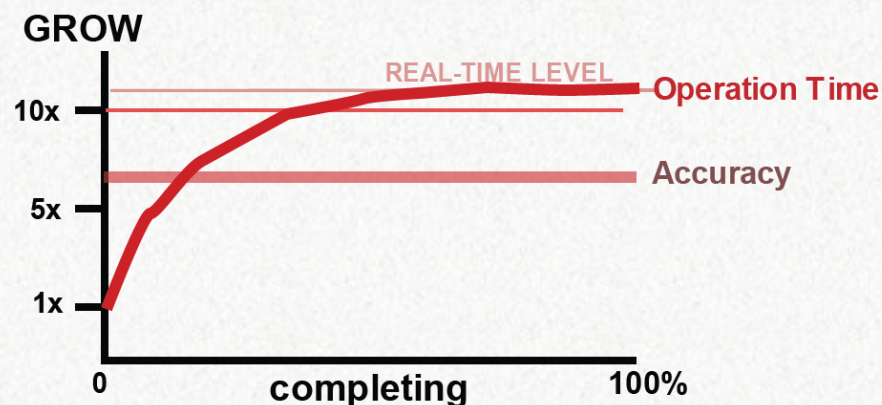
By a unique mature technology typical neural network architecture is optimized

Embedded neural network able to work on a typical device CPU

ARM

What are the Embedded Neural Networks for…
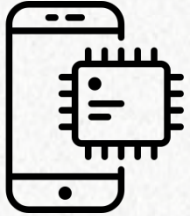
Autonomous performance of AI-technologies on a typical devices' CPU

No dependence on a remote servers – no "clouds"

Construction of distributed AI systems

Real-time mode of neural network performance

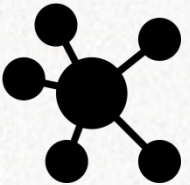Reduction in communication channels loading

Decrease in energy consumption

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Solutions based on Embedded Neural Networks

Photo and Video
Cameras, Infrared scanners

Sound and Speech
Microphones

Personal data
Smartphones, Tabs

Sensor's data
Radars, LIDAR, accelerometer etc.

Identification
Classification
Clusterization
Tracking
Comparison
Deviation
Novelty
Forecasting

Laying-out

Identification

Signs, symbols

Objects, Pedestrians, Vehicles

Events

Actions, Decisions

Unlimited opportunities for EENNT utilization

Electronics and domestic appliance
Voice control, recognition

Robotics
Computer vision, action choosing, autorun/ automatic stop

"Smart" house and "smart" cities automatization
Security, comfort, efficiency

Fitness and health
Personalization, forecasting, comfort

Transport
ADAS, service forecasting

Communications and Internet-technologies
Customization, voice control

And that is only the beginning…

Available solutions based on Embedded Neural Networks

Available for commercial use proven solutions based on the Embedded neural networks technology by Expasoft:

User voice recognition / User identification by voice	For ARM Cortex-A7 CPU speed 500 milliseconds For Intel i5 2.4 GHz - 30 мс	Text-dependent voice recognition by a phrase of 2 seconds length ERR up to 1,4%
Audio event recognition	For CPU 200 MHz in real-time mode	The precision of barking, crying, glass breaking, shooting, fire alarm sounds recognition - 95%
Pedestrians and vehicles detection	For CPU 1,2 GHz speed 200 milliseconds	Detection precision of: Pedestrians – 94%, Vehicle – 96%
Gender / Age identification	For CPU 1,2 GHz speed 300 milliseconds	Identification precision: Gender – 96%, Average age error – 6 years
Image segmentation	For CPU 1,2 GHz speed 500 milliseconds	Clothes segmentation precision (11 classes) – IoU=82%

The solutions are available under license agreement as a software development kit in C++ language. All necessary user documentation is provided as well as a technical support for the SDK implementation stage.

User voice recognition

Necessary CPU capacity for real-time mode – not less than 600 MHz. Precision: for text-dependent verification on 2 second voice record EER – 1,4 % in a quiet room and 4,2 % - in a noisy spaces

Voice samples are held in a device memory

Feasible usage:

o Medical devices that transmitting personal information to the patient monitoring centers. The device identifies patient who's data are to be taken down.

o Switching modes of any devices to personal settings using user voice identification.

o Access providing to any settings or device use after user has been identified. Ensuring independent and objective control of the device use.

Audio event recognition

The device would able to identify a set of predefined audio events such as dog barking, baby crying, broken glass sound, shooting, alarm sound and etc.

Precision:

Baby crying- 96%

Dog barking - 94%

Broken glass sound- 92%

Fire alarm sound- 98%

Voice samples are held in a device memory

Feasible usage:

o Security and alarm systems

o Realization of a given scenario at a audio event (video record or lightning switching on, sending notifications, initializing equipment diagnostics etc.).
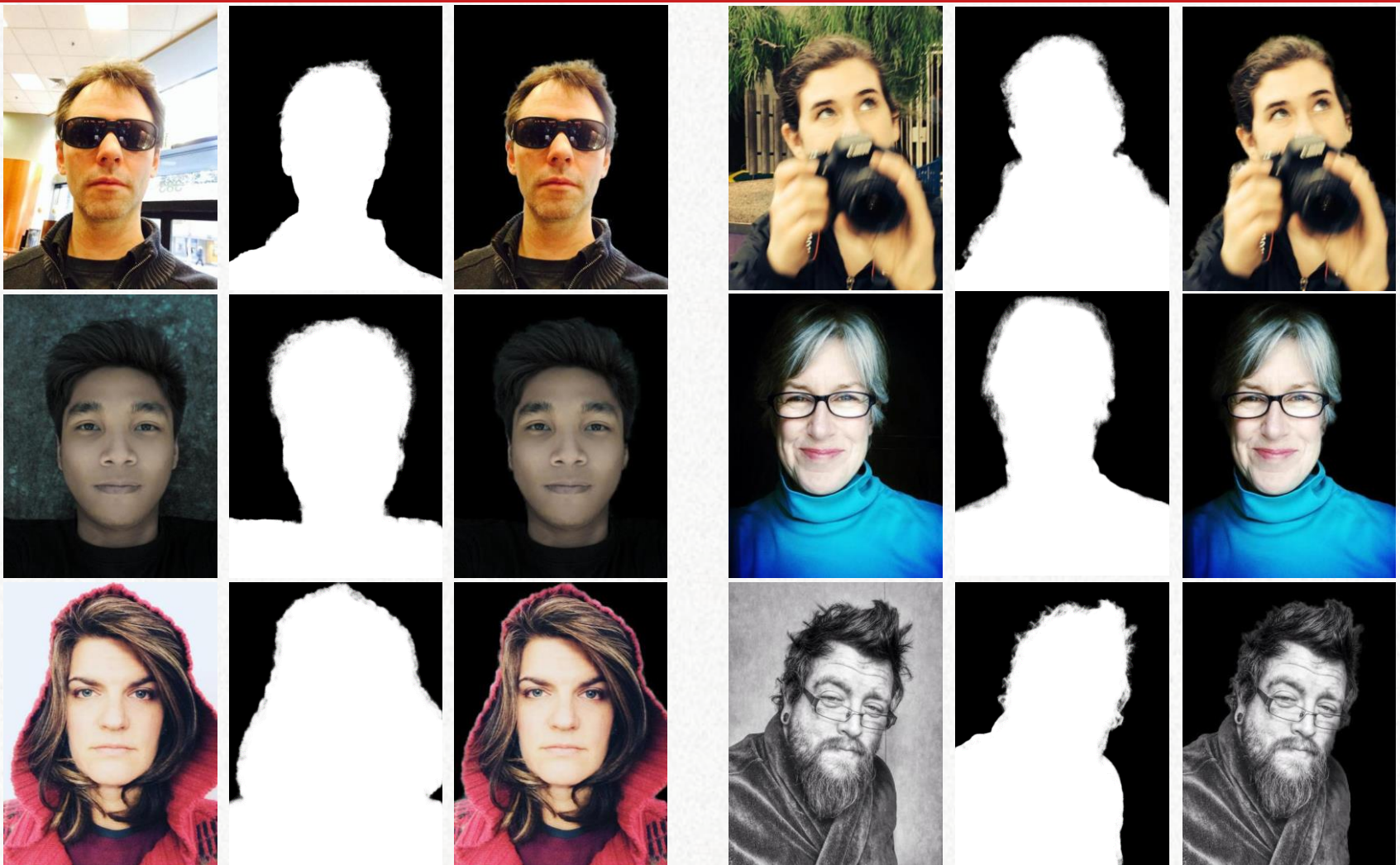
Pedestrians and vehicles detection

In a real time mode pedestrians and vehicle are detected in a video stream. The technology could significantly improve traffic and road control systems.

Device characteristics – 1,2 GHz, 15 FPS.
Precision: pedestrians detection precision – 94 %, vehicle detection precision – 96 %.

Portrait segmentation

Allows to identify certain image zones related to the user portrait.

Technology characteristics

o Precision – 98,4 % (IoU)
o Model size – 24 Mb
o Processing time – 180 ms on Snapdragon 835 (1 core)

Image segmentation

The technology allows to identify certain image zones related to certain classes of objects.
And that allows either to edit image, or compare images of separate elements in the frame.

Device characteristics: 1,2 GHz. Time of 1 frame processing – 500 ms.
Precision: for 11 objects classes IoU – 82 %.

New solution for your business

Using Expasoft Embedded Neural Network Technology we would be glad to develop a customized or brand new specified solution for your business.

To start you should:

A. Have a task or problem description
B. Prepare dataset for neural network learning

Expasoft would do all the rest:

C. Neural Network optimization with the unique Expasoft Embedded Neural Network Technology
D. Software development kit elaboration and configuring it for a specific device
E. Testing and additional training

Expasoft Embedded Nueral Nerwork Technology

We are inspired to create an embedded neural network specified for your business, and facilitate your company to become a global market leader
with leading solutions!
All you need is have a task definition and dataset to train the machine!

The proven industrial technology by Expasoft provides:
- getting the desired results
- maintaining absolute control over your software
- rapidly get the valuable results

Expasoft team took two 1st prizes at the IEEE International Low-Power Image Recognition Challenge (2018 LPIRC-II) Track 1 and Track 2, November, 2018
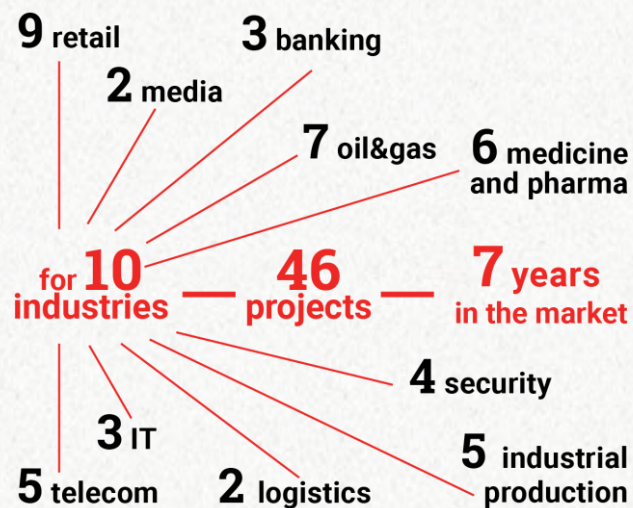it was 3rd prize at the Track 1, June 18

The 1st place was taken by the Expasoft team, called "division.ai", at the competition for portrait segmentation held by PicsArt in 2018
About 200 teams took part in the competition

About Expasoft

9 retail   **3** banking
2 media
7 oil&gas   **6** medicine and pharma
for **10** industries — **46** projects — **7** years in the market
4 security
3 IT   **5** industrial production
5 telecom   **2** logistics

Today Expasoft team is
20+ data scientists   **4** Phd   **40+** company members

Expasoft was founded in Novosibirsk Akademgorodok – the famous center of Siberian Branch of Russian Academy of Science.

Vladimir Dyubanov is a Co-founder and a CEO of the company, 30+ scientific publications, over 15 years in industry

Respectively two key success factors were laid in Expasoft foundation:
- a focus on resolving practical problems
- a cooperation with academic community with its leading views and approaches.