Forward propagation

Fall/Winter 2020-2021

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################################
##                            ##
##  Deep Learning in Python   ##
##                            ##
################################
```

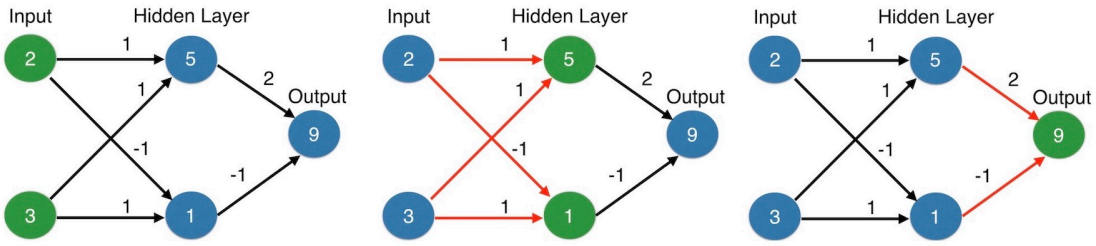
§1 Introduction to Deep Learning in Python

§1.1 Basics of deep learning and neural networks

§1.1.2 Forward propagation

1. How does the forward propagation function?

- Multiply - add process.
- Dot product.
- Forward propagation is for one data point at a time.
- The output is the prediction for that data point.



2. Code of the forward propagation:

[1]:
```
import numpy as np

input_data = np.array([2, 3])
weights = {
    'node_0': np.array([1, 1]),
    'node_1': np.array([-1, 1]),
    'output': np.array([2, -1])
}
```

```
node_0_value = (input_data * weights['node_0']).sum()
node_1_value = (input_data * weights['node_1']).sum()

hidden_layer_values = np.array([node_0_value, node_1_value])
print(hidden_layer_values)
```

```
[5 1]
```

[2]:
```
output = (hidden_layer_values * weights['output']).sum()
print(output)
```

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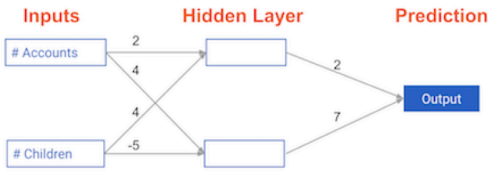
3. Practice exercises for the forward propagation:

▶ Diagram of the forward propagation:



▶ Package pre-loading:

[3]:
```
import numpy as np
```

▶ Data pre-loading:

[4]:
```
input_data = np.array([3, 5])
weights = {
    'node_0': np.array([2, 4]),
    'node_1': np.array([4, -5]),
    'output': np.array([2, 7])
}
```

▶ The forward propagation algorithm practice:

[5]:
```
# Calculate node 0 value: node_0_value
node_0_value = (input_data * weights['node_0']).sum()

# Calculate node 1 value: node_1_value
node_1_value = (input_data * weights['node_1']).sum()

# Put node values into array: hidden_layer_outputs
hidden_layer_outputs = np.array([node_0_value, node_1_value])

# Calculate output: output
output = (hidden_layer_outputs * weights['output']).sum()
```

```
# Print output
print(output)
```

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-39
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