

UCF:

Conv1: input: $h*w*3$ output: $h/2*w/2*64$

cost: $h*w*64*3*3*3 + h*w*64*3*3*64 + h*w*64 = 38656*h*w$

Conv2: input: $h/2*w/2*64$ output: $h/4*w/4*128$

cost: $h/2*w/2*128*3*3*64 + h/2*w/2*128*3*3*128 + h/2*w/2*128 = 55328*h*w$

Conv3: input: $h/4*w/4*128$ output: $h/8*w/8*256$

cost: $h/4*w/4*256*3*3*128 + h/4*w/4*256*3*3*256*2 + h/4*w/4*256 = 92176*h*w$

conv4: input: $h/8*w/8*256$ output: $h/16*2/16*512$

cost: $h/8*w/8*512*3*3*256 + h/8*w/8*512*3*3*512*2 + h/8*w/8*512 = 92168*h*w$

Conv5: input: $h/16*w/16*512$ output: $h/32*w/32*512$

cost: $h/16*w/16*512*3*3*512*3 + h/16*w/16*512 = 27650*h*w$

deconv5: input: $h/32*w/32*512$ output: $h/16*w/16*512$

cost: $h/16*w/16*512*8(\text{bilinear interpolation}) + h/16*w/16*512*3*3*512*3 = 27664*h*w$

deconv4: input: $h/16*w/16*512$ output: $h/8*w/8*256$

cost: $h/8*w/8*512*8 + h/8*w/8*512*3*3*512*2 + h/8*w/8*256*3*3*512 = 92224*h*w$

deconv3: input: $h/8*w/8*256$ output: $h/4*w/4*128$

cost: $h/4*w/4*256*8 + h/4*w/4*256*3*3*256*2 + h/4*w/4*128*3*3*256 = 92288*h*w$

deconv2: input: $h/4*w/4*128$ output: $h/2*w/2*64$

cost: $h/2*w/2*128*8 + h/2*w/2*128*3*3*128 + h/2*w/2*64*3*3*128 = 55552*h*w$

deconv1: input: $h/2*w/2*64$ output: $h*w*2$

cost: $h*w*64*8 + h*w*64*3*3*64 + h*w*2*3*3*64 = 38528*h*w$

Totally:

$38656 + 55328 + 92176 + 92168 + 27650 + 27664 + 92224 + 92288 + 55552 + 38528 = 612234*h*w$

参数量:

conv1: $3*3*3*64 + 3*3*64*64 = 38592$

conv2: $3*3*64*128 + 3*3*128*128 = 221184$

conv3: $3*3*128*256 + 3*3*256*256 + 3*3*256*256 = 1474560$

conv4: $3*3*256*512 + 3*3*512*512 + 3*3*512*512 = 5898240$

conv5: $3*3*512*512 + 3*3*512*512 + 3*3*512*512 = 7077888$

deconv5: $3*3*512*512 + 3*3*512*512 + 3*3*512*512 = 7077888$

deconv4: $3*3*512*512 + 3*3*512*512 + 3*3*512*256 = 5898240$

deconv3: $3*3*256*256 + 3*3*256*256 + 3*3*256*128 = 1474560$

deconv2: $3*3*128*128 + 3*3*128*64 = 221184$

deconv1: $3*3*64*64 + 3*3*64*2 = 38016$

PAGRN: input: $h*w*3$

Block1: input: $h*w*3$ output: $h/2*w/2*64$
cost: $h*w*64*3*3*3 + h*w*64*3*3*64 + h*w*64 = 38656 * h*w$

Block2: input: $h/2*w/2*64$ output: $h/4*w/4*128$
cost: $h/2*w/2*128*3*3*64 + h/2*w/2*128*3*3*128 + h/2*w/2*128 = 55328*h*w$

Block3: input: $h/4*w/4*128$ output: $h/8*w/8*256$
cost: $h/4*w/4*256*3*3*128 + h/4*w/4*256*3*3*256*3 + h/4*w/4*256 = 129040*h*w$

Block4: input: $h/8*w/8*256$ output: $h/16*w/16*512$
cost: $h/8*w/8*512*3*3*256 + h/8*w/8*512*3*3*512*3 + h/8*w/8*512 = 129032*h*w$

Block5: input: $h/16*w/16*512$ output: $h/16*w/16*512$
cost: $h/16*w/16*512*3*3*512*5 = 46080*h*w$

attention5:
 $h/16*w/16*512 + 1*1*512*512 + h/16*w/16*512 + h/16*w/16*512*512 + h/16*w/16*512 + h/8*w/8*512 + h/8*w/8*256*1*1*512 = 265230*h*w$

attention4:
 $h/8*w/8*256 + 1*1*256*256 + h/8*w/8*256 + h/8*w/8*256*256 + h/8*w/8*256 + h/4*w/4*256 + h/4*w/4*256*256 = 70684*h*w$

attention3:
 $h/4*w/4*256 + 1*1*256*256 + h/4*w/4*256 + h/4*w/4*256*256 + h/4*w/4*256 = 69680*h*w$

saliency_map:
 $h/4*w/4*1*1*256 = 16*h*w$

totally:
 $38656 * h*w + 55328*h*w + 129040*h*w + 129032*h*w + 46080*h*w + 265230*h*w + 70684*h*w + 69680*h*w + 16*h*w = 803746 * h*w$

参数量:

Block1: $3*3*3*64 + 3*3*64*64 = 38592$

Block2: $3*3*64*128 + 3*3*128*128 = 221184$

Block3: $3*3*128*256 + 3*3*256*256 + 3*3*256*256 + 3*3*256*256 = 2064384$

Block4: $3*3*256*512 + 3*3*512*512 + 3*3*512*512 + 3*3*512*512 = 8257536$

Block5: $3*3*512*512 * 5 = 11796480$

attention5: $512*512*2 + 512*256 = 655360$

attention4: $256*256*3 = 65536$

attention3: $256*256*3 = 65536$

saliency_map = 256

totally: $38592 + 221184 + 2064384 + 8257536 + 11796480 + 655360 + 65536 + 65536 + 256 = 23164864$

NLDF: input: 354×354

Conv1: input: $h \times w \times 3$ output: $h/2 \times w/2 \times 64$

cost: $h \times w \times 64 \times 3 \times 3 \times 3 + h \times w \times 64 \times 3 \times 3 \times 64 + h \times w \times 64 = 38656 \times h \times w$

Conv2: input: $h/2 \times w/2 \times 64$ output: $h/4 \times w/4 \times 128$

cost: $h/2 \times w/2 \times 128 \times 3 \times 3 \times 64 + h/2 \times w/2 \times 128 \times 3 \times 3 \times 128 + h/2 \times w/2 \times 128 = 55328 \times h \times w$

Conv3: input: $h/4 \times w/4 \times 128$ output: $h/8 \times w/8 \times 256$

cost: $h/4 \times w/4 \times 256 \times 3 \times 3 \times 128 + h/4 \times w/4 \times 256 \times 3 \times 3 \times 256 \times 2 + h/4 \times w/4 \times 256 = 92176 \times h \times w$

conv4: input: $h/8 \times w/8 \times 256$ output: $h/16 \times w/16 \times 512$

cost: $h/8 \times w/8 \times 512 \times 3 \times 3 \times 256 + h/8 \times w/8 \times 512 \times 3 \times 3 \times 512 \times 2 + h/8 \times w/8 \times 512 = 92168 \times h \times w$

Conv5: input: $h/16 \times w/16 \times 512$ output: $h/32 \times w/32 \times 512$

cost: $h/16 \times w/16 \times 512 \times 3 \times 3 \times 512 \times 3 + h/16 \times w/16 \times 512 = 27650 \times h \times w$

Conv6: input: $h/2 \times w/2 \times 64$ output: $h/2 \times w/2 \times 128$

cost: $h/2 \times w/2 \times 128 \times 3 \times 3 \times 64 = 18432 \times h \times w$

Conv7: input: $h/4 \times w/4 \times 128$ output: $h/4 \times w/4 \times 128$

cost: $h/4 \times w/4 \times 128 \times 3 \times 3 \times 128 = 9216 \times h \times w$

Conv8: input: $h/8 \times w/8 \times 256$ output: $h/8 \times w/8 \times 128$

cost: $h/8 \times w/8 \times 128 \times 3 \times 3 \times 256 = 4608 \times h \times w$

Conv9: input: $h/16 \times w/16 \times 512$ output: $h/16 \times w/16 \times 128$

Cost: $h/16 \times w/16 \times 128 \times 3 \times 3 \times 512 = 2304 \times h \times w$

Conv10: input: $h/32 \times w/32 \times 512$ output: $h/32 \times w/32 \times 128$

cost: $h/32 \times w/32 \times 128 \times 3 \times 3 \times 512 = 576 \times h \times w$

contrast1:

$h/2 \times w/2 \times 128 + h/2 \times w/2 \times 128 \times 3 \times 3 = 320 \times h \times w$

contrast2:

$h/4 \times w/4 \times 128 + h/4 \times w/4 \times 128 \times 3 \times 3 = 80 \times h \times w$

Contrast3:

$h/8 \times w/8 \times 128 + h/8 \times w/8 \times 128 \times 3 \times 3 = 20 \times h \times w$

Contrast4:

$h/16 \times w/16 \times 128 \times (1 + 3 \times 3) = 5 \times h \times w$

Contrast5:

$h/32 \times w/32 \times 128 \times (1 + 3 \times 3) = 1.25 \times h \times w$

unpooling5: input: $h/32 \times w/32 \times (128 + 128)$ output: $h/16 \times w/16 \times 128$

cost: $h/16 \times w/16 \times 128 \times 5 \times 5 \times 256 = 3200 \times h \times w$

Unpooling4: input: $h/16 \times w/16 \times (128 \times 2 + 128)$ output: $h/8 \times w/8 \times 256$

cost: $h/8 \times w/8 \times 256 \times 5 \times 5 \times 128 \times 3 = 38400 \times h \times w$

Unpooling3: input: $h/8 \times w/8 \times (128 \times 2 + 256)$ output: $h/4 \times w/4 \times 384$

cost: $h/4 \times w/4 \times 384 \times 5 \times 5 \times 128 \times 4 = 307200 \times h \times w$

Unpooling2: input $h/4*w/4*(128^2+384)$ output: $h/2*w/2*512$
cost: $h/2*w/2*512*5*5*128*5 = 2048000*h*w$

Local: input: $h/2*w/2*(128^2+512)$ output: $h/2*w/2*640$
Cost: $h/2*w/2*640*(128^2+512) = 122880*h*w$

Local score: $h/2*w/2*640$ output: $h/2*w/2*2$
cost: $h/2*w/2*2*640 = 320*h*w$

Global: input: $h/32*w/32*512$ ($11*11*512$) output: $1*1*128$
 $11*11*512 \rightarrow 7*7*128 \rightarrow 3*3*128 \rightarrow 1*1*128$
 $h/32*w/32*512 \rightarrow (h/32-4)*(w/32-4)*128 \rightarrow (h/32-8)*(w/32-8)*128 \rightarrow (h/32-10)*(w/32-10)*128$
Cost: $7*7*128*5*5*512 + 3*3*128*5*5*128 + 1*1*128*3*3*128 = 84115456$ (without $h*w$)
Cost: $(h/32-4)*(w/32-4)*128*5*5*512 + (h/32-8)*(w/32-8)*128*5*5*128 + (h/32-10)*(w/32-10)*128*3*3*128 = 2144*h*w - 204800*(h+w) + 26214400 - 102400*(h+w) + 26214400 - 46080*(h+w) + 14745600 = 2144*h*w - 353280*(h+w) + 67174400$ (with $h*w$)

Global score: input: $1*1*128$ output: $1*1*2$
cost: $1*1*2*1*128 = 256$

add_score:
 $h/2*w/2*2 = 0.5*h*w$

totally:
 $38656*h*w + 55328*h*w + 92176*h*w + 92168*h*w + 27650*h*w + 18432*h*w + 9216*h*w + 4608*h*w + 2304*h*w + 576*h*w + 320*h*w + 80*h*w + 20*h*w + 5*h*w + 1.25*h*w + 3200*h*w + 38400*h*w + 307200*h*w + 2048000*h*w + 122880*h*w + 320*h*w + 84115456 + 256 + 0.5*h*w = 2861540.75*h*w + 84115712$ (without $h*w$)

$2861540.75*h*w + 256 + 2144*h*w - 353280*(h+w) + 67174400 = 2863684.75*h*w - 353280*(h+w) + 67174656$ (with $h*w$)

参数量:

conv1: $3*3*3*64 + 3*3*64*64 = 38592$
conv2: $3*3*64*128 + 3*3*128*128 = 221184$
conv3: $3*3*128*256 + 3*3*256*256 + 3*3*256*256 = 1474560$
conv4: $3*3*256*512 + 3*3*512*512 + 3*3*512*512 = 5898240$
conv5: $3*3*512*512 + 3*3*512*512 + 3*3*512*512 = 7077888$
conv6: $3*3*64*128 = 73728$
conv7: $3*3*128*128 = 147456$
conv8: $3*3*256*128 = 294912$
conv9: $3*3*512*128 = 589824$
conv10: $3*3*512*128 = 589824$
unpooling5: $5*5*256*128 = 819200$
unpooling4: $5*5*384*256 = 2457600$
unpooling3: $5*5*512*384 = 4915200$
unpooling2: $5*5*640*512 = 8192000$
local: $768*640 = 491520$
local_score: $640*2 = 1280$
global: $5*5*512*128 + 5*5*128*128 + 3*3*128*128 = 2195456$
global_score = $128*2 = 256$

totally:

$$38592 + 221184 + 1474560 + 5898240 + 7077888 + 73728 + 147456 + 294912 + 589824 + 589824 + 819200 + 2457600 + 4915200 + 8192000 + 491520 + 1280 + 2195456 + 256 = 35478720$$

DSS:

conv_1:

$$h*w*64*3*3*3 + h*w*64*3*3*64 + h*w*64 = 38656*h*w$$

conv_2:

$$h/2*w/2*128*3*3*64 + h/2*w/2*128*3*3*128 + h/2*w/2*128 = 55328*h*w$$

conv_3:

$$h/4*w/4*256*3*3*128 + h/4*w/4*256*3*3*256*2 + h/4*w/4*256 = 92176*h*w$$

conv_4:

$$h/8*w/8*512*3*3*256 + h/8*w/8*512*3*3*512*2 + h/8*w/8*512 = 92168*h*w$$

conv_5:

$$h/16*w/16*512*3*3*512*3 + h/16*w/16*512 = 27650*h*w$$

Conv1_2:

$$h*w*128*3*3*64 + h*w*128*3*3*128 + h*w*1*1*128 = 221312*h*w$$

conv2_2:

$$h/2*w/2*128*3*3*128 + h/2*w/2*128*3*3*128 + h/2*w/2*1*1*128 = 73760*h*w$$

Conv3_3:

$$h/4*w/4*256*5*5*256 + h/4*w/4*256*5*5*256 + h/4*w/4*1*1*256 = 204816*h*w$$

conv4_3:

$$h/8*w/8*256*5*5*512 + h/8*w/8*256*5*5*256 + h/8*w/8*1*1*256 = 76804*h*w$$

conv5_3:

$$h/16*w/16*512*5*5*512 + h/16*w/16*512*5*5*512 + h/16*w/16*1*1*512 = 51202*h*w$$

pool5:

$$h/32*w/32*512*7*7*512 + h/32*w/32*512*7*7*512 + h/32*w/32*1*1*512 = 25088*h*w$$

Short connection:

$$\text{conv4_3: } h/8*w/8*3$$

$$\text{conv3_3: } h/4*w/4*3$$

$$\text{conv2_2: } h/2*w/2*5$$

$$\text{conv1_2: } h*w*5$$

Totally:

$$38656 + 55328 + 92176 + 92168 + 27650 + 221312 + 73760 + 204816 + 76804 + 51202 + 25088 + 6.484375 = 984054.484375*h*w$$

参数量:

$$\text{conv1: } 3*3*3*64 + 3*3*64*64 = 38592$$

$$\text{conv2: } 3*3*64*128 + 3*3*128*128 = 221184$$

$$\text{conv3: } 3*3*128*256 + 3*3*256*256 + 3*3*256*256 = 1474560$$

$$\text{conv4: } 3*3*256*512 + 3*3*512*512 + 3*3*512*512 = 5898240$$

$$\text{conv5: } 3*3*512*512 + 3*3*512*512 + 3*3*512*512 = 7077888$$

$$\text{conv1_2: } 3*3*64*128 + 3*3*128*128 + 1*1*128*1 = 221312$$

$$\text{conv2_2: } 3*3*128*128 + 3*3*128*128 + 1*1*128*1 = 295040$$

$$\text{conv3_3: } 5*5*256*256 + 5*5*256*256 + 1*1*256*1 = 3277056$$

$$\text{conv4_3: } 5*5*512*256 + 5*5*256*256 + 1*1*256*1 = 4915456$$

$$\text{conv5_3: } 5*5*512*512 + 5*5*512*512 + 1*1*512*1 = 13107712$$

$$\text{pool5: } 7*7*512*512 + 7*7*512*512 + 1*1*512*1 = 25690624$$

short connection:

$$\text{conv4_3: } 1*1*3*1 = 3$$

$$\text{conv3_3: } 1*1*3*1 = 3$$

$$\text{conv2_2: } 1*1*5*1 = 5$$

$$\text{conv1_2: } 1*1*5*1 = 5$$

totally:

$$38592 + 221184 + 1474560 + 5898240 + 7077888 + 221312 + 295040 + 3277056 + 4915456 + 13107712 + 25690624 + 3 + 3 + 5 + 5 = 62217680$$