Rocket: Hybrid edge + cloud video analytics platform

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http://aka.ms/rocket
Rocket: Video Analytics Stack

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Smart Urban Mobility  Connected Restaurant  Retail Monitoring  Smart Cars  ...

Video Pipeline Optimizer [SIGCOMM’18]

Resource Manager [NSDI’17]

Edge/cloud executor [SEC’18]

Camera Virt. [IPSN’17]

Video Event Store [OSDI’18]

Vision modules & DNNs

User apps  Systems  ML / Vision
Microsoft Rocket Video Analytics Platform

- Built on C# .NET Core
- TensorFlow model plug-in
- GPU/FPGA acceleration
- Docker containerization

Code released at https://aka.ms/RocketCode
Rocket: Video Analytics Stack

http://aka.ms/rocket

✓ line-based alerting on live videos

✓ early filtering & selective DNN calls for efficient GPU/FPGA usage

✓ edge-cloud partitioning with cascaded calls to cloud DNNs (Cognitive Services or Azure ML)

✓ detect network unavailability, shift to “edge-only” mode

✓ interactive after-the-fact querying on stored videos
  - Find all frames that contain red bag from videos in the past week
Microsoft Rocket Video Analytics Platform

We will walk-through Rocket (http://aka.ms/rocket), a hybrid edge-cloud live video analytics software stack built on C# .NET Core, and introduce five different pipelines:

0. How to setup and run the video analytics system
1. Pipeline 1: Alerting on objects
2. Pipeline 2: Detecting objects with cheap filters, and after-the-fact querying
3. Pipeline 3: Detecting objects with cascaded DNNs
4. Pipeline 4: Edge/Cloud split
5. Pipeline 5: Edge/Cloud split + containers

Research experience in machine learning, computer vision is NOT required.
Pipeline 1: Alerting on objects

1. Smart Cameras
2. Decoding
3. DNN Object Detector
4. Edge
5. Alert
6. Azure
7. Database
Pipeline 2: Alerting on objects
Pipeline 3: Detecting objects with cascaded DNNs

Smart Cameras → Edge → Azure

Decoding → Background Subtraction Detector → Light DNN Detector → Heavy DNN Detector → Database
Pipeline 4: Detecting objects with cheap filters
Pipeline 6: Edge/Cloud split + containers

- Smart Cameras
- Decoding
- Background Subtraction Detector
- Edge
- Light DNN Detector
- Heavy DNN Detector
- Azure
- Azure Machine Learning
- Database
- TensorFlow
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