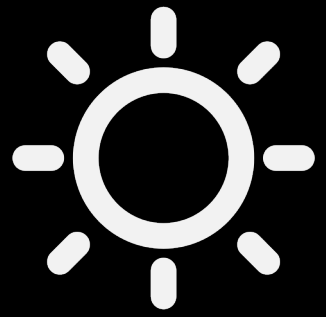
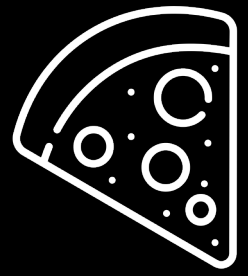
ARTIFICIAL INTELLIGENCE

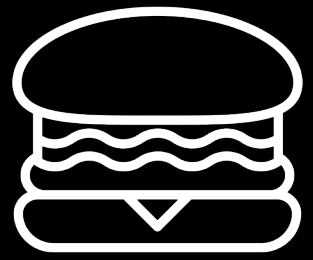
RECURRENT NEURAL NETWORKS

PERFECT ROOMATE

BY BRANDON ROHER AND LUIS SERRANO







PERFECT ROOMATE

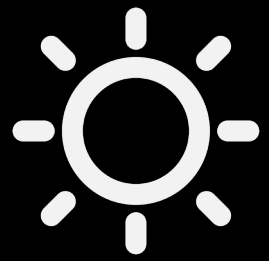
USING A NEURAL NETWORK

PERFECT ROOMATE

USING A NEURAL NETWORK

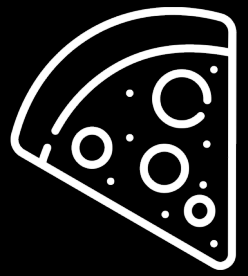
PERFECT ROOMATE

BY BRANDON ROHER AND LUIS SERRANO



$$\begin{bmatrix}1\\0\end{bmatrix}$$

$$\begin{bmatrix}0\\1\end{bmatrix}$$



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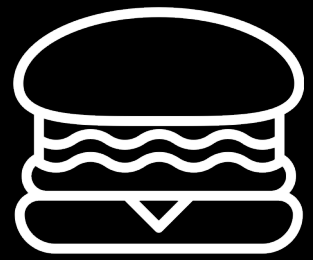

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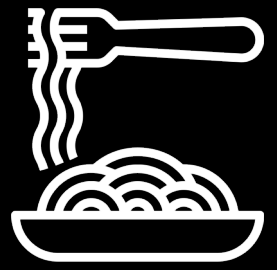
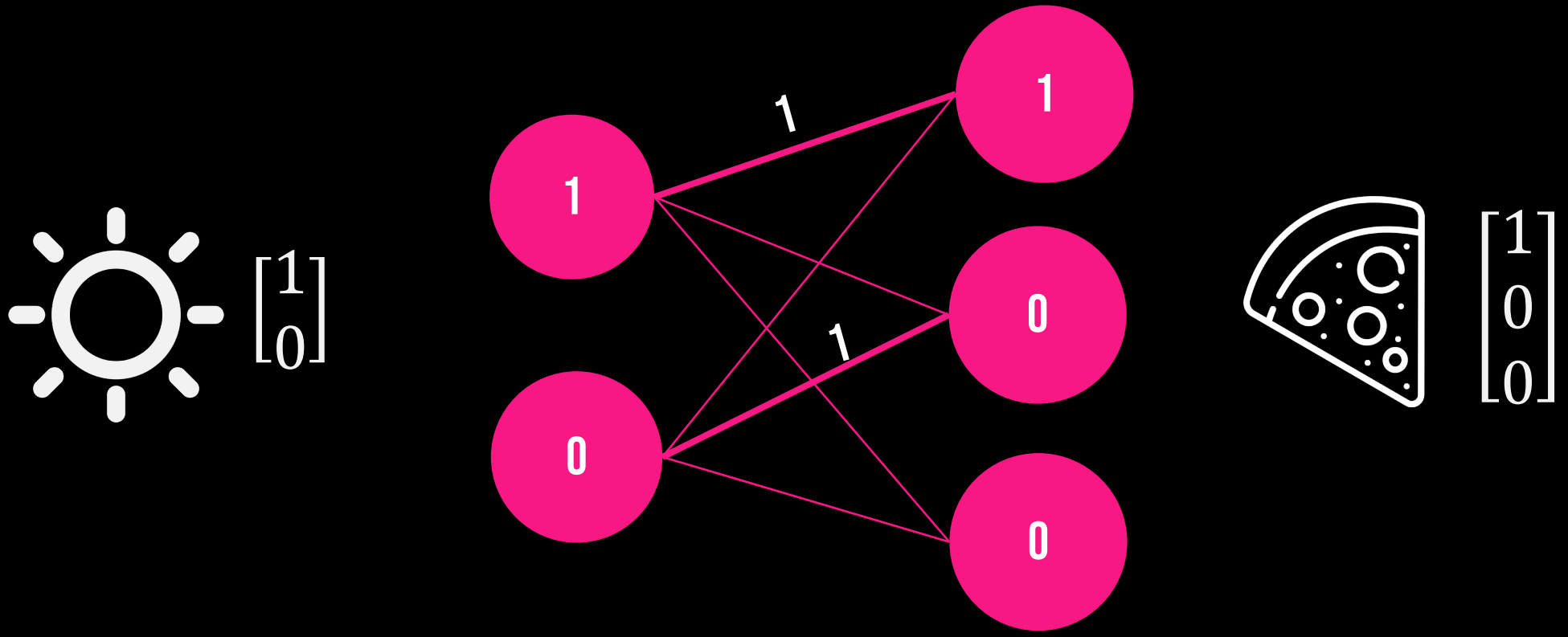


$$\begin{bmatrix}0\\0\\1\end{bmatrix}$$

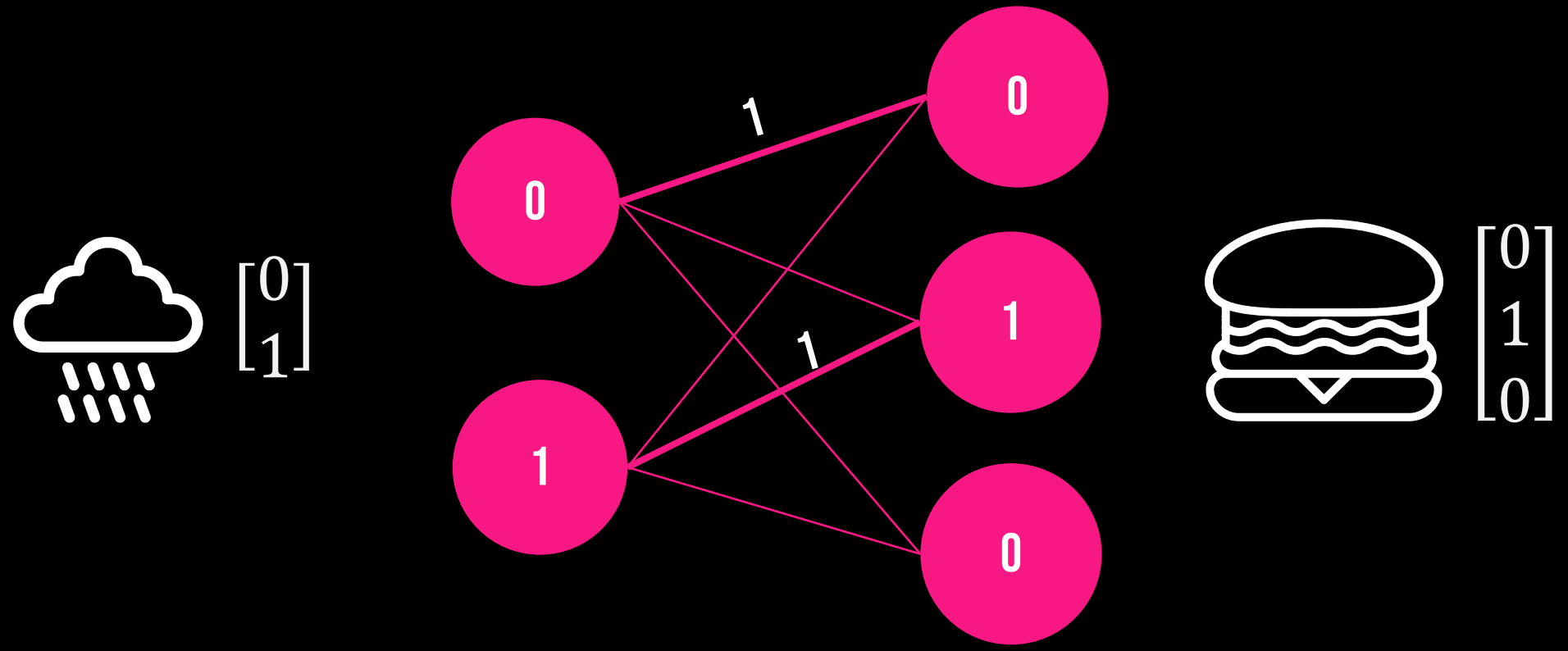
PERFECT ROOMATE

BY BRANDON ROHER AND LUIS SERRANO



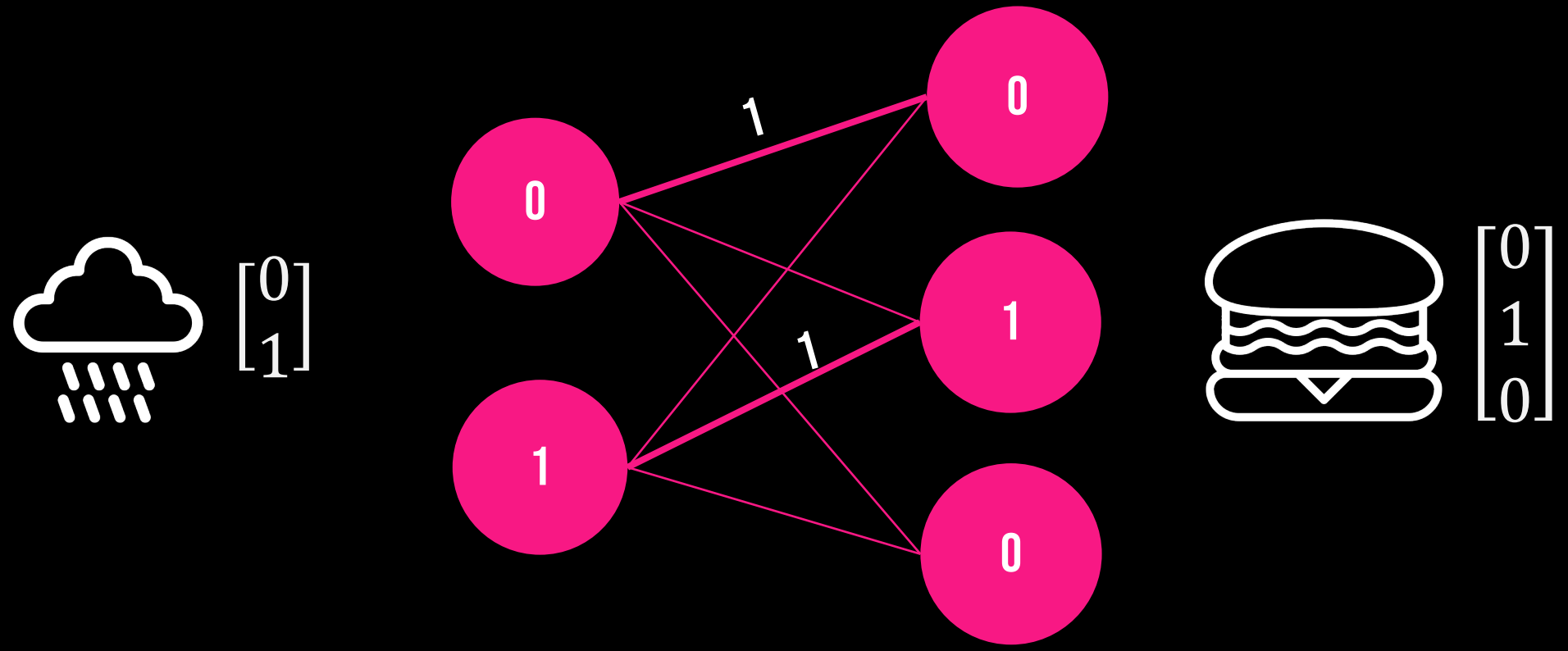
PERFECT ROOMATE

BY BRANDON ROHER AND LUIS SERRANO



PERFECT ROOMATE

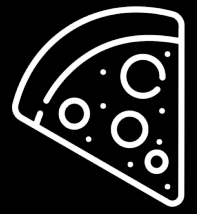
BY BRANDON ROHER AND LUIS SERRANO



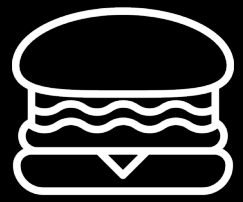
PERFECT ROOMATE

BY BRANDON ROHER AND LUIS SERRANO

MON

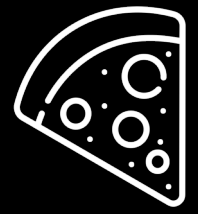


TUE

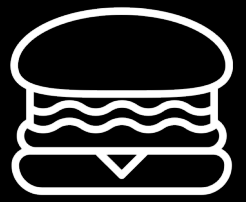


WED

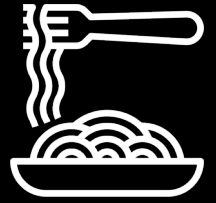
THU



FRI

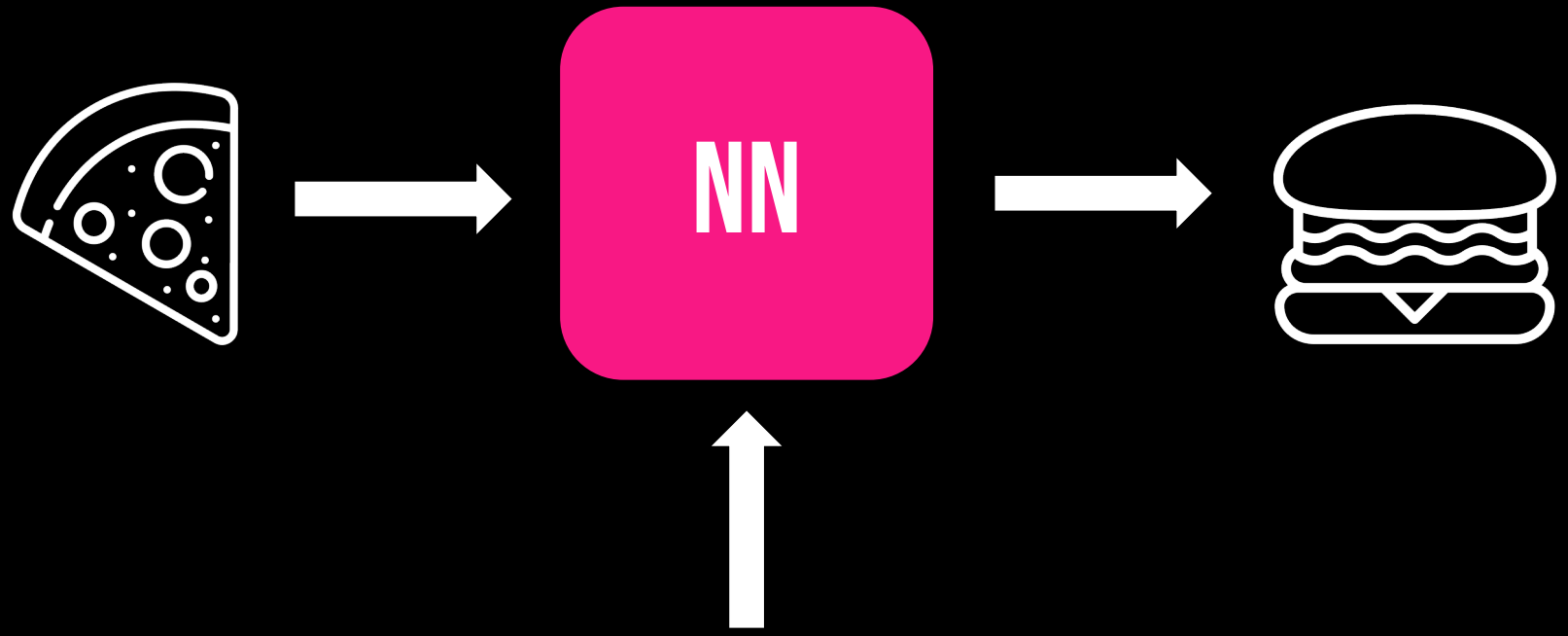


SAT



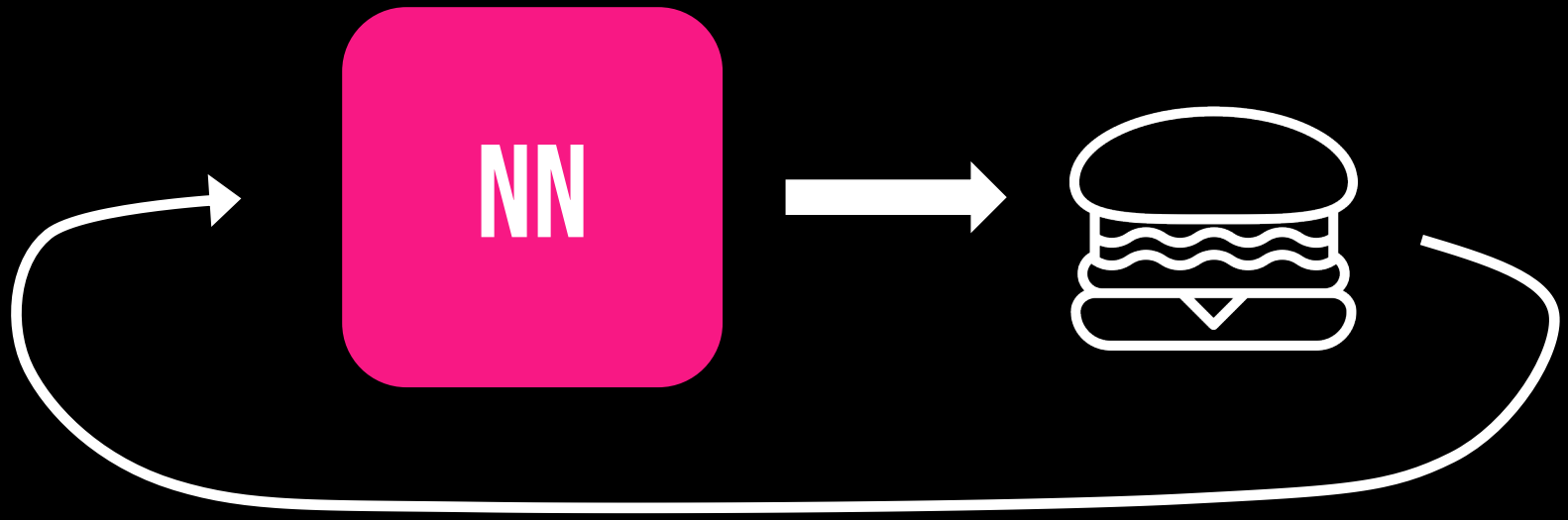
PERFECT ROOMATE

USING A SIMPLE (RECURRENT) NEURAL NETWORK



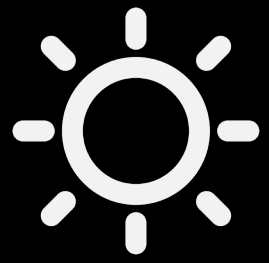
PERFECT ROOMATE

USING A SIMPLE (RECURRENT) NEURAL NETWORK



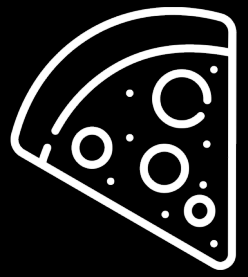
PERFECT ROOMATE

USING A SIMPLE (RECURRENT) NEURAL NETWORK

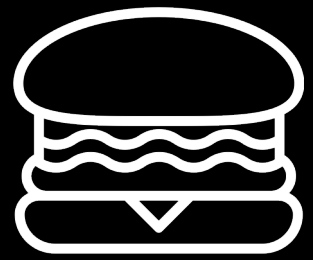


$$\begin{bmatrix}1\\0\end{bmatrix}$$

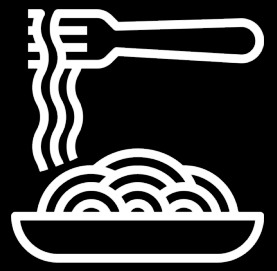
$$\begin{bmatrix}0\\1\end{bmatrix}$$



$$\begin{bmatrix}1\\0\\0\end{bmatrix}$$



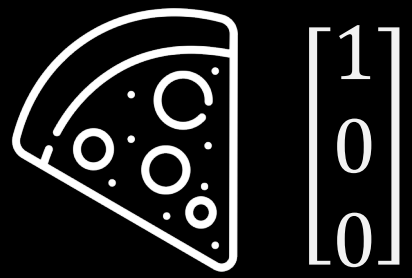
$$\begin{bmatrix}0\\1\\0\end{bmatrix}$$



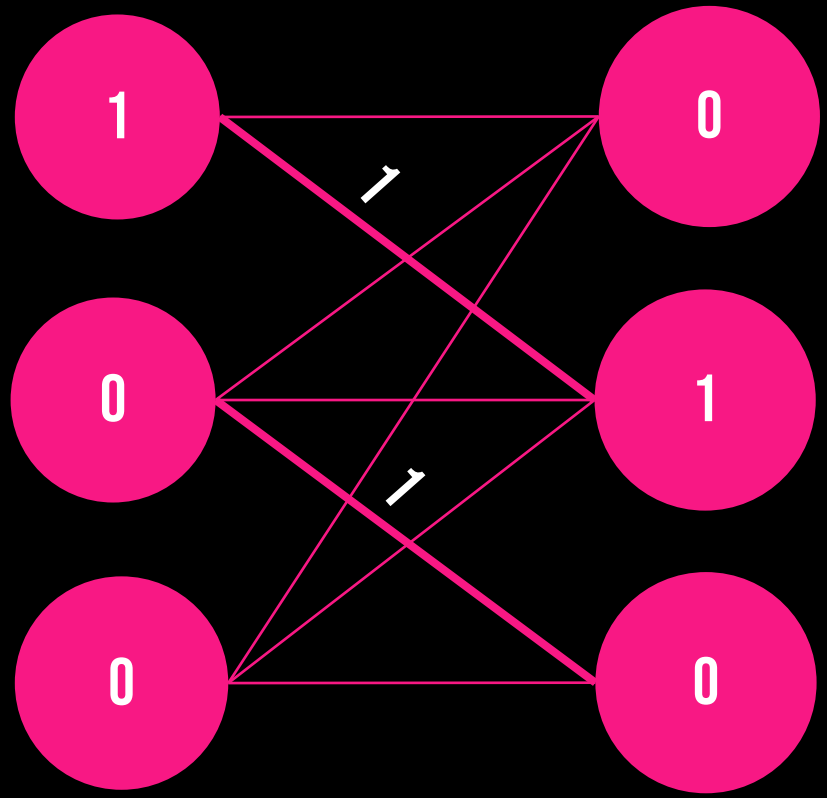
$$\begin{bmatrix}0\\0\\1\end{bmatrix}$$

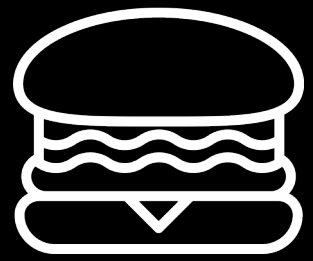
PERFECT ROOMATE

BY BRANDON ROHER AND LUIS SERRANO



$$\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

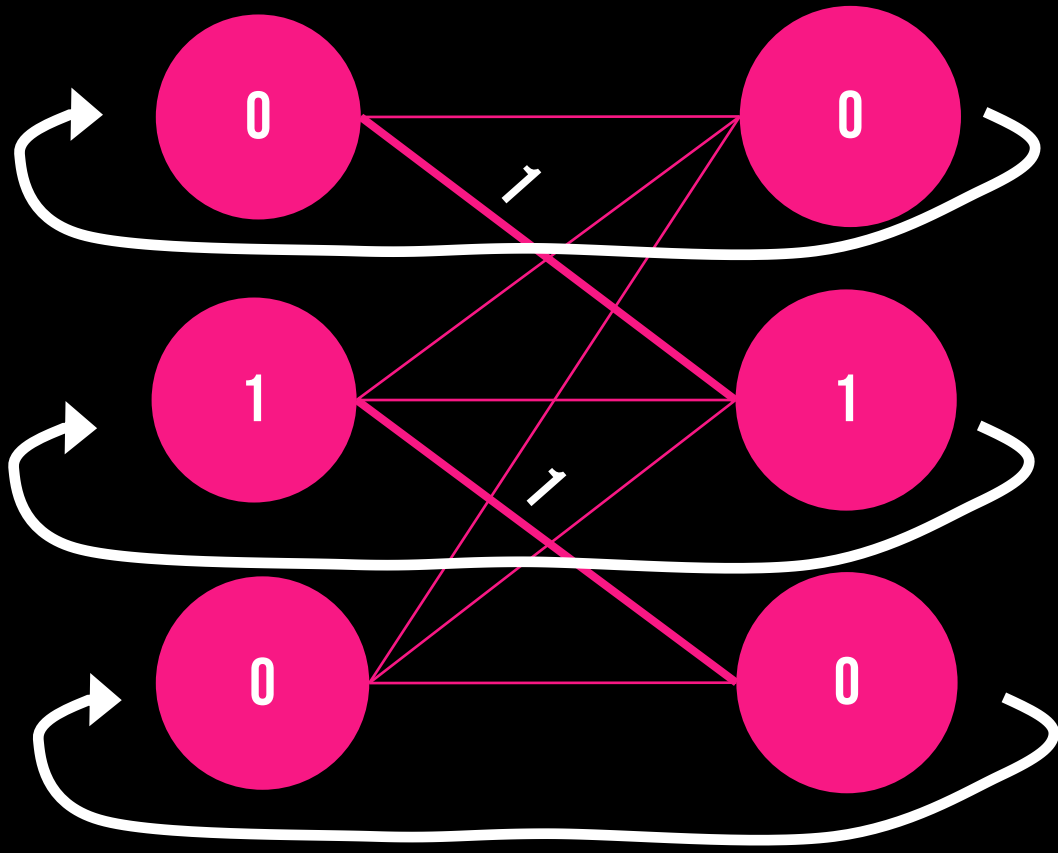


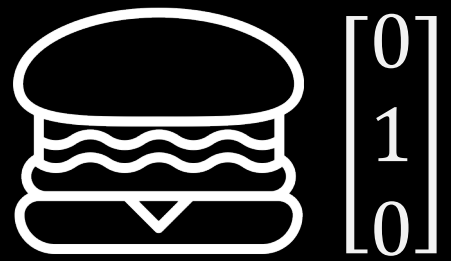


$$\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

PERFECT ROOMATE

BY BRANDON ROHER AND LUIS SERRANO

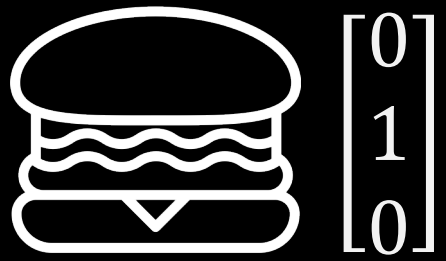




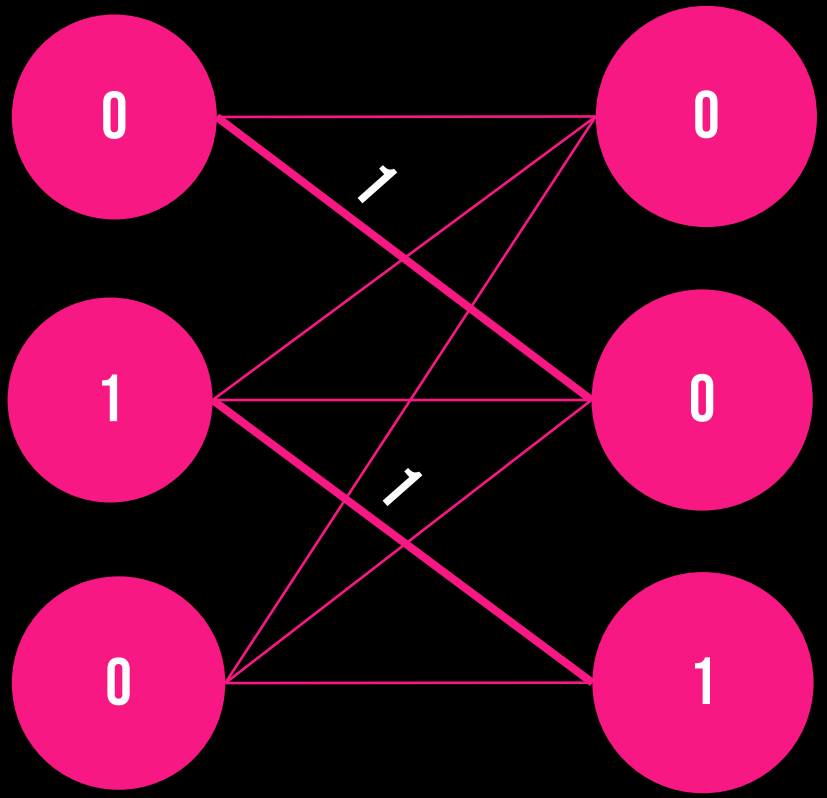
$$\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

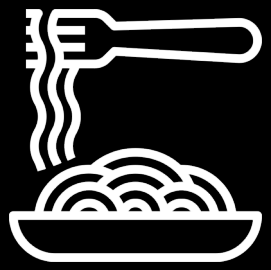
PERFECT ROOMATE

BY BRANDON ROHER AND LUIS SERRANO



$$\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$

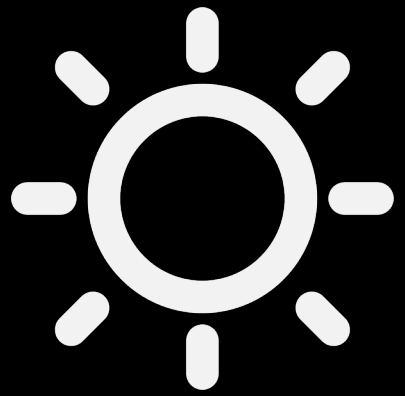




$$\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$$

PERFECT ROOMATE

USING A RECURRENT NEURAL NETWORK



SAME AS YESTERDAY

NEXT DISH

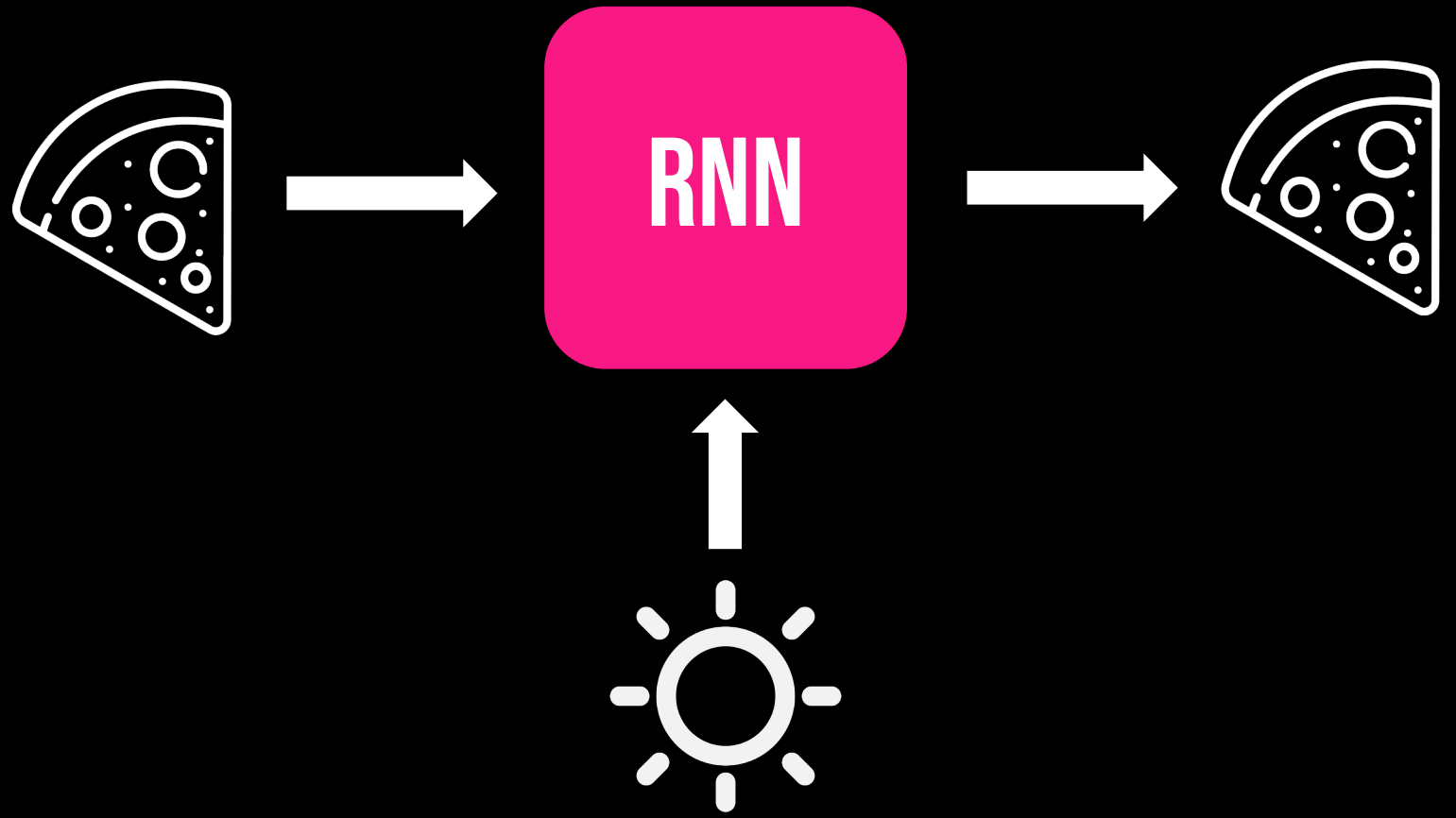
PERFECT ROOMATE

USING A RECURRENT NEURAL NETWORK

MON TUE WED THU FRI SAT

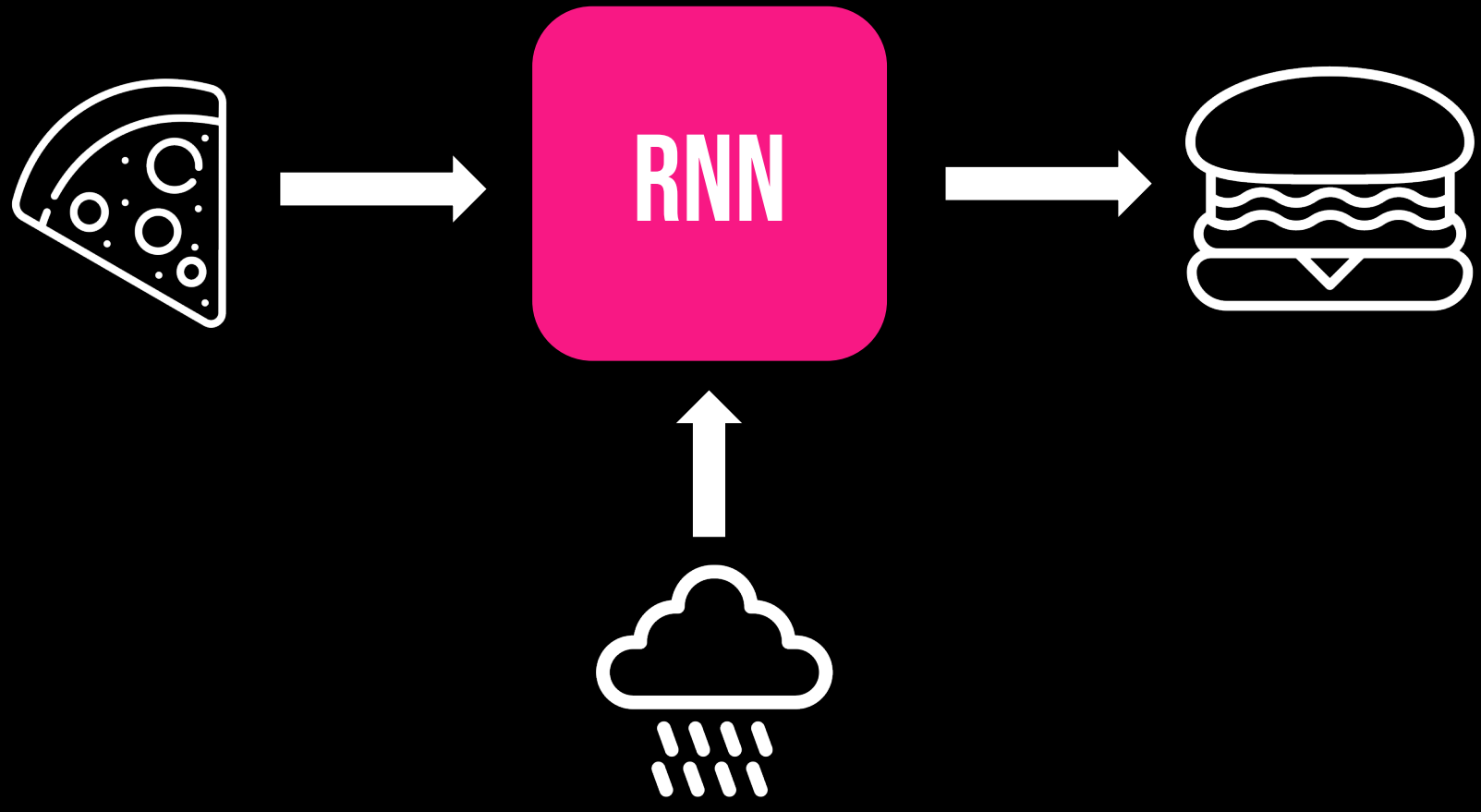
PERFECT ROOMATE

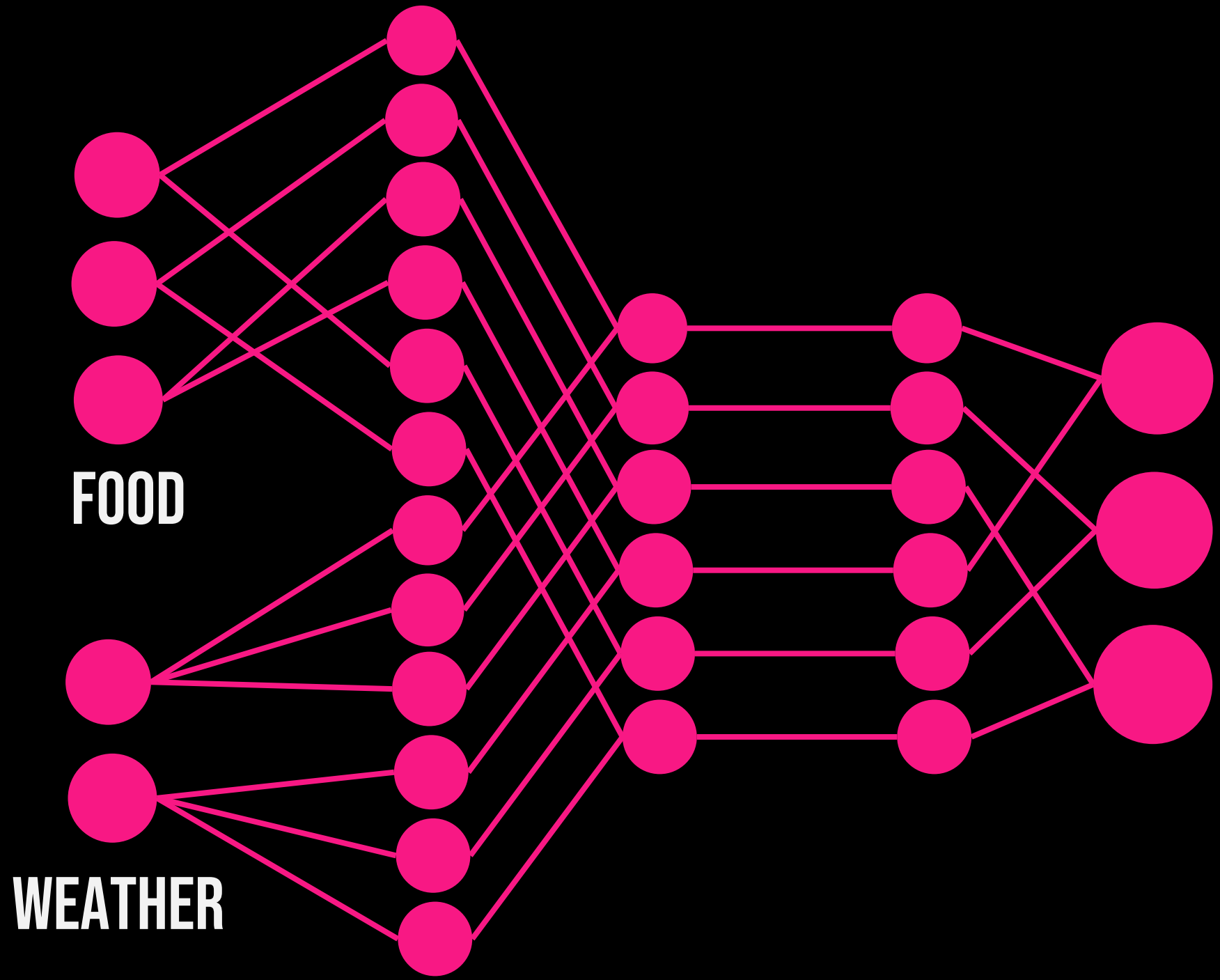
USING A RECURRENT NEURAL NETWORK

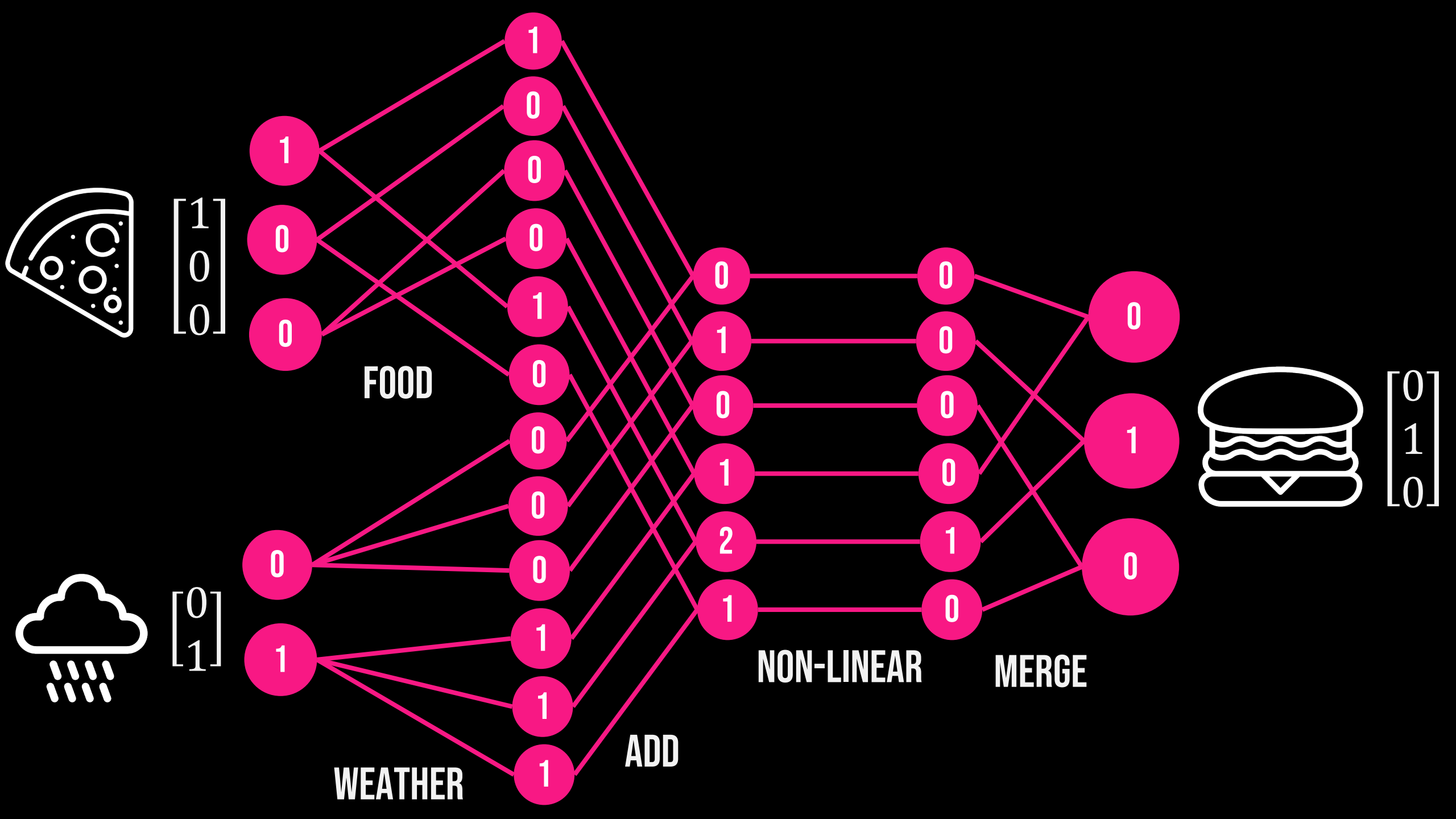


PERFECT ROOMATE

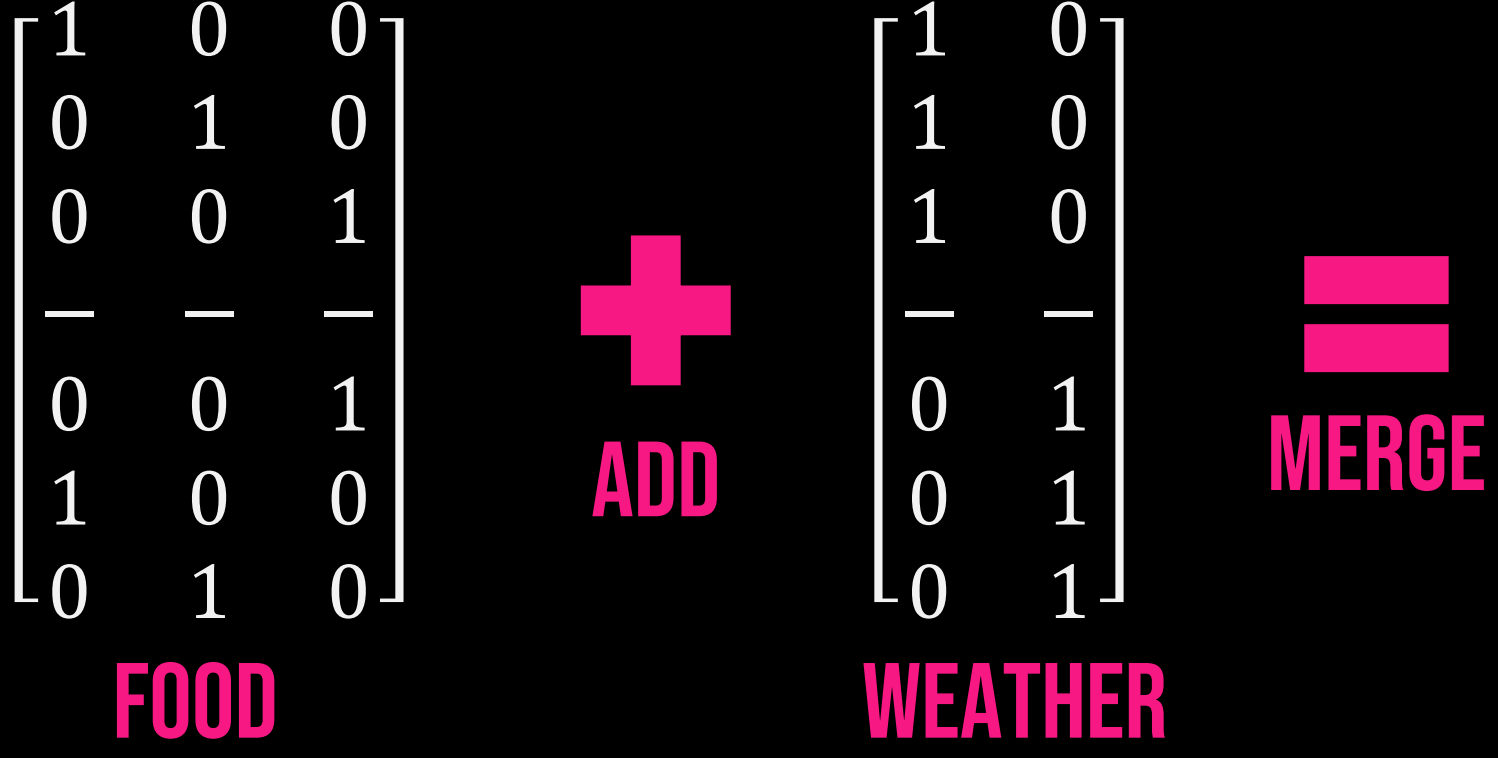
USING A RECURRENT NEURAL NETWORK

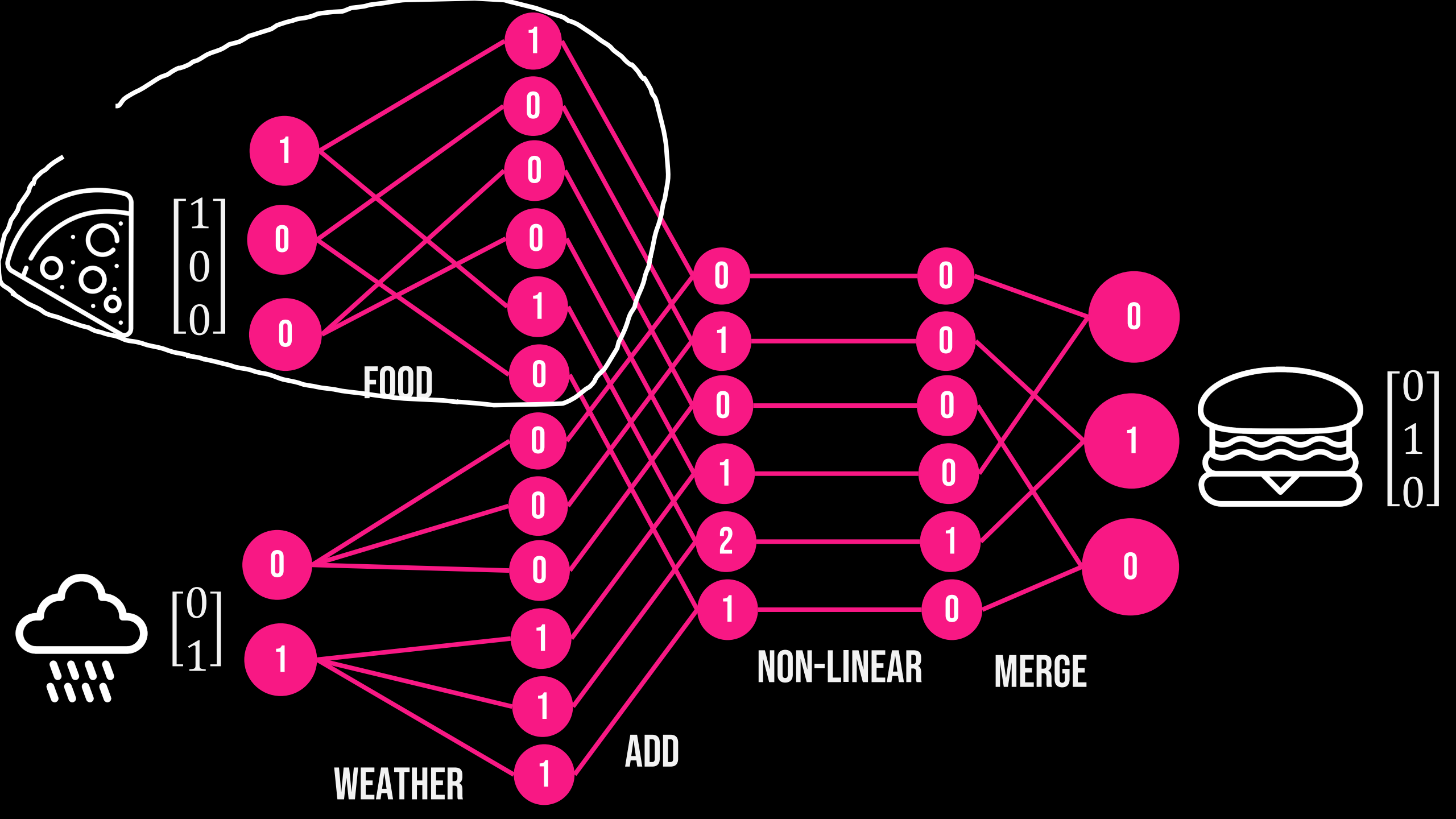



FOOD
WEATHER

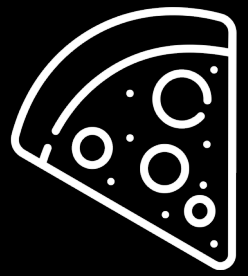

$\begin{bmatrix}1\\0\\0\end{bmatrix}$
$\begin{bmatrix}0\\1\end{bmatrix}$
$\begin{bmatrix}0\\1\\0\end{bmatrix}$
FOOD
WEATHER
ADD
NON-LINEAR
MERGE

RNN RECIPE (STEPS)



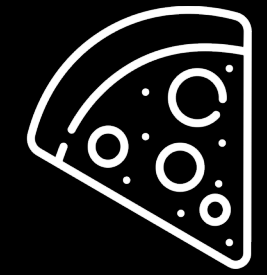

$\begin{bmatrix}1\\0\\0\end{bmatrix}$
FOOD
$\begin{bmatrix}0\\1\end{bmatrix}$
WEATHER
ADD
NON-LINEAR
MERGE
$\begin{bmatrix}0\\1\\0\end{bmatrix}$

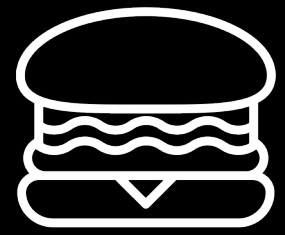
FOOD OPTIONS (HIDDEN STATE)



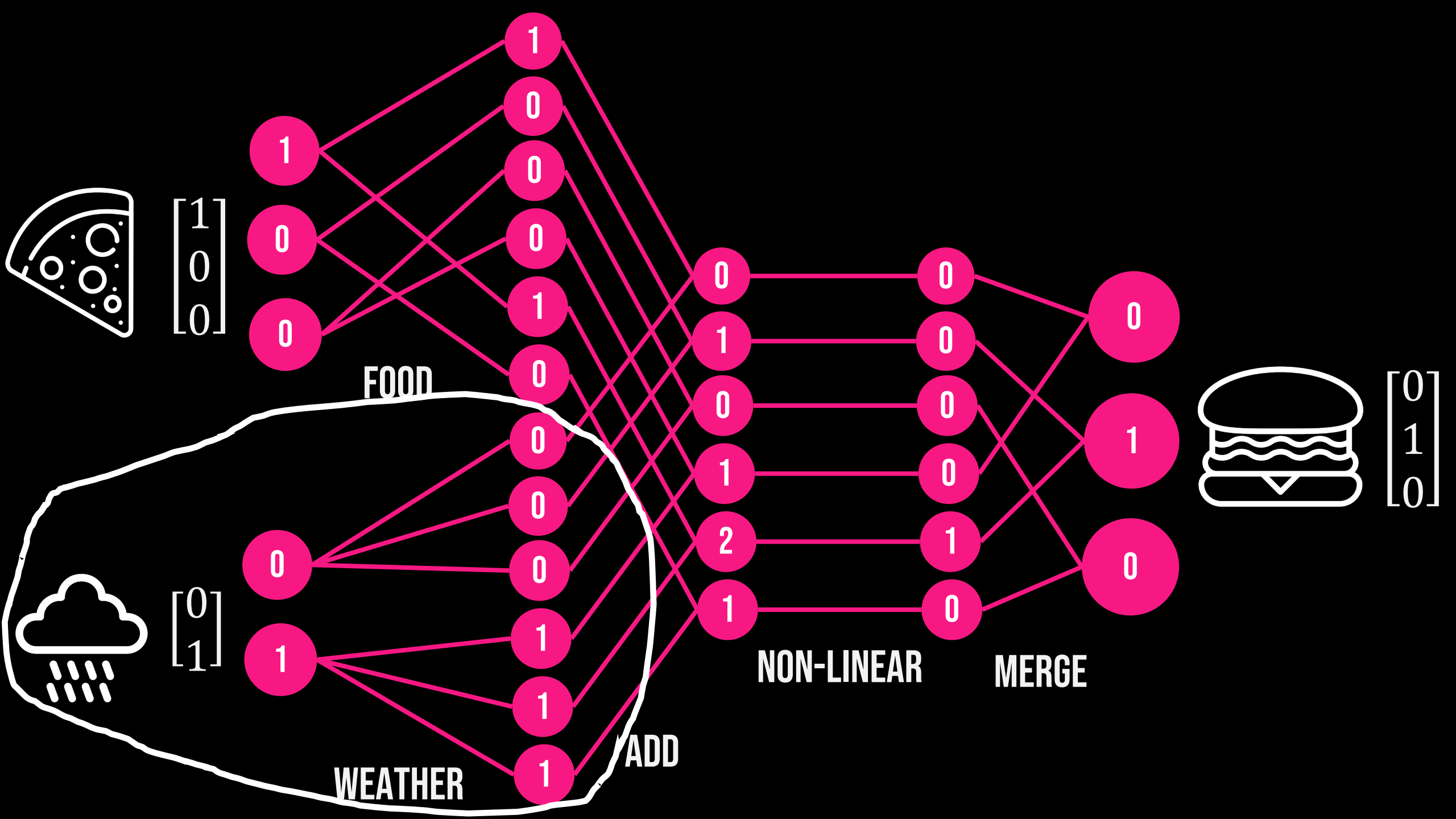
$$\begin{bmatrix}1\\0\\0\end{bmatrix}\begin{bmatrix}1 & 0 & 0\\0 & 1 & 0\\0 & 0 & 1\\ - & - & -\\0 & 0 & 1\\1 & 0 & 0\\0 & 1 & 0\end{bmatrix} = \begin{bmatrix}1\\0\\0\\ -\\0\\1\\0\end{bmatrix}$$

FOOD





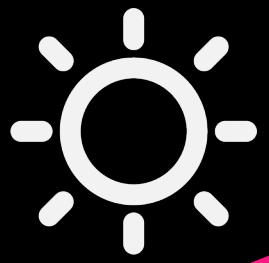
IT IS TELLING THE OPTIONS TO COOK


1
0
0
FOOD
[1 0 0]
0
1
WEATHER
[0 1]
1
0
0
1
0
0
0
0
1
1
1
ADD
0
1
0
1
2
1
NON-LINEAR
0
0
0
0
1
0
MERGE
0
1
0
[0 1 0]

WEATHER OPTIONS (INPUT)

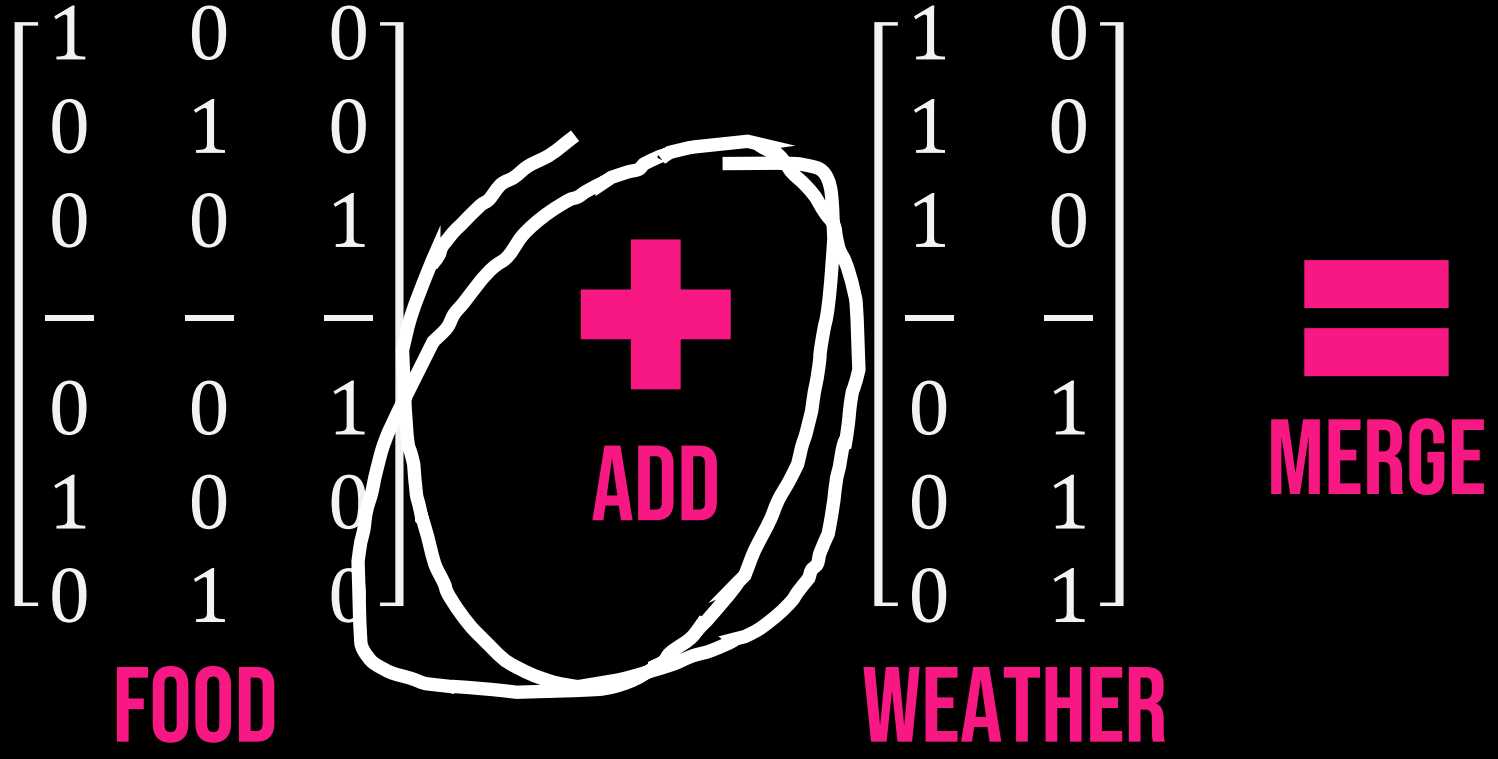
$$\begin{bmatrix}1\\0\end{bmatrix}\begin{bmatrix}1 & 0\\1 & 0\\1 & 0\\- & -\\0 & 1\\0 & 1\\0 & 1\end{bmatrix} = \begin{bmatrix}0\\0\\0\\-\\1\\1\\1\end{bmatrix}$$

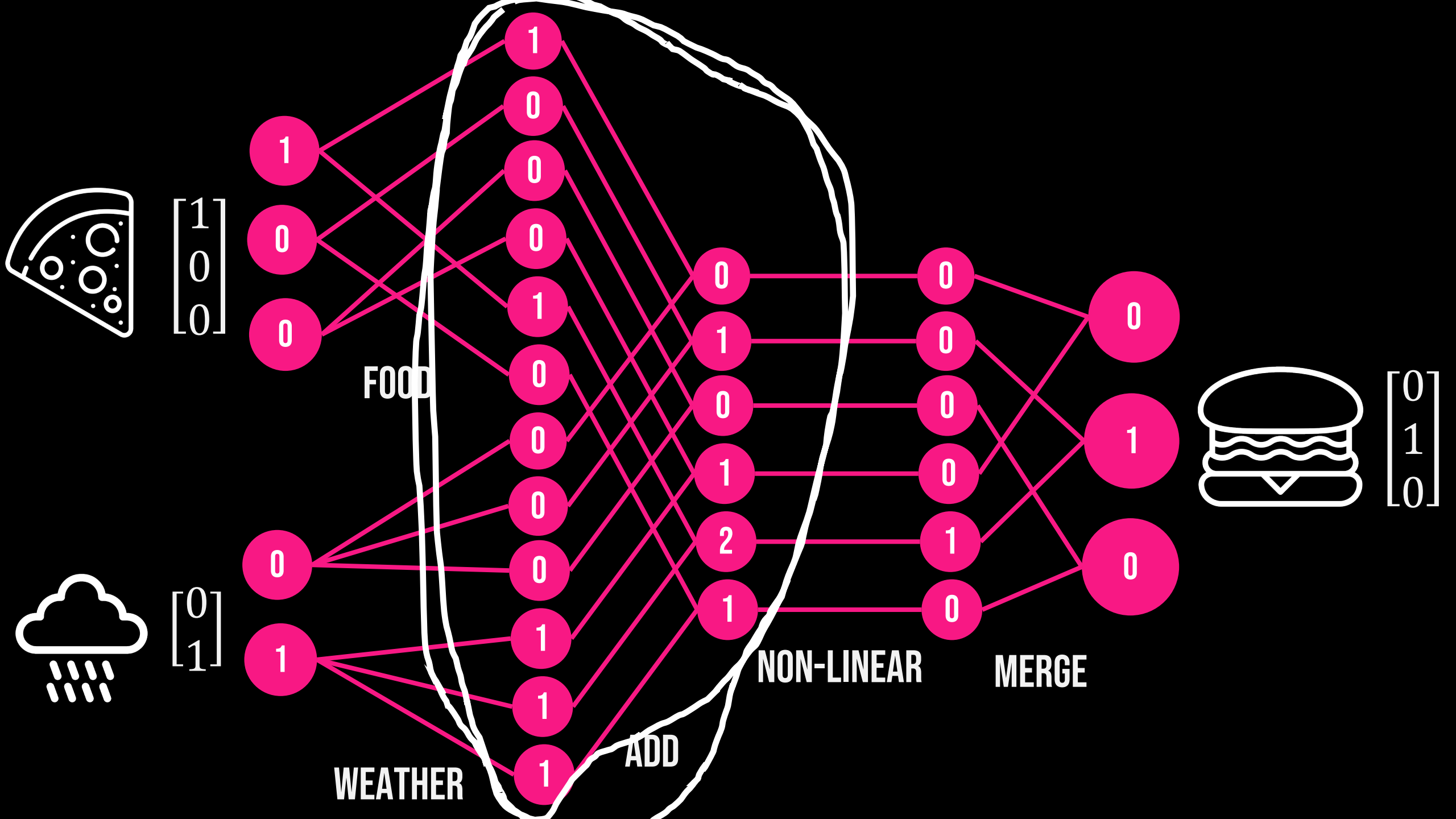
WEATHER



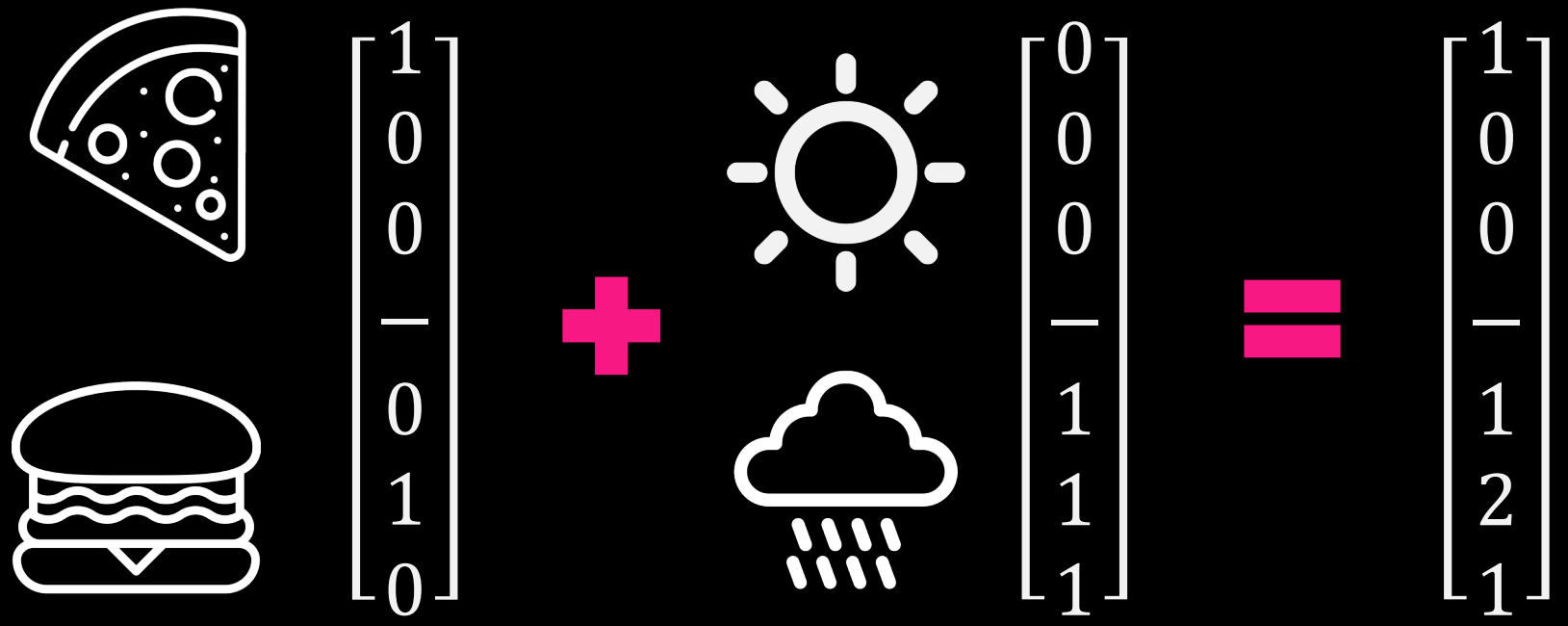
IT IS TELLING IF I SHOULD COOK TODAY FOOD OR NEXT FOOD

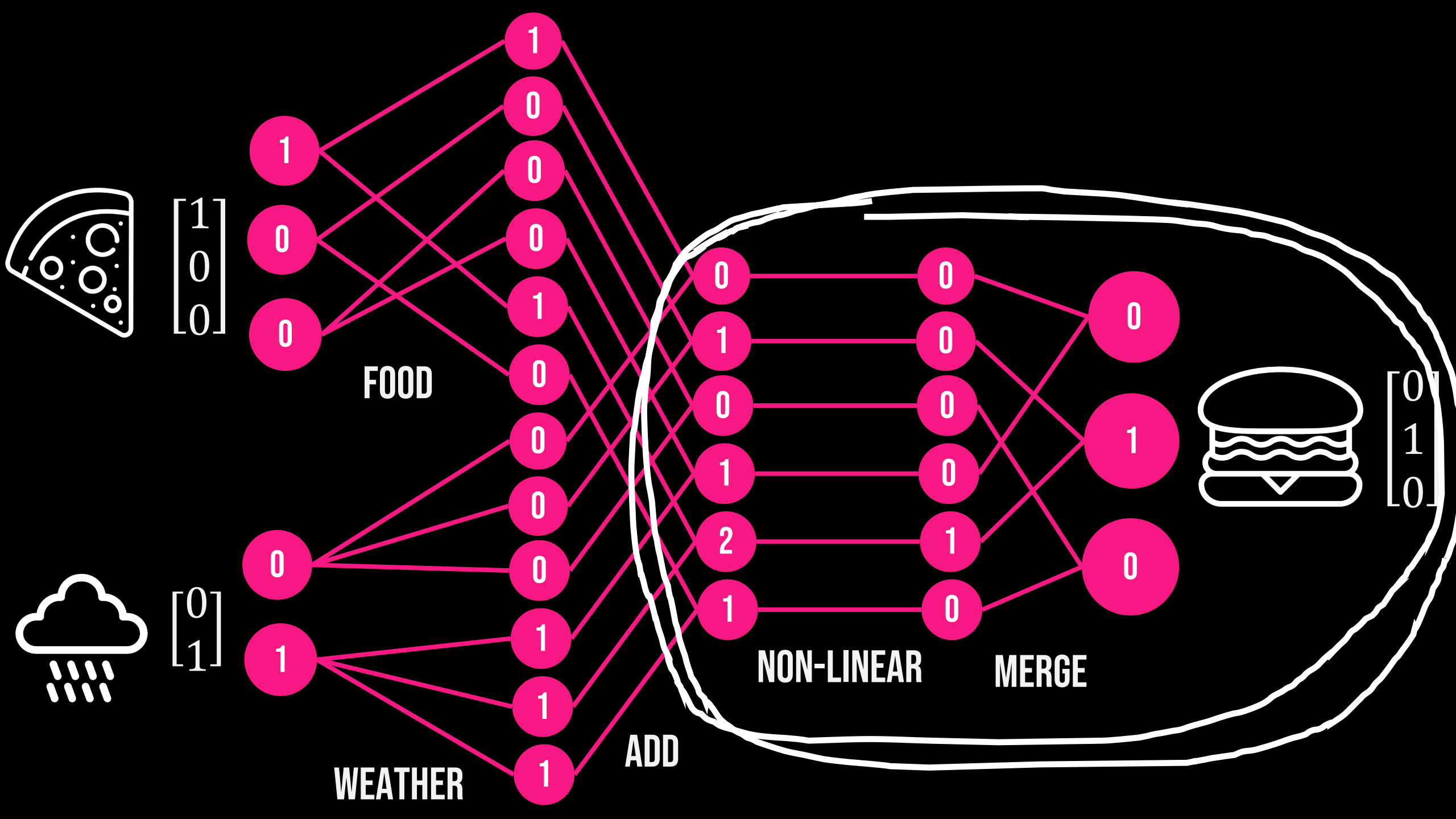
COMBINE HIDDEN STATE AND INPUT




FOOD
WEATHER
ADD
NON-LINEAR
MERGE

COMBINE HIDDEN STATE AND INPUT




$\begin{bmatrix}1\\0\\0\end{bmatrix}$
$\begin{bmatrix}0\\1\end{bmatrix}$
$\begin{bmatrix}0\\1\\0\end{bmatrix}$
FOOD
WEATHER
ADD
NON-LINEAR
MERGE

COMBINE HIDDEN STATE AND INPUT

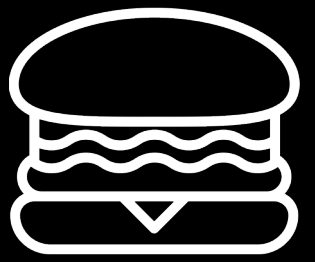
$$\begin{bmatrix} 1 \\ 0 \\ 0 \\ - \\ 1 \\ 2 \\ 1 \end{bmatrix}$$

NON-LINEAR

$$\begin{bmatrix} 0 \\ 0 \\ 0 \\ - \\ 0 \\ 1 \\ 0 \end{bmatrix}$$

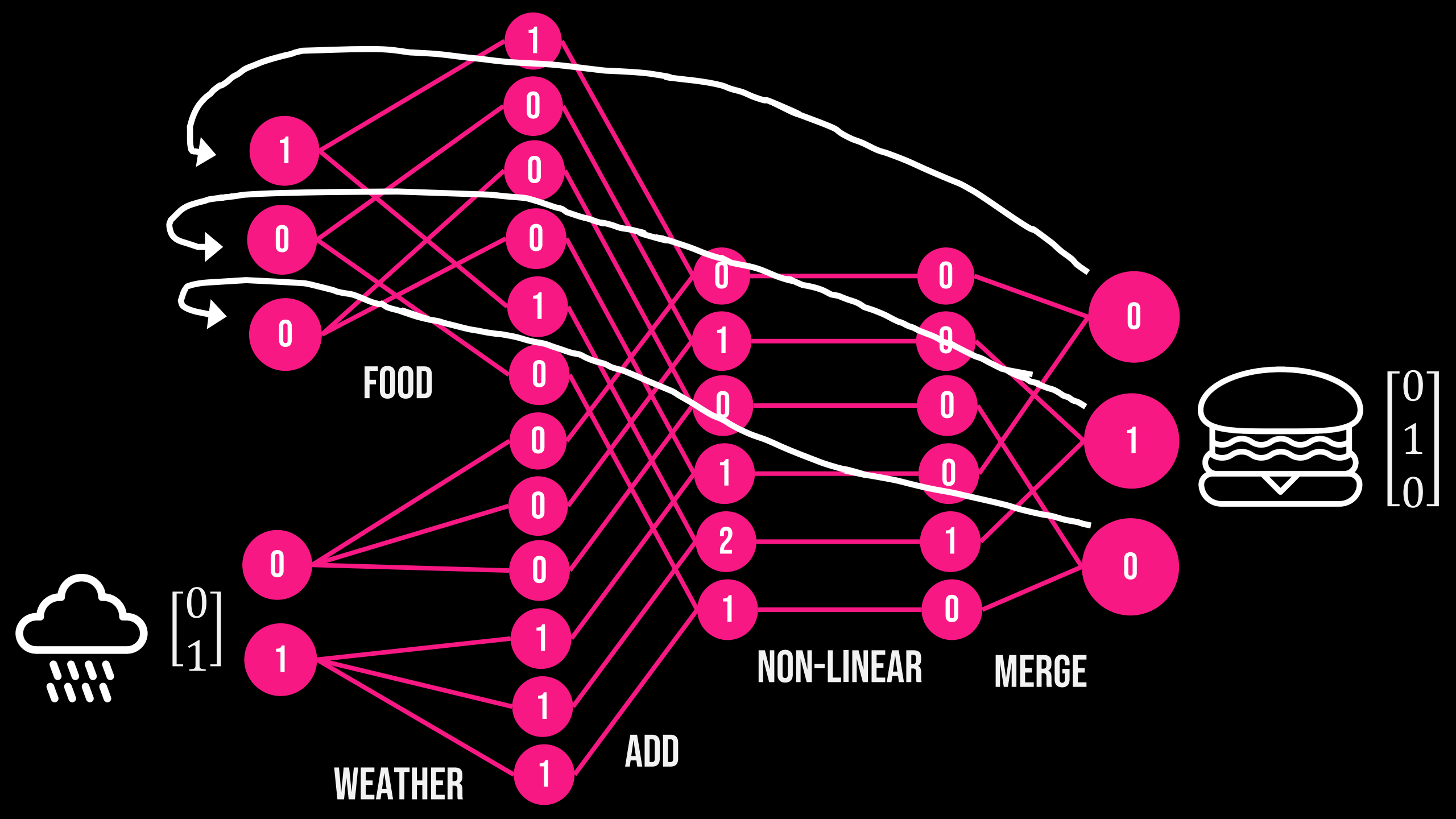
MERGE MAP

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \end{array}\right] = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$$



BASICALLY SET THE LARGEST NUMER TO 1 AND OTHERS TO 0

MERGE


FOOD
WEATHER
ADD
NON-LINEAR
MERGE
[0 1]
[0 1 0]

TRAINNING

FINDING THE RIGHT WEIGHTS FOR THOSES PARAMETERS

$$\begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \\ - & - & - \\ 0 & 0 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

FOOD (HIDDEN STATE)

+

ADD

$$\begin{bmatrix} 1 & 0 \\ 1 & 0 \\ 1 & 0 \\ - & - \\ 0 & 1 \\ 0 & 1 \\ 0 & 1 \end{bmatrix}$$

WEATHER (INPUT)

=

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 1 \end{array}\right]$$

MERGE MAP

SOME PROBLEMS

VANISHING GRADIENT: SHORT MEMORY

ALTERNATIVES: LONG SHORT-TERM MEMORY (LSTM)