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Object Detection in the DCT Domain: is Luminance the Solution?

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What we want to do

- ▶ Object detection
- ▶ Low computational resources
- ▶ Low bandwidth usage

How do we address the problem in this article

- ▶ **Avoid the decompression step** in the processing pipeline
- ▶ Follow the compression (JPEG) main idea and focus on important features, more specifically **the luminance**

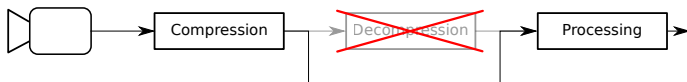


Figure: Proposed overall processing pipeline

JPEG Compression

JPEG Pipeline

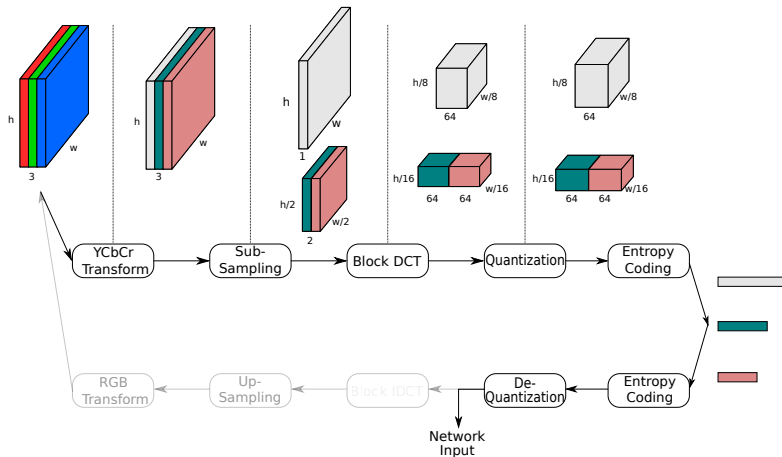
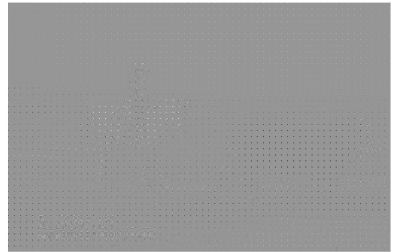


Figure: Full JPEG compression/decompression pipeline

JPEG Compression: Luminance and DCT

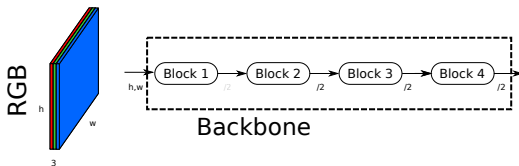


(a) Y, Cb and Cr representation of the data

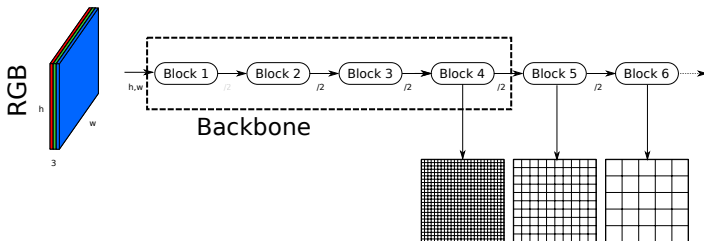


(b) Y DCT representation of the data

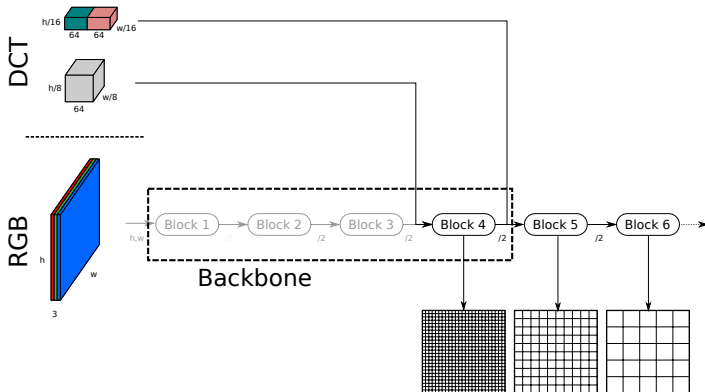
Proposed method



Proposed method



Proposed method



	Pascal VOC		MS-COCO		
	Full Input	Y only	Full Input	Y only	FPS
<i>VGG based:</i>					
SSD300 (RGB)	74.0	-	24.5	-	~100
SSD300 DCT (YCbCr)	60.0	59.8	14.3	14.4	~270
<i>ResNet50 based:</i>					
SSD300-Resnet50 (RGB)	73.1	-	26.8	-	~105
SSD300 DCT LC-RFA-Thinner (YCbCr)	67.5	70.2	25.4	24.6	~175

Table: Detection results on the Pascal VOC 2007 and MS-COCO test sets (resp trained on Pascal VOC 07+12 train/val and MS-COCO train/val).

Main results

- ▶ object detection is feasible in compressed JPEG images, with speed improvements while still keeping fairly good accuracy
- ▶ luminance seems to be enough for object detection

Thank you for your attention !
(Poster session T1.9)