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FROM CCTV TO VIDEO ANALYTICS

Video surveillance security was conceived as a closed system designed only to solve security issues. Analog CCTV restrictions didn't allow to use the equipment in some other way. CCTV integration with digital systems has opened the opportunity to receive a variety of automated data by analyzing a sequence of images. The importance can not be overestimated: in the normal case, after 12 minutes of continuous observation, the operator starts to miss up to 45% of the events. And up to 95% of the potentially alarming events will be skipped after 22 minutes of continuous monitoring (according to results of research IMS Research, 2002).

There are sophisticated video analysis algorithms: counting, counting conversions, statistics of cash transactions, and others. In this system, the operator disappears – we give the computer the ability to "look" and draw conclusions.

The simplest example of an intelligent video surveillance – motion detection. It is not important whether there is a built-in detector in the camera itself – if you install on your computer, for example, soft Ivideon Server, then the movement will be observed by detector software. One detector is capable of replacing multiple CCTV operators. And in the 2000s, the first video analytics systems began to appear that can recognize objects and events in the frame.

Apple, Facebook, Google, Intel, Microsoft and other technology giants are working on solutions in this field. Complexes surveillance systems with automatic detection of passengers are installed in 22 US airports. In Australia, a biometric facial recognition system and fingerprint in the program, designed to automate the passport and customs control are on developing stage. In 2015, Alipay, the online payment platform operator, part of the Alibaba holding company, introduced a payment verification system based on Face ++, cloud-based face recognition platform, created by Chinese startup Megvii. The system is called Smile to Pay – it enables users Alipay to pay for online purchases by taking selfie (Alipay determine the owner of a smile). UBER in China began to use the drivers face recognition system based on Face ++, to counter fraud, identity theft and provide extra safety for passengers.

Face detection – is one of the most difficult tasks in the field of analytics. On the one hand, everything seems clear. On the other hand, the identification of people in the crowd is still very expensive and doesn't provide absolute accuracy.

First you need to detect and locate the person in the image: use Haar cascades, search the texture regions, similar to the skin, etc. For example, we need to find the first available person and follow him in the video stream. Here

you can use the algorithm of Lucas-Canada. We find the face due to the algorithm and then determine the specific points in it. Using points according to the algorithm of Lucas-Canada; after their disappearance we consider that face disappeared from view. Having characteristic features of the face, they can be compared with the features laid down in the database.

To smooth the path of the object (s), as well as to predict its position in the next frame a Kalman filter can be used. Here it should be noted that the Kalman filter is for linear motion models. For the nonlinear algorithm Particle Filter is used (alternatively Particle Filter + algorithm Mean Shift). The background subtraction algorithms library can also be used with examples of implementation of algorithms for subtraction of the background paper on the implementation of + light background subtraction algorithm ViBe. In Addition, do not forget one of the most common methods of Viola-Jones, implemented in computer vision library OpenCV.

Simple face recognition is good, but not enough. It is also necessary to ensure a stable tracking of multiple objects in a scene, their joint intersection or temporary "disappearance" of the barrier, consider any number of objects that cross a certain area and take into account the direction of the intersection. Video analytics is painstaking process that requires a high level of technology provision but it also makes our life simpler and safer.

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PECULIARITIES OF TRANSPORT ALGORITHM IN POLITICAL CRISIS

Transport algorithm is a problem of optimal transportation plan for the product. In our case, by product we mean thecarriage of passengers from point of origin to pointof destination or to items that are target arrival. The purpose of the transport algorithm is the use of optimal schemes of cargo flows that reduce the cost of transportation.

Currently, when it is difficult forUkrainians to get a direct flight to Russia, our transport algorithm can solve this problem. By using the transport algorithm,we can find optimal variant of going to Russia via other countries with minimaltransfers, loss of time, as well as consider the options and choose the one that would be the cheapest and the most comfortable and avoidproblems that are arising now under ATO circumstances.

Thus, the purpose of the transportation problem would be to use the best flights schemes that would reduce the cost of time, money, connections and problems in flight.