CLAIMS

1. A computer-implemented method executed on a processor for performing matrix sketching, the method comprising:

placing a first matrix and a second matrix in an analog crossbar architecture;

low rank updating the first matrix for a first period of time;

copying the first matrix into a dynamic correction computing device;

switching to the second matrix to low rank update the second matrix for a second period of time;

as the second matrix is low rank updated, feeding the first matrix with first stochastic pulses to reset the first matrix back to a first matrix symmetry point;

copying the second matrix into the dynamic correction computing device;

switching back to the first matrix to low rank update the first matrix for a third period of time; and

as the first matrix is low rank updated, feeding the second matrix with second stochastic pulses to reset the second matrix back to a second matrix symmetry point.

2. The method of claim 1, wherein the first and second matrices include streaming data.

3. The method of claim 2, wherein the streaming data is normalized to prevent asymmetry effects.

4. The method of claim 3, wherein the low rank updating of the first and second matrices is scaled to adjust a final sketching matrix to between (-0.1, 0.1) for a full range of (-1, 1) to operate near the first and second matrix asymmetry points.

5. The method of claim 4, wherein once the matrix sketching is applied to an entire input, a final sketching matrix is moved to a digital computer to perform a regression analysis.

6. The method of claim 1, wherein the dynamic correction computing device concurrently corrects the first and second matrices.

7. A non-transitory computer-readable storage medium comprising a computer-readable program executed on a processor in a data processing system for performing matrix sketching, wherein the computer-readable program when executed on the processor causes a computer to perform the steps of:

placing a first matrix and a second matrix in an analog crossbar architecture;

low rank updating the first matrix for a first period of time;

copying the first matrix into a dynamic correction computing device;

switching to the second matrix to low rank update the second matrix for a second period of time;

as the second matrix is low rank updated, feeding the first matrix with first stochastic pulses to reset the first matrix back to a first matrix symmetry point;

copying the second matrix into the dynamic correction computing device;

switching back to the first matrix to low rank update the first matrix for a third period of time; and

as the first matrix is low rank updated, feeding the second matrix with second stochastic pulses to reset the second matrix back to a second matrix symmetry point.

8. The non-transitory computer-readable storage medium of claim 7, wherein the first and second matrices include streaming data.

9. The non-transitory computer-readable storage medium of claim 8, wherein the streaming data is normalized to prevent asymmetry effects.

10. The non-transitory computer-readable storage medium of claim 9, wherein the low rank updating of the first and second matrices is scaled to adjust a final sketching matrix to between (-0.1, 0.1) for a full range of (-1, 1) to operate near the first and second matrix asymmetry points.

11. The non-transitory computer-readable storage medium of claim 10, wherein once the matrix sketching is applied to an entire input, a final sketching matrix is moved to a digital computer to perform a regression analysis.

12. The non-transitory computer-readable storage medium of claim 7, wherein the dynamic correction computing device concurrently corrects the first and second matrices.

13. A system for performing matrix sketching, the system comprising:

a memory; and

one or more processors in communication with the memory configured to:

place a first matrix and a second matrix in an analog crossbar architecture;

low rank update the first matrix for a first period of time;

copy the first matrix into a dynamic correction computing device;

switch to the second matrix to low rank update the second matrix for a second period of time;

as the second matrix is low rank updated, feed the first matrix with first stochastic pulses to reset the first matrix back to a first matrix symmetry point;

copy the second matrix into the dynamic correction computing device;

switch back to the first matrix to low rank update the first matrix for a third period of time; and

as the first matrix is low rank updated, feed the second matrix with second stochastic pulses to reset the second matrix back to a second matrix symmetry point.

14. The system of claim 13, wherein the first and second matrices include streaming data.

15. The system of claim 14, wherein the streaming data is normalized to prevent asymmetry effects.

16. The system of claim 15, wherein the low rank updating of the first and second matrices is scaled to adjust a final sketching matrix to between (-0.1, 0.1) for a full range of (-1, 1) to operate near the first and second matrix asymmetry points.

17. The system of claim 16, wherein once the matrix sketching is applied to an entire input, the final sketching matrix is moved to a digital computer to perform a regression analysis.

18. The system of claim 13, wherein the dynamic correction computing device concurrently corrects the first and second matrices.

19. A computer-implemented method executed on a processor for performing matrix sketching, the method comprising:

applying dimensionality reduction to streaming data using outer product low rank updates;

once the dimensionality reduction is applied to an entire input, moving a sketched matrix to a digital computer to perform regression analysis, wherein the sketched matrix is derived from a first matrix and a second matrix used in parallel in a toggling manner, the first and second matrices placed in an analog crossbar architecture;

low rank updating the first matrix for a first period of time;

copying the first matrix into a dynamic correction computing device; and

switching to the second matrix to low rank update the second matrix for a second period of time.

20. The method of claim 19, further comprising:

as the second matrix is low rank updated, feeding the first matrix with first stochastic pulses to reset the first matrix back to a first matrix symmetry point;

copying the second matrix into the dynamic correction computing device;

switching back to the first matrix to low rank update the first matrix for a third period of time; and

as the first matrix is low rank updated, feeding the second matrix with second stochastic pulses to reset the second matrix back to a second matrix symmetry point.

21. A system for performing matrix sketching, the system comprising:

a memory; and

one or more processors in communication with the memory configured to:

apply dimensionality reduction to streaming data using outer product low rank updates;

once the dimensionality reduction is applied to an entire input, move a sketched matrix to a digital computer to perform regression analysis, wherein the sketched matrix is derived from a first matrix and a second matrix used in parallel in a toggling manner, the first and second matrices placed in an analog crossbar architecture;

low rank update the first matrix for a first period of time;

copy the first matrix into a dynamic correction computing device; and

switch to the second matrix to low rank update the second matrix for a second period of time.