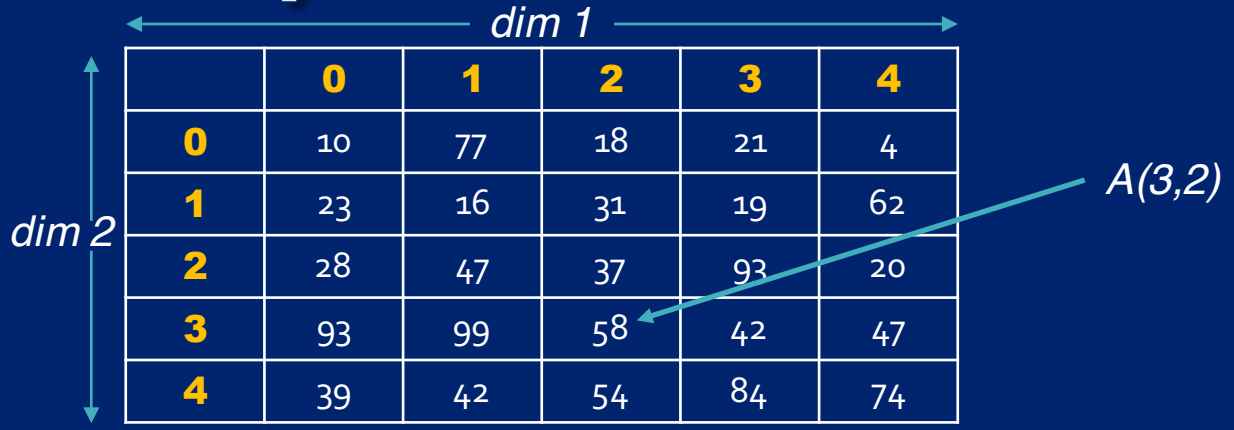
"Other" Data Models

SDSC SAN DIEGO SUPERCOMPUTER CENTER

After this video you will be able to

- Describe how arrays can serve as a data model
- Explain why images can be modeled as vector arrays
- Specify a set of operations on scalar and vector arrays

Array as a Data Model

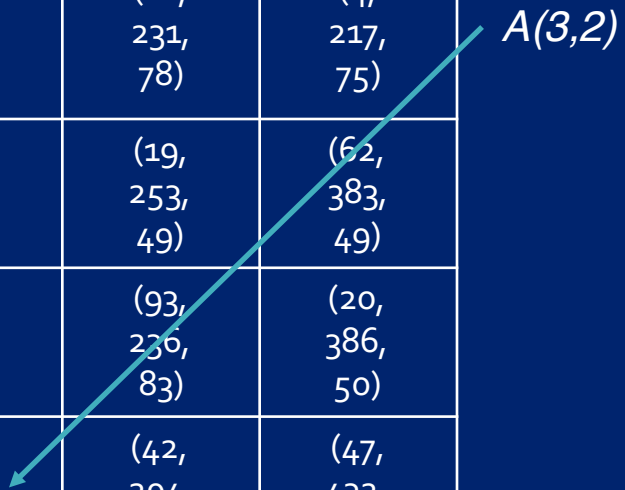


	0	1	2	3	4
0	10	77	18	21	4
1	23	16	31	19	62
2	28	47	37	93	20
3	93	99	58	42	47
4	39	42	54	84	74

- Array → Indexed relation
  - Table representation
    - Number of columns = number of dimensions + 1
    - Number of tuples = size of dimension 1 X size of dimension 2 X …

Arrays of Vectors

	0	1	2	3	4
0	(10, 200, 68)	(77, 182, 83)	(18, 310, 56)	(21, 231, 78)	(4, 217, 75)
1	(23, 193, 35)	(16, 301, 74)	(31, 290, 84)	(19, 253, 49)	(62, 383, 49)
2	(28, 174, 56)	(47, 168, 90)	(37, 341, 57)	(93, 236, 83)	(20, 386, 50)
3	(93, 348, 67)	(99, 192, 79)	(58, 293, 82)	(42, 294, 74)	(47, 432, 45)
4	(39, 168, 90)	(42, 203, 75)	(54, 326, 53)	(84, 388, 94)	(74, 392, 44)



Operations on Array of Vectors

- *dim(A)* – number of dimensions of A
- *size(A, dim)* – size of a specific dimension
- *A(i, j)* – value of the element at the *(i.j)*-th cell
- *A(i, j)[k]* – value of the k-th element of the cell at *A(i, j)*
- *length(A(i, j))* – vector-length of the vector at the *(i, j)*-th cell
- *distance(A(i, j), A(k,l), f)* – vector distance between the values of two cells given the distance function f

	0	1
0	(10, 200, 68)	(77, 182, 83)
1	(23, 193, 35)	(16, 301, 74)

A(1,1)[2]

A(1,1)