**Lembar Jawaban Kalkulasi Neural Network**

**Pada lembar jawaban ini, kamu dapat menuliskan cara mengkalkulasikan nilai-nilai yang diminta pada arsitektur neural network sesuai soal beserta hasilnya, ya, semangat!**

Pertama, masukkan dulu nilai initial value dan initial randomnya ya …

**Initial Value**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **x1** | **x2** | **x3** | **α** | **Threshold** | **Yd,6** |
| 0.7 | 0.8 | 0.8 | 0.1 | -1 | 0 |

**Initial Random**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **W14** | **W15** | **W24** | **W25** | **W34** | **W35** | **W46** | **W56** | **θ4** | **θ5** | **θ6** |
| 0.5 | 0.6 | 0.3 | 1.1 | -1 | 0.1 | -1.1 | -0.7 | 0.2 | 0.3 | 0.4 |

Jika sudah selesai, kita akan masuk ke langkah-langkah kalkulasi, sebagai berikut:

**Forward Pass**

Forward Pass merupakan hasil dari langkah 1 pada proses kalkulasi di challenge deck. Oleh karena itu kamu tuliskan langkah kalkulasi yang kamu lakukan untuk mencari nilai-nilai di bawah ini, ya🙌

**Langkah 1: Menghitung output Neuron 4 (y4), Neuron 5 (y5), Neuron 6 (y6), dan Error menggunakan sigmoid function**

|  |  |
| --- | --- |
| Y4 | =sigmoid(X1W14 + X2W24 + X3W34 - θ4) |
|  | =1/[1 + e-(0.7 x 0.5 + 0.8 x 0.3 + 0.9 x -1.0 - (-1) x 0.2)] |
|  | =0.3751 |
| Y5 | =sigmoid(X1W15 + X2W25 + X3W35 - θ5) |
|  | =1/[1 + e-(0.7 x 0.6 + 0.8 x 1.1 + 0.9 x 0.1 - (-1) x 0.3)] |
|  | = 0.7483 |
| Y6 | =sigmoid(Y4W46 + Y5W56 - θ6) |
|  | =1/[1 + e-(0.37 x -1.1 + 0.74 x -0.7 - 1 x 0.4)] |
|  | =0.2080 |
| e | =Yd,6- Y6 |
|  | =0 - 0.2080 |
|  | =-0.2080 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| 0.3751 | 0.7483 | 0.2080 | -0.2080 |

**Backward Pass**

Sementara itu, nilai-nilai dari backward pass didapatkan dengan menjalankan langkah 2, 3, dan 4. Jangan lupa tuliskan proses dan hasil kalkulasinya pada tempat yang telah disediakan di bawah, ya👍

**Langkah 2: Hitung error gradient untuk Neuron 6 di Output Layer dan weight corrections**

|  |  |
| --- | --- |
| δ6 | =y6(1-y6)e |
|  | =0.208 x (1-0.208) x -0.208 |
|  | =-0.034 |
| ∇46 | =α x Y4 Xδ6 |
|  | =0.1 x 0,3751 x -0,034 |
|  | =-0.0012864 |
| ∇56 | =α x Y5 xδ6 |
|  | =0.1 x 0.7483x-0.034 |
|  | =-0.0025659 |
| ∇θ6 | =α x (-1) xδ6 |
|  | =0.1 x (-1) x -0.034 |
|  | =0.0034286 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| -0.034 | -0.0012864 | -0.0025659 | 0.0034286 |

**Langkah 3: Hitung error gradients untuk Neuron 4 dan Neuron 5 di Middle Layer/Hidden Layer**

|  |  |
| --- | --- |
| δ4 | =Y4(1-Y4) x δ6xW46 |
|  | =0.3751x(1-0.3751)x-0,034x-1.1 |
|  | =0.00884118 |
| δ5 | =Y5(1-Y5) x δ6xW56 |
|  | =0.7483x(1-0.7483)x-0.034x-0.7 |
|  | =0.00451939 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |
| --- | --- |
| **δ4** | **δ5** |
| 0.00884118 | 0.00451939 |

**Langkah 4: Hitung weight corrections**

|  |  |
| --- | --- |
| ∇w14 | =α x X1 x δ4 |
|  | =0.1x0.7x0.00884118 |
|  | =0.00061888 |
| ∇w24 | =α x X2 x δ4 |
|  | =0.1x0.8x0.00884118 |
|  | =0.00070729 |
| ∇w34 | =α x X3 x δ4 |
|  | =0.1x0.9x0.00884118 |
|  | =0.00079571 |
| ∇θ4 | =α x (-1) x δ4 |
|  | =0.1x(-1)x0.00884118 |
|  | =-0.0008841 |
| ∇w15 | =α x X1 x δ5 |
|  | =0.1x0.7x0.00451939 |
|  | =0.00031636 |
| ∇w25 | =α x X2 x δ5 |
|  | =0.1x0.8x0.00451939 |
|  | =0.00036155 |
| ∇w35 | =α x X3 x δ5 |
|  | =0.1x0.9x0.00451939 |
|  | =0.00040675 |
| ∇θ5 | =α x (-1) x δ5 |
|  | =0.1x(-1)x0.00451939 |
|  | =-0.0004519 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| 0.00061888 | 0.00070729 | 0.00079571 | -0.0008841 | 0.00031636 | 0.00036155 | 0.00040675 | -0.0004519 |

**Backward Pass**

Last but not least, adalah nilai-nilai dari updated weight didapatkan dengan menjalankan langkah nomor 5. Seperti biasa, tuliskan proses dan hasil kalkulasinya pada tempat yang telah disediakan di bawah, ya👌

**Langkah 5: Hitung semua weights dan theta pada arsitektur yang telah diperbarui**

|  |  |
| --- | --- |
| w14 | =w14+∇w14 |
|  | =0.5+0.00061888 |
|  | =0.50061888 |
| w15 | =w15+∇w15 |
|  | =0.6+0.00031636 |
|  | =0.60031636 |
| w24 | =w24+∇w24 |
|  | =0.3+0.00070729 |
|  | =0.30070729 |
| w25 | =w25+∇w25 |
|  | =1.1+0.00036155 |
|  | =1.10036155 |
| w34 | =w34+∇w34 |
|  | =-1+0.00079571 |
|  | =-0.9992043 |
| w35 | =w35+∇w35 |
|  | =0.1+0.00040675 |
|  | =0.10040675 |
| θ4 | =θ4+∇θ4 |
|  | =0.2+(-0.0008841) |
|  | =0.19911588 |
| θ5 | =θ5+∇θ5 |
|  | =0.3+(-0.0004519) |
|  | =0.29954806 |
| θ6 | =θ6+∇θ6 |
|  | =0.4+0.0034286 |
|  | =0.4034286 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **Θ4** | **Θ5** | **Θ6** |
| 0.50061888 | 0.60031636 | 0.30070729 | 1.10036155 | -0.9992043 | 0.10040675 | 0.19911588 | 0.29954806 | 0.4034286 |

**Hore, kamu sudah menyelesaikan satu dari tiga proyek challenge platinum! Semoga mendapatkan hasil yang maksimal dan selamat bersenang-senang~**