sodacon 2020

DATA CONNECTED

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Data Explosion in Video Analytics

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Big Video Data- Evolution & Growth

- Cisco VNITM expects video data generation CAGR to be 31%
- The growth of video data was 72521 PB per month in 2015
- By end of 2020 it will be 194,374 PB per month [1]
- Major potential applications of Big Video Data in Reliance Group:
- Scene Visualization for Retail
- Remote Sensing for Smart Agriculture
- Medical imaging for Healthcare
- Vision perception in Autonomous Vehicles

Role of Big Data in Video surveillance

A 4000 camera surveillance system coming up in one location

- Text detection
- Human activity detection
- Restricted video filtering
- Crowd tracking
- Emotion recognition

Data explosion in Remotely Sensed (RS) video

- High dimensionality of RS data is a challenge for storage and retrieval
- Detection in change of geographical attributes uses Gibbs Markov random fields, a storage and compute intensive operation
- In RS, the radiated energy by the earth is measured by sensors and edge devices
- The complexity lies in spectral, spatial and radiometric behaviors of sensor measurements
- Multi-spectral sensors and thematic mappers are used in agriculture planning

Big data in Healthcare and Diagnosis- Contd

Analysis of Medical Images involves the following steps:

- Localization of Region of Interest
- Segmentation
- Characterization
- Information integration from different modalities
- Model reconstruction
- Physiological parameter estimation

Data explosion in Healthcare and Diagnosis

- A light field (LF) based 3D telemedicine system is being experimented
- This leads to Big LFV Data Analysis with Storage Challenges
- A new framework is being developed to integrate Multi-view video coding (MVC) to LF MVC with conventional telemedicine
- This has introduced a burden on storing and processing of such Big Data
- The heterogeneity in modality and lack of unified protocol makes storage a bigger challenge

Big data in Healthcare and Diagnosis- Contd

- We are now moving towards integrating cross-domain information along with image analysis to understand causality of disease at genome level
- A system to detect and diagnose 7 ocular diseases is being developed by this group. 2.5 lakh potential centres (DSC) to collect eye images
- In an in-patient hospital scenario, a single recorder can produce 2GB data per day
- With 100,00 cameras installed across a network of hospitals, the volume can be 200,00 GB per day

Big Video Data Analytics Framework- Challenges and way forward

To develop a framework for Video Analytics using opensource and academic collaboration:

- Scanner by Stanford University
- Kitware
- Vise by Oxford VGG Group
- DeepVideo Analytics by Caltech

Developments over the Last 5 years

High Quality Libraries and pre-trained models are available for free

- Theano — Recognition- Inception/VGG/Resnet
- Torch
- ROS — Detection- YOLO/R-CNN/SSD
- Caffe
- TensorFlow — Face Recognition- Facenet/MTCNN
- MXNET
- Pytorch — Semantic Segmentation- Multipathnet/FCN/CRFasRNN
- Deeplearnjs

Developments over the Last 5 years

Deluge of Publicly available datasets

- Open images
- Yahoo Flickr Creative Com
- MSCOCO
- Vicom
- Visual Genome
- Youtube bounding box
- AMOS
- KITTI
- Udacity Car dataset
- Caltech Pedestrians
- Stanford Drone dataset
- Uber Text
- THUMOS

Each dataset has its own JSON or XML format, incompatible with each other

What else has changed in last 5 years

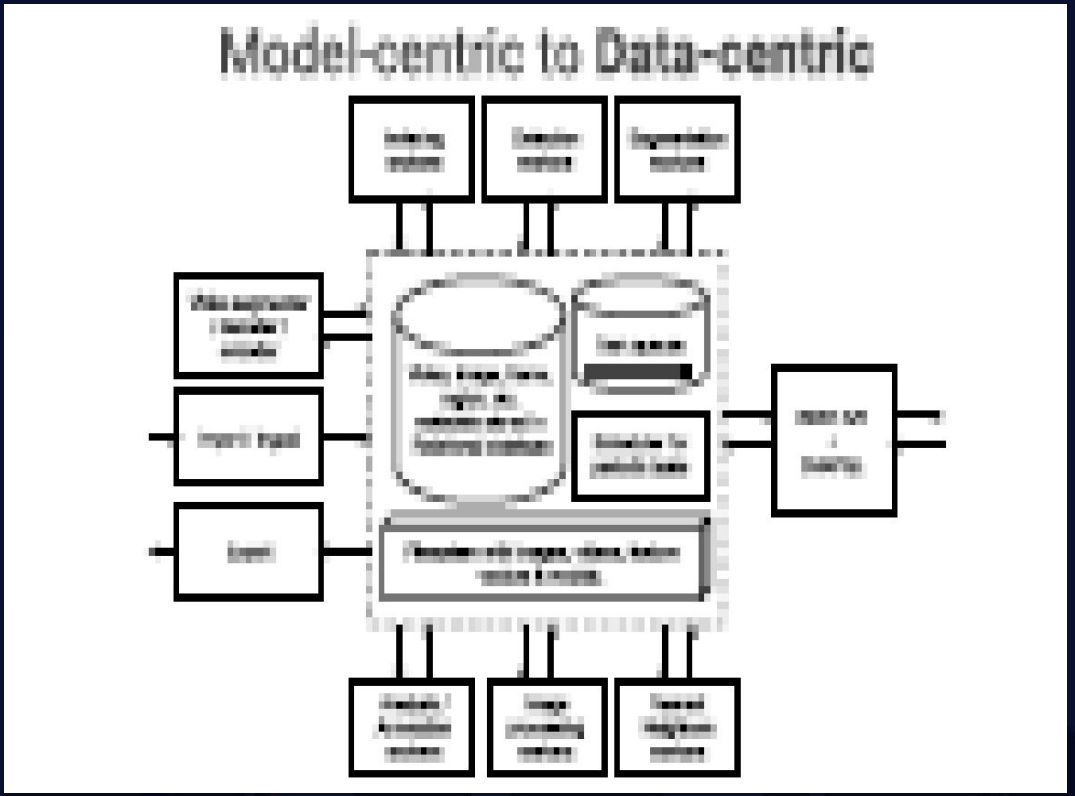
- Container ecosystem (Docker, Kubernetes) has enabled deployment of complex applications
- Ability to scale quickly by adding compute capability billed at minutes and seconds resolution (AWS Spot/ GCP preempitible)
- Flexible cloud storage options (S3, GS, EBS, GC-PD)

Newer approach

We need a data-centric approach that allows us to combine:

- Models for multiple tasks
- Data from multiple sources
- User friendly interface and interaction

Model-Centric to Data-centric transformation



Refrences

- 1. Big data analytics for surveillance by Badri Narayan Subudi et al.
- 2. Video Analytics reference framework by Zia Saquib & Mina Khandikar
- 3. Deep Video Analytics by Akshay Bhat, Caltech