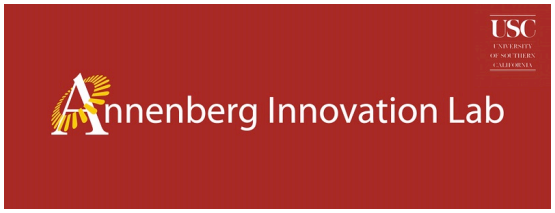

Realtime Traffic Video Analysis Using Intel Viewmont Co-processor

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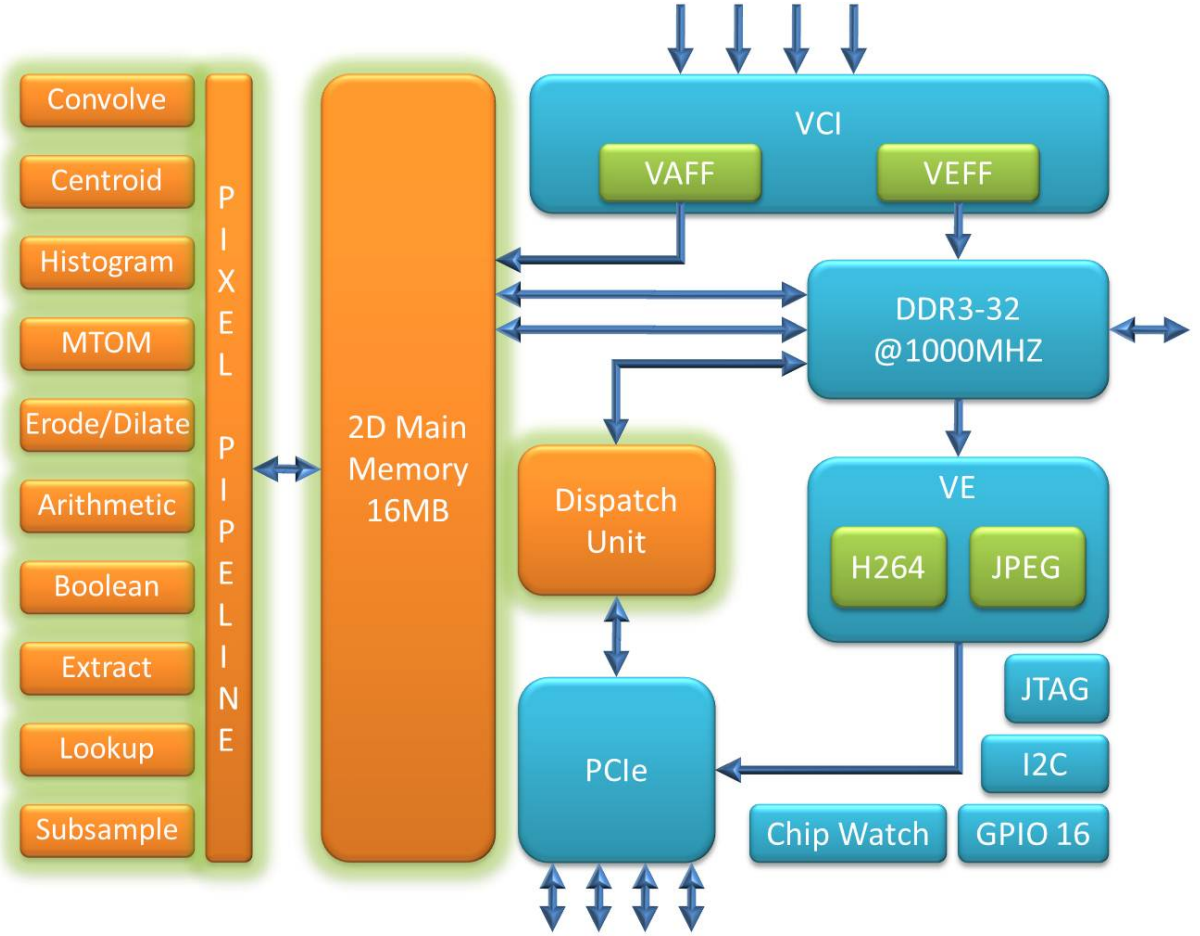
Background

- Intel Viewmont co-processor

Computer vision (OpenCV) tools in hardware



Objectives

- Define and verify a new market for Intel's Viewmont co-processor
  - Implement vision-based algorithms to extract traffic flow data using Viewmont
  - Compare results with those of the loop-detectors
  - Integrate into the CT pipeline

Video-Based Traffic Inference

- Opportunity
  - High maintenance of loop detectors (e.g., need to stop traffic for installation & maintenance)
  - High cost of installation
- Requirements
  - Compatible data collection (traffic volume/count, speed)
  - Comparable accuracy
- Extras
  - Vehicle classification, weight, length

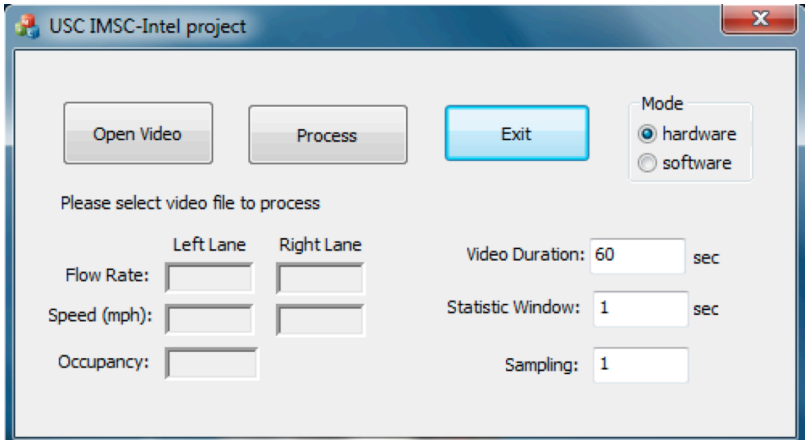
Related Work

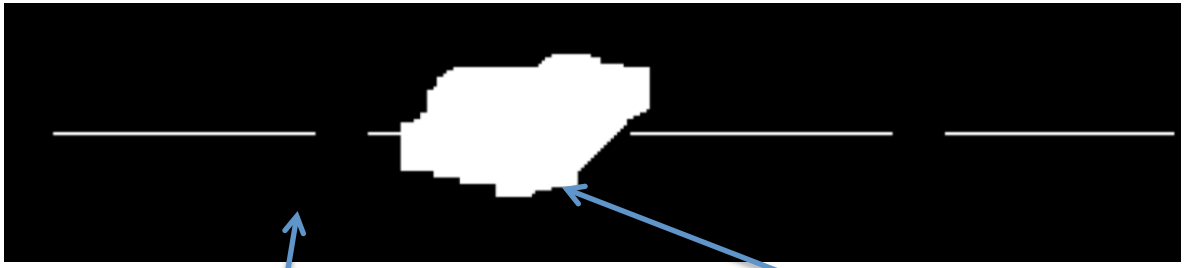
- Video processing techniques for traffic flow
  - tripline, closed-loop tracking, data association tracking
  - Solutions, limitations, problems have been studied
- Industrial products
  - Iteris, Autoscope, Traficon, etc.
  - Rack mounted dedicated systems and cameras
  - Data acquisition and event detection

The goal of our project is not to enhance video processing techniques nor device new techniques. We implement a technique on Intel Viewmont coprocessor and show its comparability to loop detector.

Status

- Developed C++ based video analysis program using Viewmont SDK
- Developed GUI for flexible testing environment
- Used the simplest representation of vehicle movement to enhance the performance of video analysis





region of interest (ROI) ➡ *background subtraction* ➡ *morphological operation*

Analyze the movement of a car represented as a simple white block!

Extract traffic flow data: count and speed of passing cars

Preliminary Results (Examples)

Example 1: Daytime without shade
Counting No. of cars: 428/420 - 3.81%

Speed: 48.4 MPH (ours), 52.7 MPH (sensor) No ground truth in speed.

Example 2: Rainy Daytime
Counting No. of cars: 343/324 - 7.72%

Red #: ground truth (manual counting)
Blue #: our result

Preliminary Results (Examples)

Example 3: Night with headlights
Counting No. of cars: 301/340 – 11.5%

Red #: ground truth (manual counting)
Blue #: our result

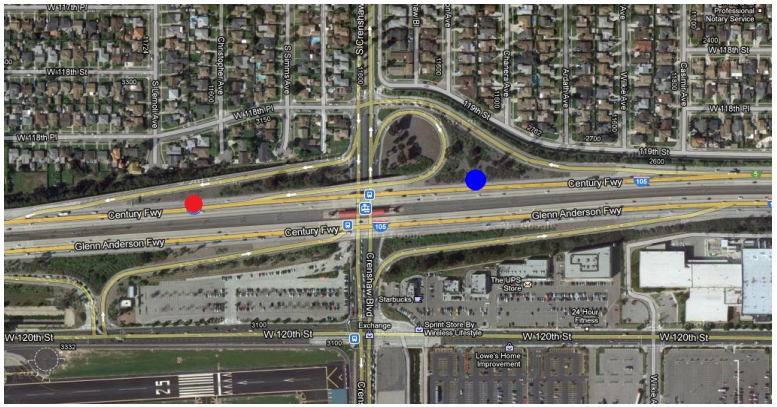
Example 4: Night with taillights
Counting No. of cars: 231/218 - 5.96%

Remaining Challenges

- Environmental impact on visual clarity: night, rain, shadow, wind, etc.



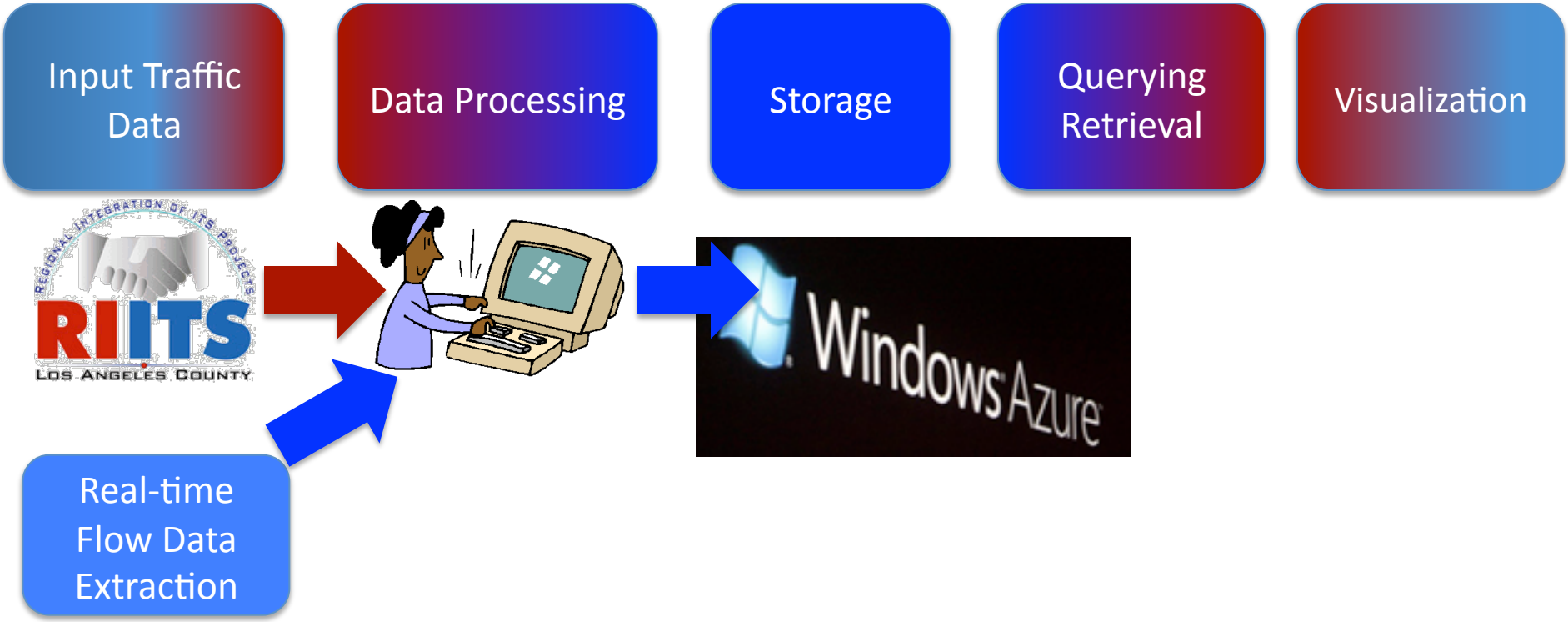
- Comparison of results with loop detector



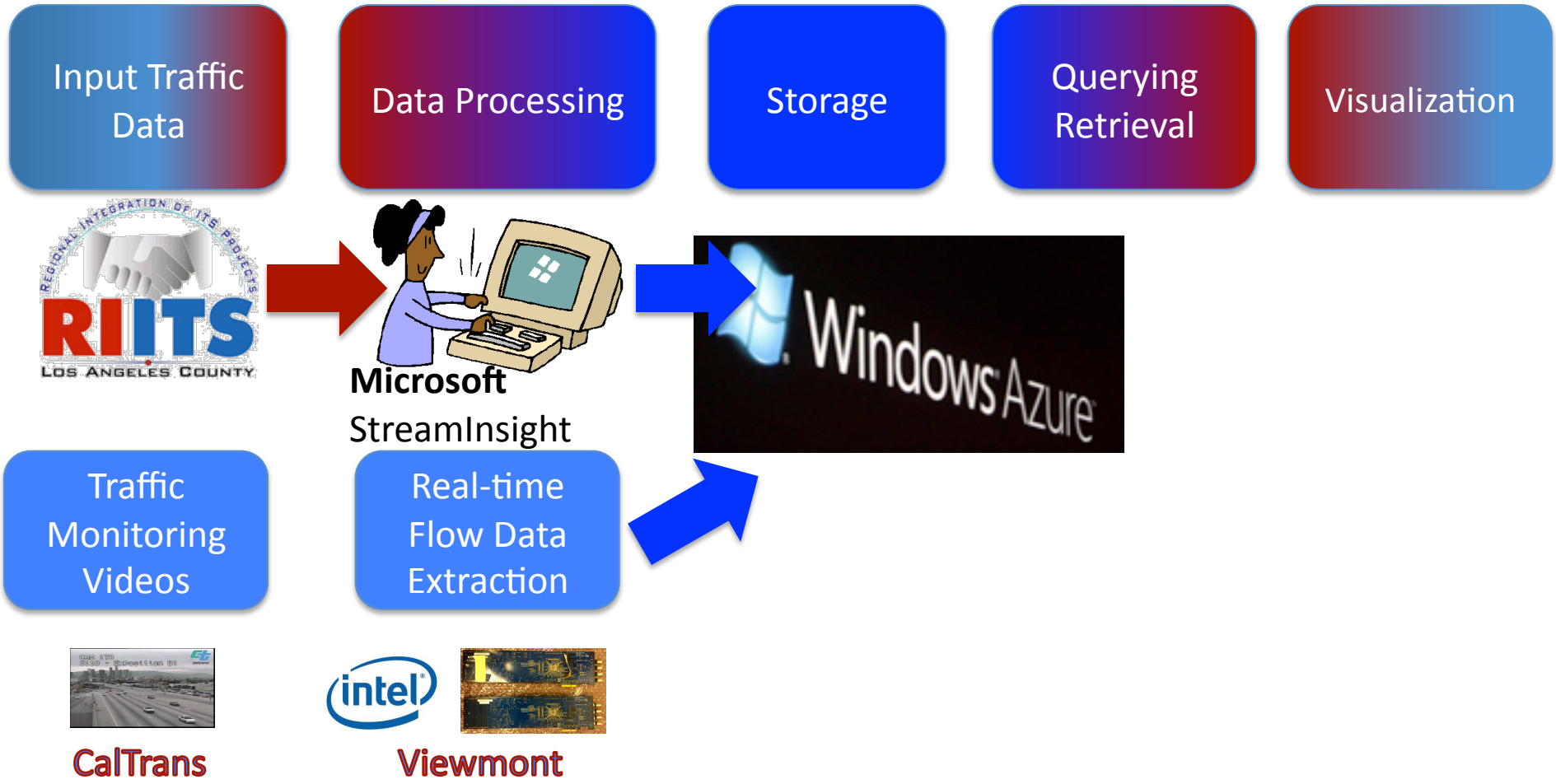
- Most locations of cameras and sensors are significantly different resulting in difficult comparison
- Manual verification of most comparable locations is time consuming

Remaining Challenges

Demonstrate integration of Microsoft Streaminsight and Azure Cloud platform as part of end-to-end system



Future: Phase-II – Tight Inegration



Thanks!