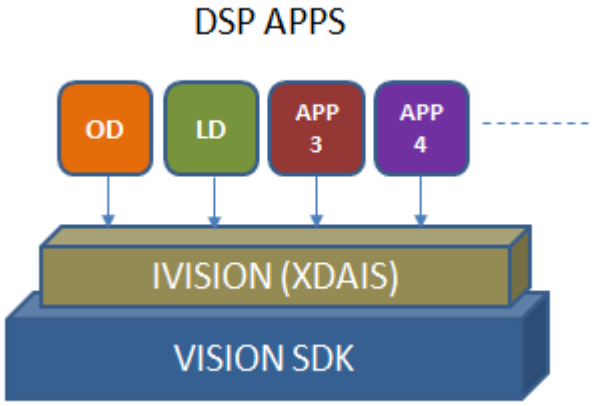
- **IVISION (XDAIS) interface compliant**
- **Validated on TDA2x EVM**
- **Supports pedestrian detection , traffic sign detection and vehicle detection**
- **Tracks up to 32 pedestrians, traffic signs and vehicles frame**
- **Identifies 26 different types of German traffic signs**
- **Supports user controlled parameters to control between accuracy and run time performance**
- **Supports user controlled thresholds to control the accuracy (False positive vs True Negative)**
- **Accepts AdaBoost classifier weights from user**



Description

Object detection module is TI's proprietary Vision and Imaging algorithm implemented on TMS320C66x DSP. Objected detection module is validated with Code Composer Studio version 5.1.0.09000 and code generation tools version 7.4.2.

Performance and Memory Summery

Table 1. Configuration Table

CONFIGURATION	ID
Pedestrian Detection + Traffic Sign Detection + Vehicle Detection	OBJDET_001
Pedestrian Detection Only	OBJDET_002
Traffic Sign Recognition Only	OBJDET_003
Vehicle Detection Only	OBJDET_004

CONFIGURATION ID	TEST DESCRIPTION	TI C66X DSP PERFORMANCE STATISTICS / FRAME	
		MIN (MHZ)	MAX(MHZ)
OBJDET_001	Resolution = 1280x720, Number of scales/octave = 4 Number of scales/frame= 13 % ROI in base scale = 32% with grow by 1.19 in each successive scale 2x2 block sum done on EVE	12.6	18.5
OBJDET_002		5.5	9.4
OBJDET_003		4.8	5.9
OBJDET_004		3.4	6.8

OBJDET_001	Resolution = 1280x720, Number of scales/octave = 4 Number of scales/frame= 13 % ROI in base scale = 32% with grow by 1.19 in each successive scale 2x2 block sum done on DSP	13.7	18.0
OBJDET_002		7.0	9.9
OBJDET_003		6.4	6.9
OBJDET_004		5.1	7.1
OBJDET_001	Resolution = 1280x720, Number of scales/octave = 6 Number of scales/frame= 20 % ROI in base scale = 25% with grow by 1.12 in each successive scale 2x2 block sum done on EVE	13.6	20.7
OBJDET_002		6.1	10.4
OBJDET_003		5.2	3.1
OBJDET_004		3.7	7.4
OBJDET_001	Resolution = 1280x720, Number of scales/octave = 6 Number of scales/frame= 20 % ROI in base scale = 25% with grow by 1.12 in each successive scale 2x2 block sum done on DSP	14.8	19.8
OBJDET_002		7.8	10.9
OBJDET_003		7.1	7.6
OBJDET_004		5.6	7.9

[1] Performance is validated by running on TDA2x platform. DDR-532Mhz, DSP-600Mhz. The scene comprises of 2-3 pedestrians, traffic signs and vehicles. The performance of the algorithm will vary depending on the number of objects available in the scene.

Table 2. Memory Statistics - Generated with Code Generation Tools Version 7.4.4

CONFIGURATION ID	RESOLUTION	MEMORY STATISTICS[1]						
		PROGRAM MEMORY	DATA MEMORY					TOTAL
			INTERNAL	EXTERNAL			STACK	
				PERSISTENT	SCRATCH	CONST		
OBJDET_001	1280x720	44.2	224	1164.9	212	90	8	1743.1
OBJDET_002	1280x720	44.2	224	1164.9	212	40	8	1693.1
OBJDET_003	1280x720	44.2	224	1164.9	212	25	8	1678.1
OBJDET_004	1280x720	44.2	224	1164.9	212	25	8	1678.1

[1] All memory requirements are expressed in kilobytes (1 K-byte = 1024 bytes) and there could be a variation of around 1-2% in the numbers.

Table 3. Internal Data Memory Split-up

CONFIGURATION ID	DATA MEMORY – INTERNAL[2]		
	SHARED		INSTANCE[3]
	CONSTANTS	SCRATCH	
OBJDET_001	90	134	-
OBJDET_002	40	184	-
OBJDET_003	25	199	-
OBJDET_004	25	199	

[2] Internal memory refers to on chip memory. All memory requirements are expressed in kilobytes and there could be a variation of around 1-2% in numbers. L1D memory is split into 24kb of SRAM, 8kb of cache. L2 memory is split as 224kb of SRAM and 64 kb of cache. Executing object detection module along with other DSP algorithm which requires different L1D configuration could hinder performance.
[3] I/O buffers are not included. Some of the instance memory buffers could be scratch.

notes

- I/O buffers:
  - Input buffer size = 3040.93 K-bytes (For 1280x720 resolution , 13 scales, 1 frame, 32% ROI)
  - Output buffer size = 1544 bytes (For a maximum of 32 objects per frame) – Object list
  - Output buffer size = 1544 bytes (For a maximum of 32 objects per frame) – Detected list
  - Total data memory for N non pre-emptive instances = Constants + Runtime Tables + Scratch + N * (Instance + I/O buffers + Stack)
- Total data memory for N pre-emptive instances = Constants + Runtime Tables + N * (Instance + I/O buffers + Stack + Scratch)

references

- ObjectDetection_DSP_UserGuide.pdf

glossary

Constants	Elements that go into .const memory section
Scratch	Memory space that can be reused across different instances of the algorithm
Shared	Sum of Constants and Scratch
Instance	Persistent-memory that contains persistent information - allocated for each instance of the algorithm

acronyms

DMA	Direct Memory Access
EVM	Evaluation Module

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