①

a) 5 bits para $\mathbb{N}$

31	11111
30	11110
29	11101
	⋮
0	00000

$$\text{Rango} = \{0, 2^5 - 1\} = \{0, 31\}$$

b) 8 bits para $\mathbb{Z}$ en complemento ar

127	0	1111111
126	0	1111110
⋮	0	1111101
0	0	0000000
−0	1	1111111
−1	1	1111110
−2	1	1111101
		⋮

$$\text{Rango} = \{-(2^{n-1} - 1), 2^{n-1} - 1\}$$

−128

$$= \{-(2^7 - 1), 2^7 - 1\} = \{-127, 127\}$$

c) 7 bits para $\mathbb{Z}$ en complemento ar-1

63	0	111111
62	0	111110
	⋮	
0	0	000000
−1	1	111111
−2	1	111110
	⋮	

$$\text{Rango} = \{-(2^{n-1}), 2^{n-1} - 1\}$$

$$= \{-(2^6), 2^6 - 1\}$$

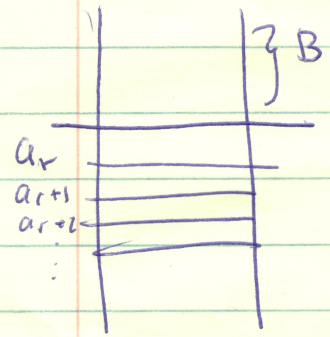
$$= \{-64, 63\}$$

−63

c) Arreglo 1D

$\hookrightarrow$ $Dir\ A(a_i) = B + N(i - r + 1) - 1 \rightarrow$ bottom

$Dir\ A(a_i) = B + N(i - r) \rightarrow$ top



d) Arreglo 2D

Sin considerar indices negativos

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(2)

a) $843.21 - 175.01$ en ar y base 9 $= 657.20_9$

b) $843.21 - 175.01$ en $ar-1$ y base 9 $= 657.20_9$

c) $123.001 - 6$ en complemento ar y base 7 $= 114.0001_7$

d) $0.123 - 1$ en complemento ar y base 4 $= -0.211_4$

e) $1101 - 1000.01$ en $ar-1$ y base 11 $= 100.AA_{11}$

$$\begin{array}{r} 1101.00 \\ -\ 1000.01 \\ \hline 0100.AA \end{array}$$

0 1 2 3 4 5 6 7 8 9 A

(A)

$$\begin{array}{r} 843.21_9 \\ -175.01_9 \\ \hline \end{array} \xrightarrow{\text{en ar}} C = 9^3 - |N|_9 = 9^3 - 175.01$$

$$C = 1000 - 175.01$$

$$C \Rightarrow \begin{array}{r} 1000.00 \\ -\;175.01 \\ \hline 713.88 \end{array}$$

$C = 713.88_9$

$$843.21_9 + C_9 = 843.21_9 - 175.01_9$$

$$\begin{array}{r} 843.21 \\ +\;713.88 \\ \hline 1657.10 \end{array}$$

$\therefore$ respuesta es $\underline{\underline{657.10_9}}$

bit de acarreo significa
resultado positivo en $\underline{ar}$

(B)

$$\begin{array}{r} 843.21 \\ -175.01_9 \\ \hline \end{array} \xrightarrow{\text{en ar-1}} C = 9^3 - 9^{-2} - |N|_9$$

$$C = 1000 - 0.01 - 175.01_9$$

$$C \Rightarrow \begin{array}{r} 175.01 \\ +\;\;\;01 \\ \hline 175.02 \end{array}$$

$$\begin{array}{r} 1000.00 \\ -\;175.02 \\ \hline 713.87_9 \end{array}$$

$$\begin{array}{r} 843.21 \\ +\;713.87 \\ \hline 1657.18 \end{array}$$

si existe acarreo en ar-1
se suma al final

$$\begin{array}{r} 657.18 \\ +\;\;\;\;\;1 \\ \hline \underline{\underline{657.20_9}} \end{array}$$

(c) 123.001 − 6 en ar y base 7:

$c = 7^1 - 6$

$c = 10 - 6$

$$\begin{array}{r} 10.00 \\ -\ 06.00 \\ \hline 01.000 \end{array}$$

$C(\bar{\bar{x}}) = x \rightarrow$ II

$$\begin{array}{r} 123.001 \\ 1 \\ \hline 124.001 \end{array}$$

esta $\bar{\bar{x}}$ porque $124.001 > 123.001$

~~$c = 7^3 - 123.01$~~

~~$$\begin{array}{r} 1000.000 \\ 124.001 \\ \hline .666 \end{array}$$~~

~~cambio~~

Se tiene que cambiar el complemento a 123.001 y luego sumar 6

$C = 7^3 - 123.001$

$$\begin{array}{r} 1000.000 \\ 0123.001 \\ \hline 0543.666 \end{array}$$

$C(543.666_7 + 6_7) \equiv 123.001_7 + 6_7$

$$\begin{array}{r} 543.666_7 \\ +\ 6._7 \\ \hline x = 552.666 \end{array}$$

$\bar{\bar{x}} = C(\bar{x})$

$\bar{\bar{x}} = 7^3 - 552.666$

$$\begin{array}{r} 1000\,000 \\ -\ 552.666 \\ \hline 0114.001 \end{array}$$

~~II~~

~~124.001~~

~~$c = 7^3 - 124.001$~~

~~$$\begin{array}{r} c \rightarrow 1000.000 \\ -\ 124.001 \\ \hline 0542.666 \end{array}$$~~

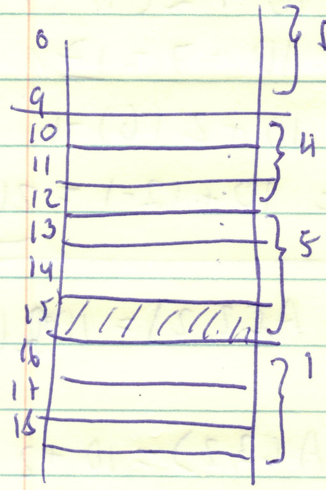
③

a) indice -10

aplicando la formula general
de array 1D contigua

$$Dir\ A(a_i) = B + N(i - r + 1) - 1$$
$$Dir\ A(a_i) = B + 3(i - (-10) + 1) - 1$$
$$Dir\ A(a_i) = B + 3(i + 11) - 1 \quad \underline{\text{en bottom}}$$

ejemplo
Sea $A = [4, 5, 1,]$



$$Dir\ (A a_{-9}) = B + 3(-9 + 11) - 1$$
$$= 10 + 3(2) - 1$$
$$= 10 + 6 - 1 = 15$$

correcto ✓

en top

$$Dir\ A(a_i) = B + N(i - r) = \underline{B + N(i + 10)}$$
$$Dir\ A(a_{-9}) = 10 + 3(-9 + 10) = 10 + 3(1) = \underline{13} \checkmark$$

b) indice → 8
2 bytes

$$Dir\ \cancel{A(A2)}\ A(a_i) = B + N(i - r + 1) - 1$$
$$Dir\ A(a_i) = B + 2(i - 8 + 1) - 1 = \underline{\underline{B + 2(i - 7) - 1}}$$

bottom

$$Dir\ A(a_i) = B + N(i - r) = \underline{\underline{B + 2(i - 8)}}$$

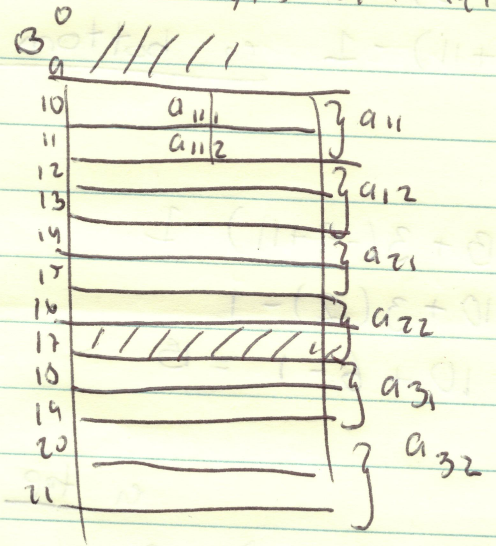
top

d)

$$\text{Dir } A[i,j] = \underline{B + N(i*j) - 1} \rightarrow \text{respuesta en bottom}$$

Sea $A = \begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \\ a_{31} & a_{32} \end{bmatrix}$

sea 2 bytes cada celda



$$\text{Dir } A[i,j] = \underline{B + N(i*j) - N}$$

↓ respuesta en top

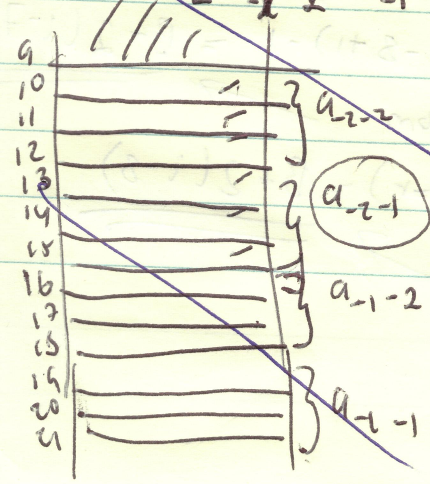
$$\text{Dir } A[2,2] = 10 + 2(2*2) - 1$$
$$= 10 + 2(4) - 1$$
$$= 10 + 7 = 17$$

$$\text{Dir } A[3,2] = 10 + 2(6) - 1$$
$$= 10 + 12 - 1 = 21$$

indices negativos

$$\text{Dir } A[i,j] = B + N[(i*j) - r] - 1$$

Sea $A = \begin{bmatrix} a_{-2-2} & a_{-2-1} \\ a_{-1-2} & a_{-1-1} \end{bmatrix}$ de 3 bytes



$$\text{Dir } A[2,2] = 10 + 2(4) = 18 - 2$$
16

$$\text{Dir } A[3,2] = 10 + 2(6) - 2$$
$$= 18 + 12 - 2 = 20$$

$-3(-2)$

$3(1-2-2)$

$(1-r)$

$$\text{Dir}[a_{-1,-2}] = 10 + 3(2-2) - Nr + N(x-x) = 16$$

$$\text{Dir}[a_{-2,-2}] = 10 + 3(4-2)$$
$$= 10 + 3(2) + 6$$

4.

para un tensor 3x3x3

$$T(i,k) = \begin{bmatrix} x & x+9 & x+18 \\ x+3 & x+12 & x+21 \\ x+6 & x+15 & x+24 \end{bmatrix}$$

la localidad en memoria para

proponer $\boxed{a_{111}}$

$$x = loc(a_{111}) = dir\ A[a_{111}]$$

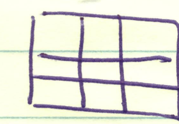
$x \longrightarrow x+9$

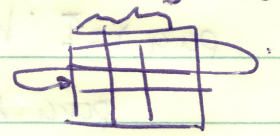
se recorren 9 unidades de memoria de una cara de tensor

$\downarrow$

$x+3$

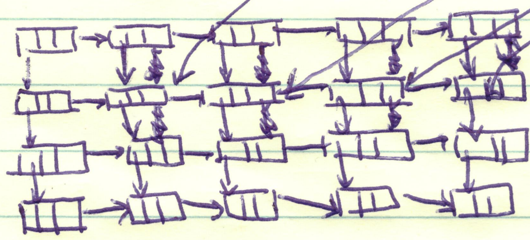
incrementa un nivel hacia abajo





5. ⓐ Sea la matiz

$$A_{4\times4} = \begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}$$

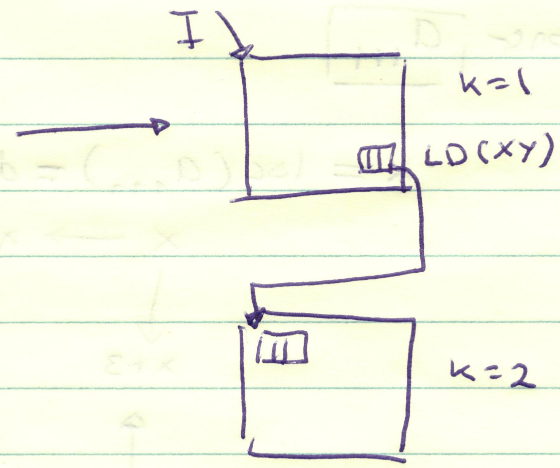


Proponer localidades de memoria y aplicar el algoritmo.

(b) tensor $2 \times 3 \times 2$

Sea la Matriz 2×3 en $k=1$

$$\begin{bmatrix} a_{111} & a_{121} & a_{131} \\ a_{211} & a_{221} & a_{231} \end{bmatrix}$$



$k=2$

$$\begin{bmatrix} a_{112} & a_{122} & a_{132} \\ a_{212} & a_{222} & a_{232} \end{bmatrix}$$

$x = 1$

para $L = I$ hasta $L \leq k$

para $M = 1$ hasta $M \leq j$

$x = LD(x)$

fin

para $H = 1$ hasta $H \leq i$

$x = LI(x)$