Rakhat Yskak SE-2108

1.1 Segmentation is the process of extracting smaller segments, like background and foreground, mb some item, while classification is identifying if an image forms part of class, like flowers, human, and bricks, etc.

1.2 1080 x 1920 RGB picture → 3 channels with values from 0 to 255

then matrix will be 1080 × 1920 × 3

After flattening it will be (1080 × 1920 × 3) X 1 =

6220800 x 1

1.3 Regularization is a technique used to decrease amount of errors on the train set, by fitting the function.

2. $f(x, y, z) = (x+y) \cdot z$

$x = -4 \quad y = 10 \quad z = -8$

forward propagation

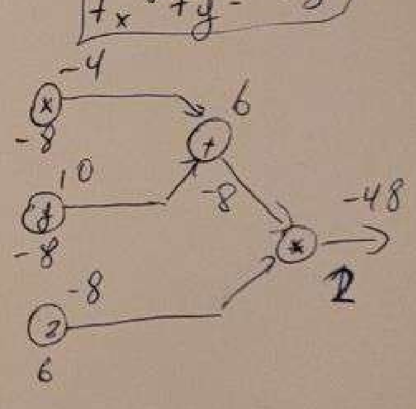
$f(x,y,z) = f(-4, 10, -8) = (-4+10) \cdot (-8) = 6 \cdot (-8) = -46$

backward propagation → Partial derivation $\boxed{f_x \cdot f_y = -8}$

$f_x(x,y,z) = ((x+y)z)' = (xz+yz)' = z = -8$

$f_y(x,y,z) = ((x+y)z)' = (xz+yz)' = z = -8$

$f_z(x,y,z) = ((x+y) \cdot z)' = x+y = 6$



3.
```
1 1 2 4 5
6 7 8 9 3
3 4 1 0 4
1 2 4 5 6
7 8 9 1 2
```

$M_{0,0} = \begin{bmatrix} 1 & 1 & 2 \\ 6 & 7 & 8 \\ 3 & 4 & 1 \end{bmatrix} \Rightarrow 8$ $\quad M_{0,1} \begin{bmatrix} 1 & 2 & 4 \\ 7 & 8 & 9 \\ 4 & 1 & 0 \end{bmatrix} = 9$ $\quad M_{0,2} \begin{bmatrix} 2 & 4 & 5 \\ 8 & 9 & 3 \\ 1 & 0 & 4 \end{bmatrix} = 9$

$M_{1,0}$ 6 7 8 / 3 4 1 / 1 2 4 ⇒ 8 $\quad M_{1,1}$ 7 8 9 / 4 1 0 / 2 4 5 = 9 $\quad M_{1,2}$ 8 9 3 / 1 0 4 / 4 5 6 = 9 ⇒

```
8 9 9
8 9 9
9 9 9
```

$M_{1,5}$ = i - index row, j - index column

$M_{2,0}$ 3 4 1 / 1 2 4 / 7 8 9 ⇒ 9 $\quad M_{2,1}$ 4 1 0 / 2 4 5 / 8 9 1 ⇒ 9 $\quad M_{2,2}$ 1 0 4 / 4 5 6 / 9 1 2 = 9

Rakhat Yskak SE-2108

1.1 Segmentation is the process of extracting smaller segments, like background and foreground, mb some item, while Classification is identifying if an image forms part of class, like flowers, human, and bricks, etc.

1.2 1080×1920 RGB picture → 3 channels with values from 0 to 255
then matrix will be $1080 \times 1920 \times 3$
After flattening it will be $(1080 \times 1920 \times 3) \times 1 =$
6220800×1

1.3 Regularization is a technique used to decrease amount of errors on the train set, by fitting the function.

2. $f(x, y, z) = (x+y) \cdot z$
$x = -4 \quad y = 10 \quad z = -8$
forward propagation
$\ldots -8) = (-4+(10) \cdot (-8) = 6 \cdot (-8) = -46$ ... ation $(f \cdot f_1 = -8)$

6220800×1

1.3 Regularization is a technique used to decrease amount of errors on the train set, by fitting the function.

2. $f(x, y, z) = (x+y) \cdot z$

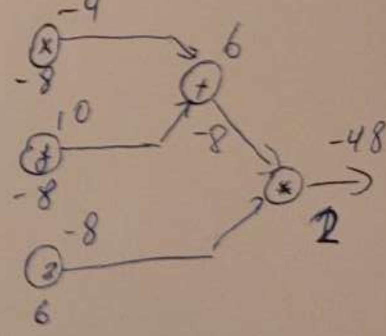
$x = -4 \quad y = 10 \quad z = -8$

forward propagation

$f(x,y,z) = f(-4, 10, -8) = (-4+10) \cdot (-8) = 6 \cdot (-8) = -46$

backward propagation → Partial derivation

$\boxed{f_x \cdot f_y = -8}$



$f_x(x, y, z) = ((x+y)z)' = (xz + yz)' = z = -8$

$f_y(x, y, z) = ((x+y)z)' = (xz + yz)' = z = -8$

$f_z(x, y, z) = ((x+y) \cdot z)' = x+y = 6$

3.
1 1 2 4 5
6 7 8 9 3
3 4 1 0 4

$M_{0,0} = \begin{bmatrix} 1 & 1 & 2 \\ 6 & 7 & 8 \\ 3 & 4 & 1 \end{bmatrix} \Rightarrow 8$ $M_{0,1} = \begin{bmatrix} 1 & 2 & 4 \\ 7 & 8 & 9 \\ 4 & 1 & 0 \end{bmatrix} = 9$ $M_{0,2} = \begin{bmatrix} 2 & 4 & 5 \\ 8 & 9 & 3 \\ 1 & 0 & 4 \end{bmatrix} = 9$

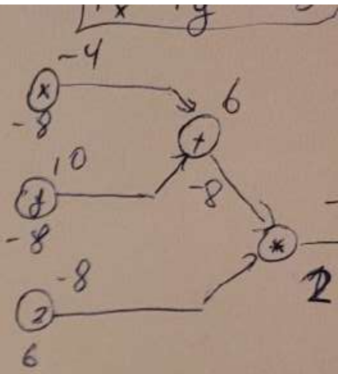
6 7 8 → 8 $M_{1,1}$ = 7 8 9 = 9 $M_{1,2}$ = 8 9 3 1 0 4 = 9 ⇒

8 9 9
8 9 9
9 9 9

$$f_x(x,y,z) = ((\cancel{x}+\cancel{y})z)' = (xz+yz)' = \cancel{z} = -8$$

$$f_y(x,y,z) = ((x+y)z)' = (xz+yz)' = z = -8$$

$$f_z(x,y,z) = ((x+y) * z)' = x+y = 6$$



3.

$$\begin{matrix} 1 & 1 & 2 & 4 & 5 \\ 6 & 7 & 8 & 9 & 3 \\ 3 & 4 & 1 & 0 & 4 \\ 1 & 2 & 4 & 5 & 6 \\ 7 & 8 & 9 & 1 & 2 \end{matrix}$$

$$M_{0,0} = \begin{bmatrix} 1 & 1 & 2 \\ 6 & 7 & 8 \\ 3 & 4 & 1 \end{bmatrix} \Rightarrow 8 \quad M_{0,1} = \begin{bmatrix} 1 & 2 & 4 \\ 7 & 8 & 9 \\ 4 & 1 & 0 \end{bmatrix} = 9 \quad M_{0,2} = \begin{bmatrix} 2 & 4 & 5 \\ 8 & 9 & 3 \\ 1 & 0 & 4 \end{bmatrix} = 9$$

$$M_{1,0} \begin{matrix} 6 & 7 & 8 \\ 3 & 4 & 1 \\ 1 & 2 & 4 \end{matrix} \Rightarrow 8 \quad M_{1,1} = \begin{matrix} 7 & 8 & 9 \\ 4 & 1 & 0 \\ 2 & 4 & 5 \end{matrix} = 9 \quad M_{1,2} = \begin{matrix} 8 & 9 & 3 \\ 1 & 0 & 4 \\ 4 & 5 & 6 \end{matrix} = 9 \Rightarrow \begin{matrix} 8 & 9 & 9 \\ 8 & 9 & 9 \\ 9 & 9 & 9 \end{matrix}$$

$M_{i,j}$: i - index row, j - index column

$$M_{2,0} \begin{matrix} 3 & 4 & 1 \\ 1 & 2 & 4 \\ 7 & 8 & 9 \end{matrix} \Rightarrow 9 \quad M_{2,1} \begin{matrix} 4 & 1 & 0 \\ 2 & 4 & 5 \\ 8 & 9 & 1 \end{matrix} \Rightarrow 9 \quad M_{2,2} = \begin{matrix} 1 & 0 & 4 \\ 4 & 5 & 6 \\ 9 & 1 & 2 \end{matrix} = 9$$