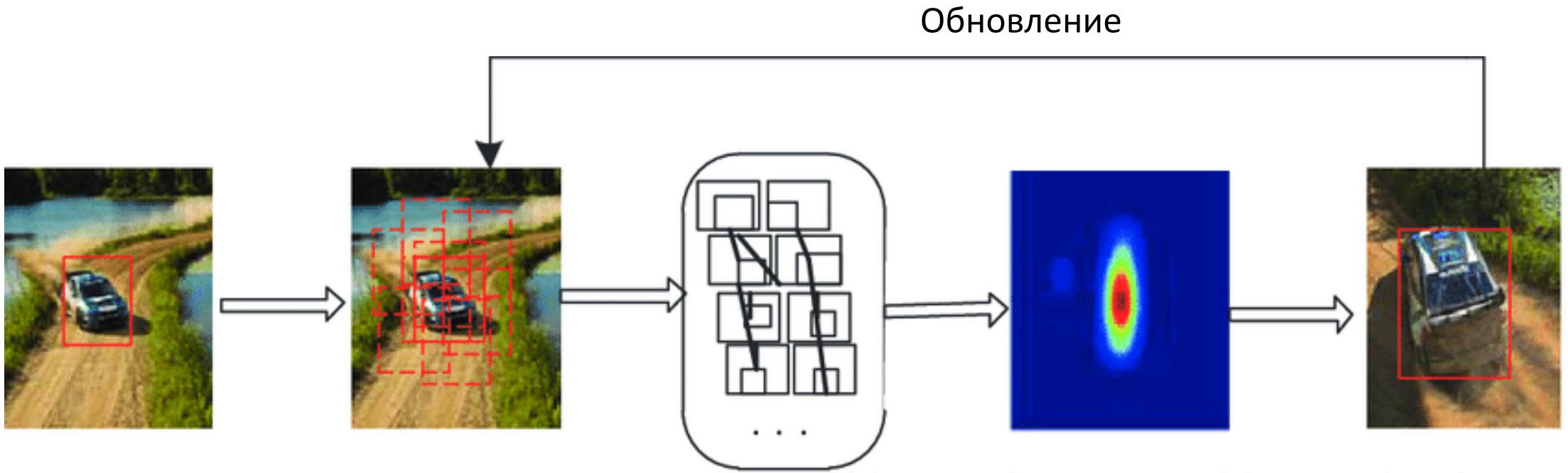
Pattern Recognition and Image Analysis

Задача сопровождения объектов на видео: одиночный объект. (Single Object Tracking)

Single Object Tracking



Набор данных

Basketball
IV, OCC, DEF, OPR, BC

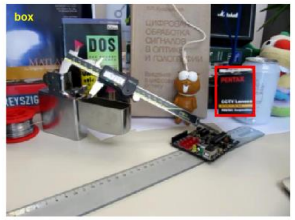
Biker
SV, OCC, MB, FM, OPR, OV, LR

Bird1
DEF, FM, OV

BlurBody
SV, DEF, MB, FM, IPR

BlurCar2
SV, MB, FM

Bolt
OCC, DEF, IPR, OPR



Box
IV, SV, OCC, MB, IPR, OPR, OV, BC, LR

Car1
IV, SV, MB, FM, BC, LR

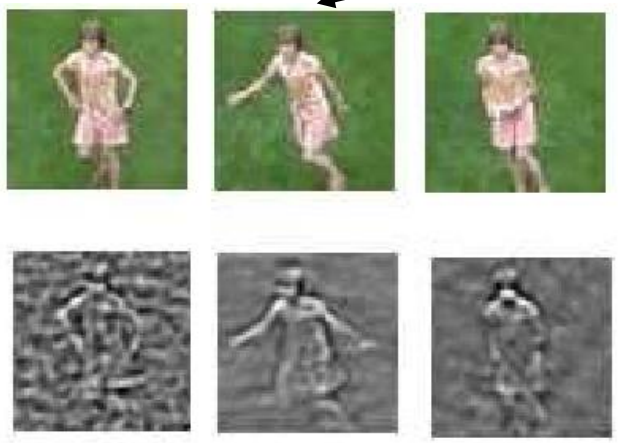
Car4
IV, SV

CarDark
IV, BC

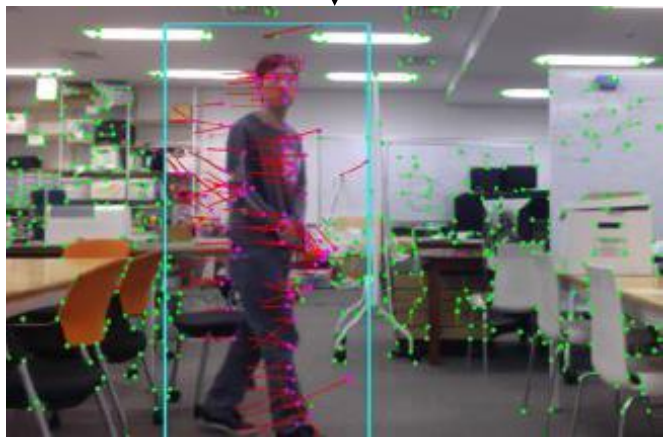
Object Tracking Benchmark 2015

Методы

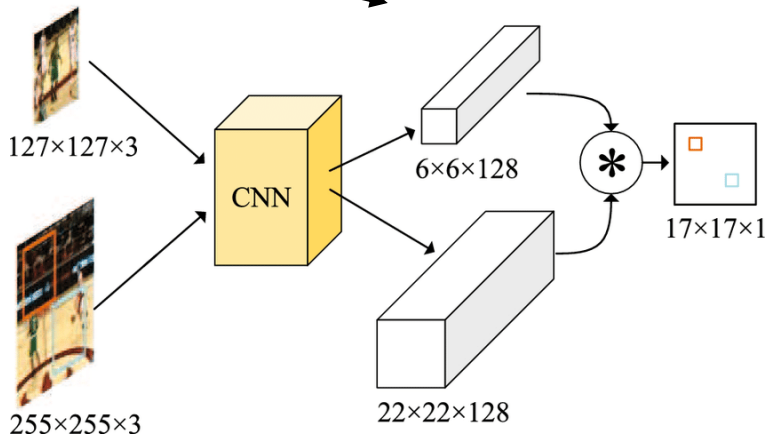
Single Object Tracking



Корреляционные фильтры

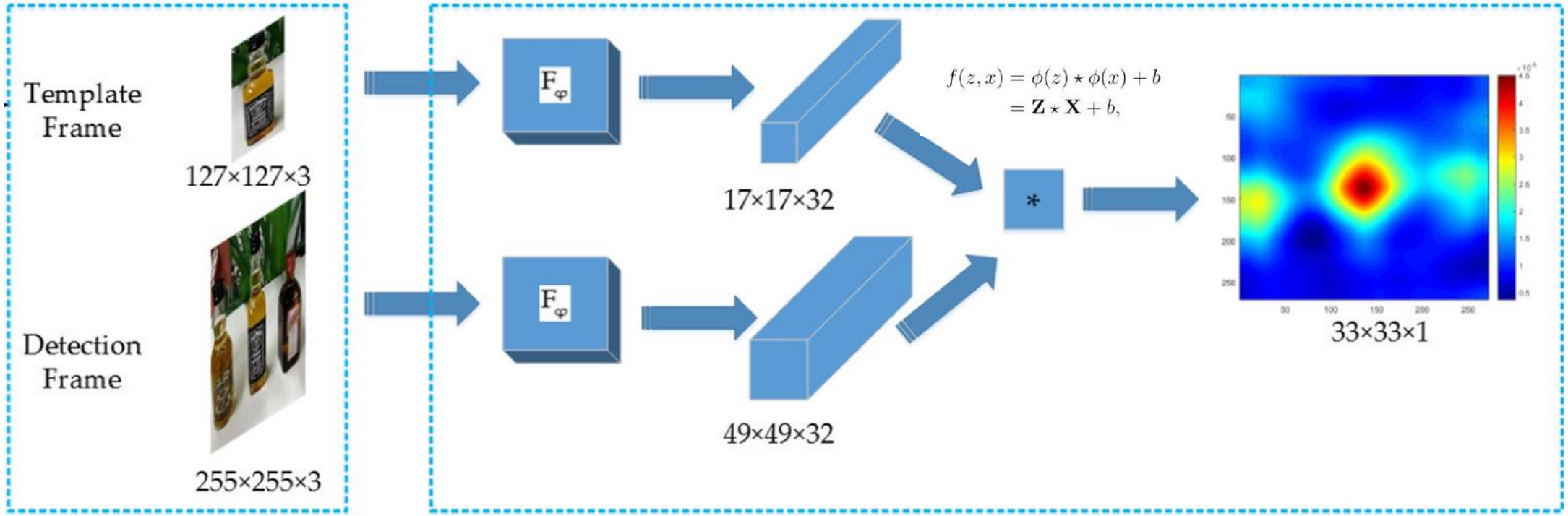


Оптический поток



Сиамские
Нейронные Сети

SiamFC



https://arxiv.org/pdf/1606.09549.pdf

Backbone (AlexNet)

Layer	Support	Chan. map	Stride	Activation size for exemplar	Activation size for search	Activation size chans.
				127×127	255×255	$\times 3$
conv1	11×11	96×3	2	59×59	123×123	$\times 96$
pool1	3×3		2	29×29	61×61	$\times 96$
conv2	5×5	256×48	1	25×25	57×57	$\times 256$
pool2	3×3		2	12×12	28×28	$\times 256$
conv3	3×3	384×256	1	10×10	26×26	$\times 192$
conv4	3×3	384×192	1	8×8	24×24	$\times 192$
conv5	3×3	256×192	1	6×6	22×22	$\times 128$

https://arxiv.org/pdf/1606.09549.pdf

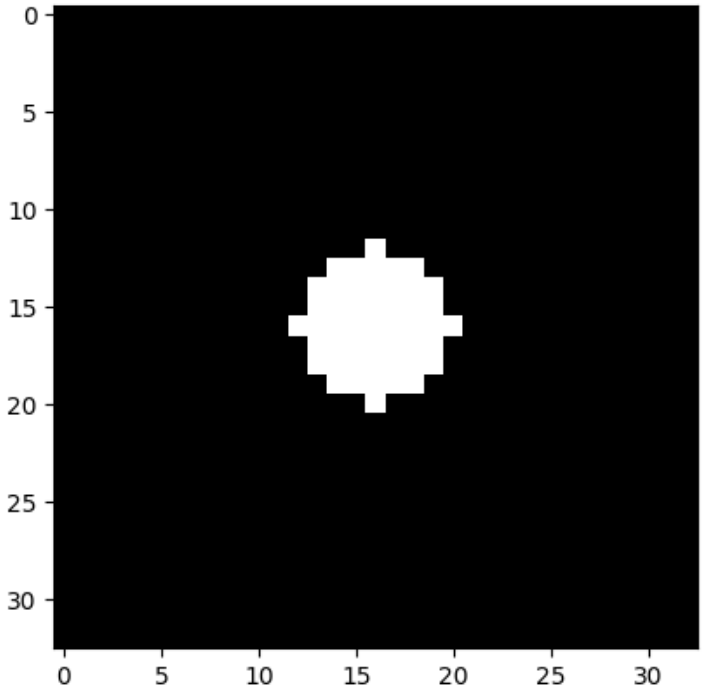
Preprocessing Images

$$s(w + 2p) \times s(h + 2p) = A = 127^2$$

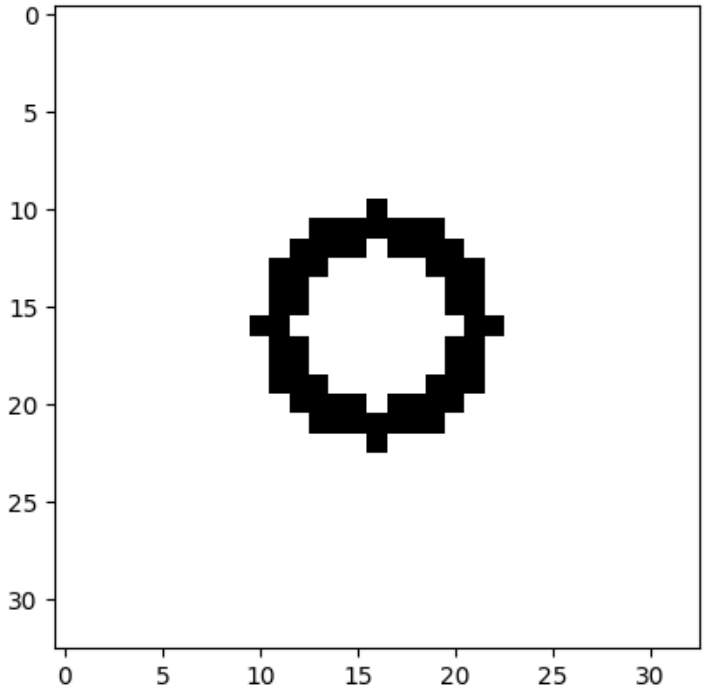
$$p = \frac{(w + h)}{4}$$

https://arxiv.org/pdf/1606.09549.pdf

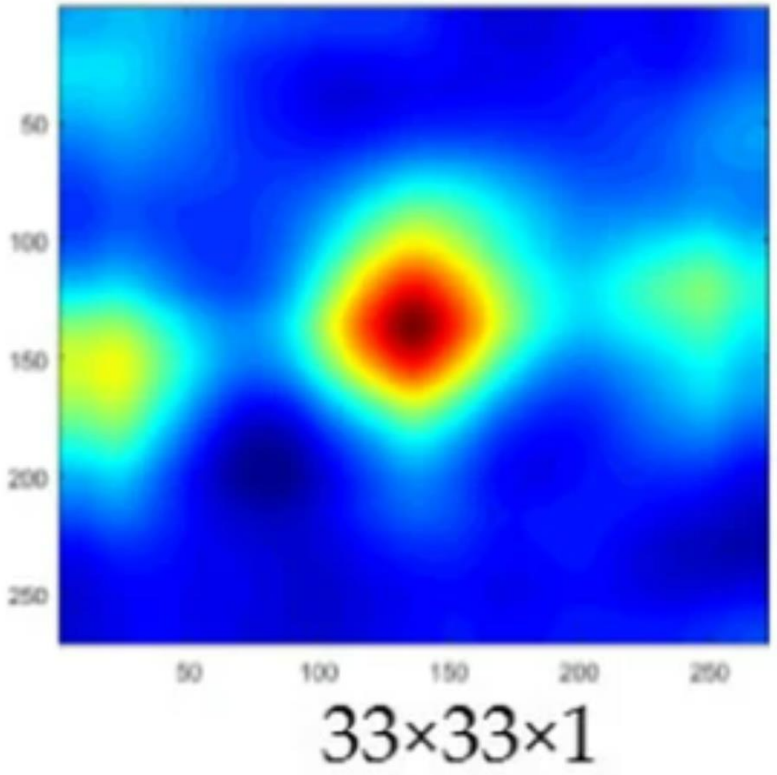
Labelling



Метки классов



Вес объектов



$$y[u] = \begin{cases} 1, k\|u - c\| \leq R \\ 0, \quad \text{иначе} \end{cases}$$

https://arxiv.org/pdf/1606.09549.pdf

Loss Function

$$BCE = -w_n[y_n \log \sigma(x_n) + (1 - y_n) \log(1 - \sigma(x_n))]$$

x_n - элемент карты корреляции

y_n- метка класса (1 – Positive, 0 - Negative)

w_n - вес элемента карты корреляции

σ - Sigmoid

Дополнительно метрики:

- Accuracy
- ROC AUC

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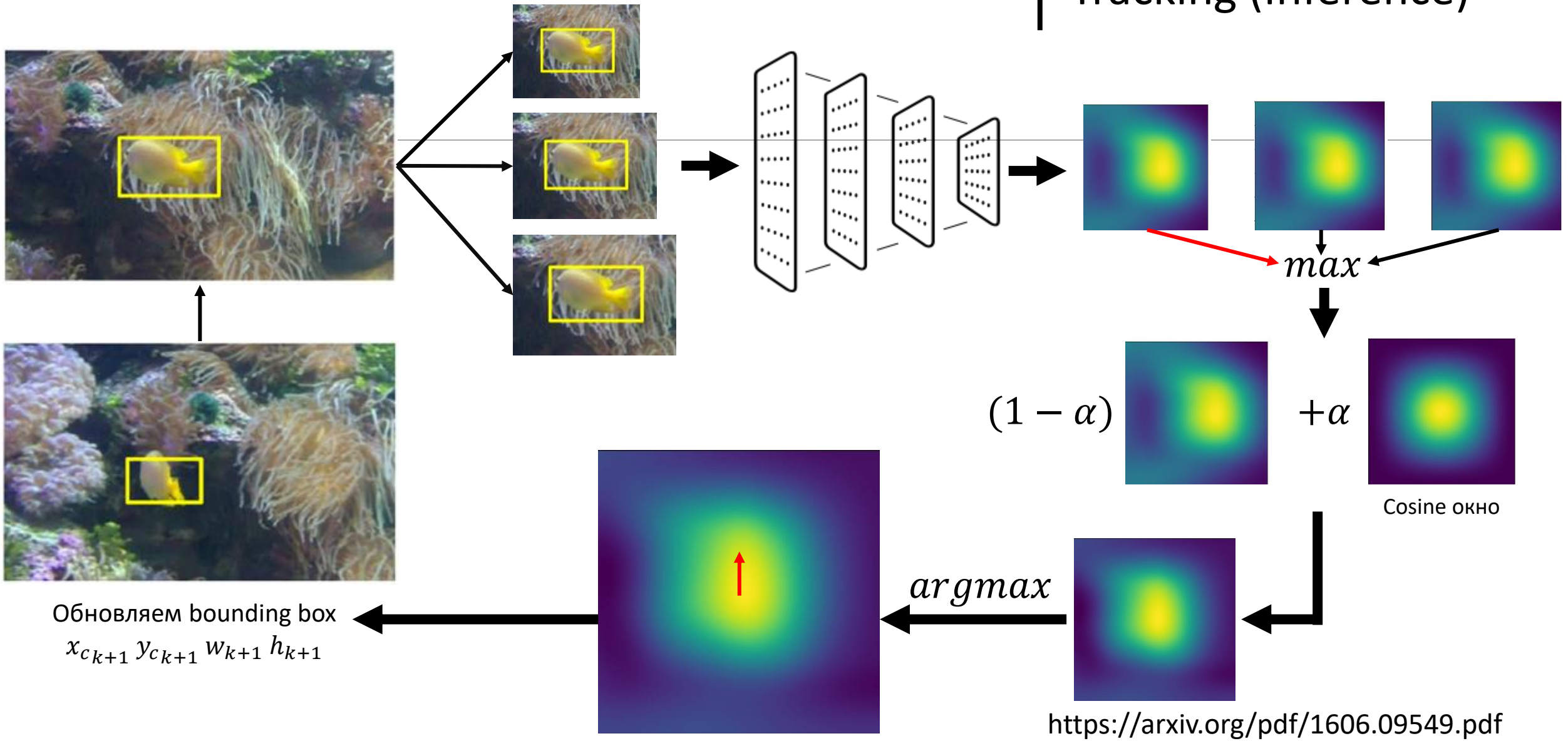
Tracking (Inference)



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Спасибо за внимание!