**Lembar Jawaban Kalkulasi Neural Network**

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

Pertama. masukkan dulu nilai initial value dan 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 | 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**

|  |  |
| --- | --- |
| Z4 | = X1 W14 + X2 W24 + X3 W34 - θ4 |
|  | = (0.7 \* 0.8) + (0.8 \* 0.3) + (0.9\*-1.0) -1\*0.2 |
|  | = -0.51 |
| Y4 | = |
|  | = 0.375194 |
| Z5 | = X1 W15 + X2 W25 + X3 W35 - θ5 |
|  | = (0.7 \* 0.6) + (0.8 \* 1.1) + (0.9\*-0.1) -1\*0.3 |
|  | = 1.09 |
| Y5 | = |
|  | = 0.748382 |
| Z6 | = Y4 W46 + Y5 W56 - θ6 |
|  | = (0.375194\* 0.6) + (0.748382\* 1.1) -1\*0.4 |
|  | = -1.33658 |
| Y6 | = |
|  | = 0.208073 |
| e | = |
|  | = 0 – 0.208073 |
|  | = – 0.208073 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **Y4** | **Y5** | **Y6** | **e** |
| 0.375194 | 0.748382 | 0.208073 | – 0.208073 |

**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 |
|  | = 0.208073 \* [1 – 0.208073] \* – 0.208073 |
|  | = -0.03429 |
| ∇46 | = α × Y4 × δ6 |
|  | = 0.1 \* 0.375194 \* -0.03429 |
|  | = -0.001287 |
| ∇56 | = α × Y5 × δ6 |
|  | = 0.1 \* 0.748382 \* -0.03429 |
|  | = -0.002566 |
| ∇θ6 | = α × (-1) × δ6 |
|  | = 0.1 \* (-1) \* -0.03429 |
|  | = 0.003429 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |
| --- | --- | --- | --- |
| **δ6** | **∇46** | **∇56** | **∇θ6** |
| -0.03429 | -0.001287 | -0.002566 | 0.003429 |

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

|  |  |
| --- | --- |
| δ4 | = Y4(1 – Y4) × δ6 × w46 |
|  | = 0.375194 \* (1 – 0.375194) \* -0.03429 \* -1.1 |
|  | = 0.008842 |
| δ5 | = Y5(1 – Y5) × δ6 × w56 |
|  | = 0.748382 \* (1 – 0.748382) \* -0.03429 \* -0.7 |
|  | = 0.00452 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |
| --- | --- |
| **δ4** | **δ5** |
| 0.008842 | 0.00452 |

**Langkah 4: Hitung weight corrections**

|  |  |
| --- | --- |
| ∇w14 | = α × X1 × δ4 |
|  | = 0.1 \* 0.7 \* 0.008842 |
|  | = 0.000619 |
| ∇w24 | = α × X2 × δ4 |
|  | = 0.1 \* 0.8 \* 0.008842 |
|  | = 0.000707 |
| ∇w34 | = α × X3 × δ4 |
|  | = 0.1 \* 0.9 \* 0.008842 |
|  | = 0.000796 |
| ∇θ4 | = α × (-1) × δ4 |
|  | = 0.1 \* (-1) \* 0.008842 |
|  | = -0.000884 |
| ∇w15 | = α × X1 × δ5 |
|  | = 0.1 \* 0.7 \* 0.00452 |
|  | = 0.000316 |
| ∇w25 | = α × X2 × δ5 |
|  | = 0.1 \* 0.8 \* 0.00452 |
|  | = 0.000362 |
| ∇w35 | = α × X2 × δ5 |
|  | = 0.1 \* 0.9 \* 0.00452 |
|  | = 0.000407 |
| ∇θ5 | = α × (-1) × δ5 |
|  | = 0.1 \* (-1) \* 0.00452 |
|  | = -0.000452 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **∇w14** | **∇w24** | **∇w34** | **∇θ4** | **∇w15** | **∇w25** | **∇w35** | **∇θ5** |
| 0.000619 | 0.000707 | 0.000796 | -0.000884 | 0.000316 | 0.000362 | 0.000407 | -0.000452 |

**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 + 0.000619 |
|  | = 0.500619 |
| w15 | = w15 + ∇w15 |
|  | = 0.6 + 0.000316 |
|  | = 0.600316 |
| w24 | = w24 + ∇w24 |
|  | = 0.3 + 0.000707 |
|  | = 0.300707 |
| w25 | = w25 + ∇w25 |
|  | = 1.1 + 0.000362 |
|  | = 1.100362 |
| w34 | = w34 + ∇w34 |
|  | = -1.0 + 0.000796 |
|  | = -0.999204 |
| w35 | = w35 + ∇w35 |
|  | = 0.1 + 0.000407 |
|  | = 0.100407 |
| θ4 | = θ4 + ∇θ4 |
|  | = 0.2 + -0.000884 |
|  | = 0.199116 |
| θ5 | = θ5 + ∇θ5 |
|  | = 0.3 + -0.000452 |
|  | = 0.299548 |
| θ6 | = θ6 + ∇θ6 |
|  | = 0.4 + 0.003429 |
|  | = 0.403429 |

Lalu isi rangkuman hasilnya di tabel ini ya …

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **w14** | **w15** | **w24** | **w25** | **w34** | **w35** | **θ3** | **θ4** | **θ5** |
| 0.500619 | 0.600316 | 0.300707 | 1.100362 | -0.999204 | 0.100407 | 0.199116 | 0.299548 | 0.403429 |

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