

A3: locality

Performance estimates
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Estimated cache hit rate

	row-major access	column-major access
90-deg rotation	2	2
180-deg rotation	1	3

Our `Array2` uses a row-major implementation under the hood. Since 180 degree rotations map from row to row or column to column, a 180 degree row-major access will have a high cache hit rate because all data is in adjacent memory. However, this also means that 180 degree column-major accesses will have a low cache hit rate because no data is in adjacent memory. Both 90 degree rotations have roughly the same, intermediate cache hit rate because they access both adjacent (row-major) and non-adjacent (column-major) memory at some point.

Operation counts

op	$+-$	\times	$\div\%$	comps	loads	hit rate	stores	hit rate
180R	5	0	0	1	5	3/5	3	3/3
180C	5	0	0	1	5	0/5	3	0/3
90R	3	0	0	1	4	3/4	3	3/3
90C	3	0	0	1	4	0/4	3	0/3

These counts are a combination of the operations both within each transform function as well as the iterator created in doing so.

Expected speed

	row-major	column-major
90 degree	1	3
180 degree	2	3

These estimates are based off of the total loads/stores of each of the above transformations as well as what % of them actually hit.