CenterRepp: Predict Central Representative Point Set's Distribution For Detection

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Most methods select the points inside the bounding boxes to present objects, which ignores the importance of surroundings.

- How to pick reasonable features of the surroundings?
- How to trade off the importance of these selected features?





CenterRepp predicts bounding boxes by the sampling representative

points distribution based on the center point.



Illustration of the CenterRepp Module

Deformable Convolution is a good choice to pick the sensitive features.

Box offsets 3N K > 0 7 \uparrow \uparrow \rightarrow mask 0.1 0.4 0.3 class score 0.7 1.0 0.5 map 0.3 0.2 0.6 Extract Feature person deformable conv

boxes is:

$$\begin{cases} \text{offsets} &= \frac{\sum_{i}^{n} \Delta \mathbf{R_{i}} + \mathbf{R_{i}}}{8} & \mathbf{i} \neq 5 \\ \text{wh} &= \mathbf{std} \left(\Delta \mathbf{R} + \mathbf{R_{i}} \right) \end{cases}$$

The convert function from the sampling points to bounding

 $B = p_0 + offset + wh$

Overview of the proposed CenterRepp module

Our proposed MixBiFPN, which mixtures the direction of the passways, and

changes the destination to p3, making it more suitable for keypoints detection.



Illustration of the MixBiFPN Module

Ablation Study of MixBiFPN module and CenterRepp module.

TABLE II

The effect of applying the MixBiFPN layer and the CenterRepp module, compared with different ResNet backbones. All input is a single size.

Backbone	MBiFPN	CenterRepp	AP	AP_{50}	AP_{75}
ResNet18			28.1	44.9	29.6
ResNet18	\checkmark		32.4	49.4	34.2
ResNet18		\checkmark	29.6	47.1	31.3
ResNet18	\checkmark		33 .0	50.2	35.2
ResNet50	\checkmark		37.2	55.2	39 .8
ResNet101			34.6	53.0	36.9
ResNet101	\checkmark	\checkmark	38.1	56.9	40.7

Compare the qualitative Results between our proposed CRPDet and CenterNet



Whether to pick the features inside the bounding boxes or larger ranges is still controversial.

- Suitable receptive field is indeed significant
- The process of adaptive selection and adaptive fusion is helpful towards detectors

Thank You!

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We gratefully welcome corrections!