**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 | 0.9 | 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 |
|  | = 0.2080 X (1-0.2080) X (-0.2080) |
|  | = 0.3428 |
| ∇46 | = α x Y4 x δ6 |
|  | = 0.1 x 0.3751 x (0.3428) |
|  | = 0.0012 |
| ∇56 | = α x Y5 x δ6 |
|  | = 0.1 x 0.7483 x (0.3428) |
|  | = 0.0025 |
| ∇θ6 | = α x (-1) x δ6 |
|  | = 0.1 x (-1) x (0.3428) |
|  | = -0.0034 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| 0.3428 | 0.0012 | 0.0025 | -0.0034 |

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

|  |  |
| --- | --- |
| δ4 | = -0.0034 |
|  | = 0.3751 x (1 - 0.3751) x 0.3428 x -1.1 |
|  | = -0.0088 |
| δ5 | = Y5 (1-Y5) x δ6 x W56 |
|  | = 0.7483 x (1 - 0.7483) x 0.3428 x -0.7 |
|  | = -0.0045 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |
| --- | --- |
| **δ4** | **δ5** |
| -0.0088 | -0.0045 |

**Langkah 4: Hitung weight corrections**

|  |  |
| --- | --- |
| ∇w14 | = a x X1 x δ4 |
|  | = 0.1 x 0.7 x -0.0088 |
|  | =-0.000618 |
| ∇w24 | = a x X2 x δ4 |
|  | = 0.1 x 0.8 x -0.0088 |
|  | = -0.000707 |
| ∇w34 | = a x X3 x δ4 |
|  | = 0.1 x 0.9 x -0.0088 |
|  | = -0.000795 |
| ∇θ4 | = a x (-1) x δ4 |
|  | = 0.1 x (-1) x -0.0088 |
|  | = 0.000884 |
| ∇w15 | = a x X1 x δ5 |
|  | = 0.1 x 0.7 x -0.0045 |
|  | =-0.000316 |
| ∇w25 | = a x X2 x δ5 |
|  | = 0.1 x 0.8 x -0.0045 |
|  | = -0.000361 |
| ∇w35 | = a x X3 x δ5 |
|  | = 0.1 x 0.9 x -0.0045 |
|  | = -0.000406 |
| ∇θ5 | = a x (-1) x δ5 |
|  | = 0.1 x (-1) x -0.0045 |
|  | = 0.000451 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| -0.000618 | -0.000707 | -0.000795 | 0.000884 | -0.000316 | -0.000361 | -0.000406 | 0.000451 |

**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 + -0.000618 |
|  | = 0.4993 |
| w15 | = w15 + ∇w15 |
|  | = 0.6 + -0.000316 |
|  | = 0.5996 |
| w24 | = w24 + ∇w24 |
|  | = 0.3 + -0.000707 |
|  | = 0.2992 |
| w25 | = w25 + ∇w25 |
|  | = 1.1 + -0.000361 |
|  | = 1.0996 |
| w34 | = w34 + ∇w34 |
|  | = -1 + -0.000795 |
|  | = -1.000795 |
| w35 | = w35 + ∇w35 |
|  | = 0.1 + -0.000406 |
|  | = 0.9959 |
| θ4 | = θ4 - ∇θ4 |
|  | = 0.2 - 0.000884 |
|  | = 0.2008 |
| θ5 | = θ5 - ∇θ5 |
|  | = 0.3 - 0.000451 |
|  | = 0.3004 |
| θ6 | = θ6 - ∇θ6 |
|  | = 0.4 - (-0.0034) |
|  | = 0.3965 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **θ3** | **θ4** | **θ5** |
| 0.4993 | 0.5996 | 0.2992 | 1.0996 | -1.000795 | 0.9959 | 0.2008 | 0.3004 | 0.3965 |

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