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Appendix A

Matrix multiplication

The multiplication of a matrix by another matrix is illustrated in Figure A.1. In this case, the matrix has been multiplied by a copy of itself that has been flipped along its diagonal (this new matrix is called the transpose of the original matrix).

Each entry in the multiplied matrix is the sum of values in the cell's row in the original matrix multiplied by the values in the cell's column in the transpose of the matrix. For example, the value 251 (top-left cell) in the multiplied matrix is obtained from:

$$(1 \times 1) + (5 \times 5) + (9 \times 9) + (12 \times 12) = 1 + 25 + 81 + 144 = 251$$

As another example, the value 309 (second row from the top, second column) of the multiplied matrix is obtained from:

$$(2 \times 2) + (6 \times 6) + (10 \times 10) + (13 \times 13) = 4 + 36 + 100 + 169 = 309$$

The cells used in this example are highlighted in Figure A.2.

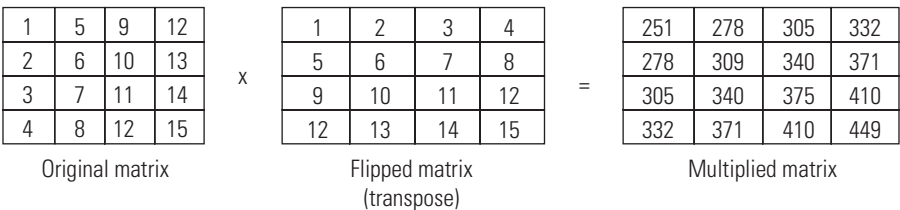


Figure A.1 Matrix multiplication.

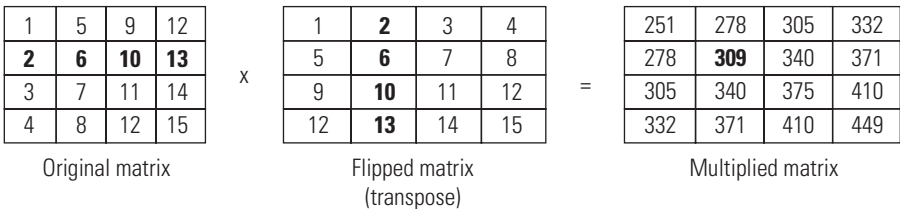


Figure A.2 Matrix multiplication: selection of cells for the output cell in column 2, row 2.