

CLAIMS

1. A system for mapping a neural network architecture onto a computing core, the system comprising,

5 a neural network module configured to provide a neural network;

a data input module coupled to the neural network module, the data input module
~~neural network module~~ configured to provide input data to the neural network;

a layer selector module coupled to the neural network module, the layer selector module configured to select a layer of the neural network;

10 a pipeline module coupled to the layer selection module, the pipeline module configured to perform at least one backward pipelining analysis from the selected layer of the layer selector module, the pipeline module being arranged to perform the at least one backward pipelining analysis towards an input layer of the neural network;

a mapper module coupled to the pipeline module, the mapper module being
 15 arranged to receive activation information from the pipeline module, the activation information based on the at least one backward pipelining analysis; ~~and~~

wherein the mapper module is further arranged to map at least the selected layer of the neural network using the activation information to a computing core; and

wherein the activation information comprises an identification of activations and a
 20 number of activations needed in each layer of the neural network for the generation of
activations in an adjacent layer of the each layer, the each layer being analysed in the at
least one backward pipelining analysis.

2. The system as claimed in claim 1, wherein the layer selection module is
 25 configured to select the layer of the neural network between the input layer and an output layer of the neural network.

3. The system as claimed in claims 1 or 2, wherein the pipeline module is
further configured to perform an additional pipelining analysis for a split pipelined
 30 mapping.

43. The system as claimed in claims ~~31 or 2~~, wherein the additional pipelining analysis is based on the pipeline module ~~is being~~ further configured to perform at least one forward pipelining analysis from the selected layer of the layer selector module, the pipeline module being arranged to perform the at least one forward pipelining analysis from the selected layer away from the input layer.

54. The system as claimed in claims ~~31 or 2~~, wherein the additional pipelining analysis is based on the pipeline module ~~is being~~ further configured to perform at least another backward pipelining analysis from another layer further from the input layer than the selected layer, the at least another backward

pipelining analysis being from the another layer towards the selected layer and the input layer.

~~5. The system as claimed in any one of claims 1 to 4, wherein the activation information comprises an identification of and a number of activations needed in each layer of the neural network for the generation of activations in an adjacent layer of the each layer, the each layer being analysed in the at least one backward pipelining analysis.~~

6. The system as claimed in any one of claims 1 to 5, wherein the mapper module is further arranged to perform the mapping to the computing core based on a crossbar array of synapses, the crossbar array providing an interconnected relationship between axons and neurons with each synapse arranged for at least one mathematical operation.

7. The system as claimed in claim 6, wherein the mapper module is further arranged to perform the mapping to the computing core with the crossbar array of synapses, the mapping being based on a matrix method.

8. The system as claimed in claim 7, wherein the matrix method is selected from a group consisting of a block matrix, a Toeplitz matrix and a hybrid matrix of a block matrix and Toeplitz matrix.

9. The system as claimed in any one of claims 1 to 8, further comprising a first storage module, the first storage module being configured to store the activation information relating to the selected layer, output information relating to the selected layer or both.

10. A method of mapping a neural network architecture onto a computing core, the method comprising,
 providing a neural network;
 providing input data to the neural network;

selecting a layer of the neural network;

performing at least one backward pipelining analysis from the selected layer towards an input layer of the neural network;

determining activation information based on the at least one backward pipelining analysis; and

mapping at least the selected layer of the neural network using the activation information to a computing core,

wherein the step of determining activation information based on the at least one backward pipelining analysis comprises identifying activations and determining a number of activations needed in each layer of the neural network for the generation of activations in an adjacent layer of the each layer, the each layer being analysed in the at least one backward pipelining analysis.

11. The method as claimed in claim 10, wherein the step of selecting a layer of the neural network comprises selecting the layer between the input layer and an output layer of the neural network.

12. The method as claimed in claims 10 or 11, further comprising performing an additional pipelining analysis for a split pipelined mapping.

~~13~~12. The method as claimed in claims ~~12~~10 or 11, wherein the additional pipelining analysis comprises further comprising performing at least one forward pipelining analysis from the selected layer away from the input layer.

~~14~~13. The method as claimed in claims ~~12~~10 or 11, wherein the additional pipelining analysis comprises further comprising performing at least another backward pipelining analysis from another layer further from the input layer than the selected layer, the at least another backward pipelining analysis being from the another layer towards the selected layer and the input layer.

~~14. The method as claimed in any one of claims 10 to 13, wherein the step of determining activation information based on the at least one backward pipelining analysis~~

~~comprises identifying activations and determining a number of activations needed in each layer of the neural network for the generation of activations in an adjacent layer of the each layer, the each layer being analysed in the at least one backward pipelining analysis.~~

- 5 15. The method as claimed in any one of claims 10 to 14, wherein the step of mapping at least the selected layer of the neural network with the activation information to a computing core comprises performing the mapping based on a crossbar array of

synapses, the crossbar array providing an interconnected relationship between axons and neurons with each synapse arranged for at least one mathematical operation.

5 16. The method as claimed in claim 15, further comprising performing the mapping to the computing core based on a matrix method.

10 17. The method as claimed in claim 16, further comprising selecting the matrix method from a group consisting of a block matrix, a Toeplitz matrix and a hybrid matrix of a block matrix and Toeplitz matrix.

15 18. The method as claimed in any one of claims 10 to 17, further comprising storing the activation information relating to the selected layer, or storing output information relating to the selected layer or storing both the activation information relating to the selected layer and output information relating to the selected layer.