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MNIST

{ PCA
t-SNE }

MNIST is a simple computer vision dataset. It consists of 28x28 pixel images of handwritten digits, such as:

Every MNIST data point, every image, can be thought of as an array of numbers describing how dark each pixel is. For example, we might think of \ as something like:

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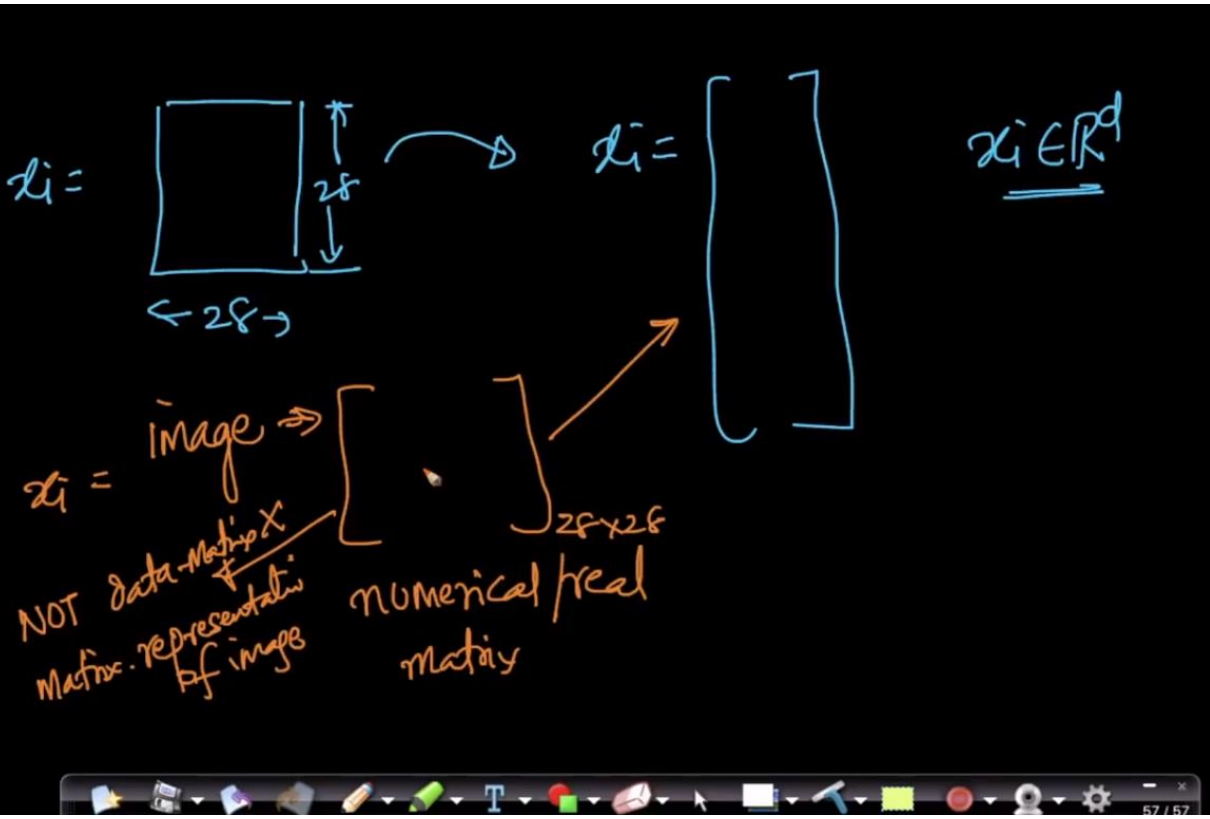

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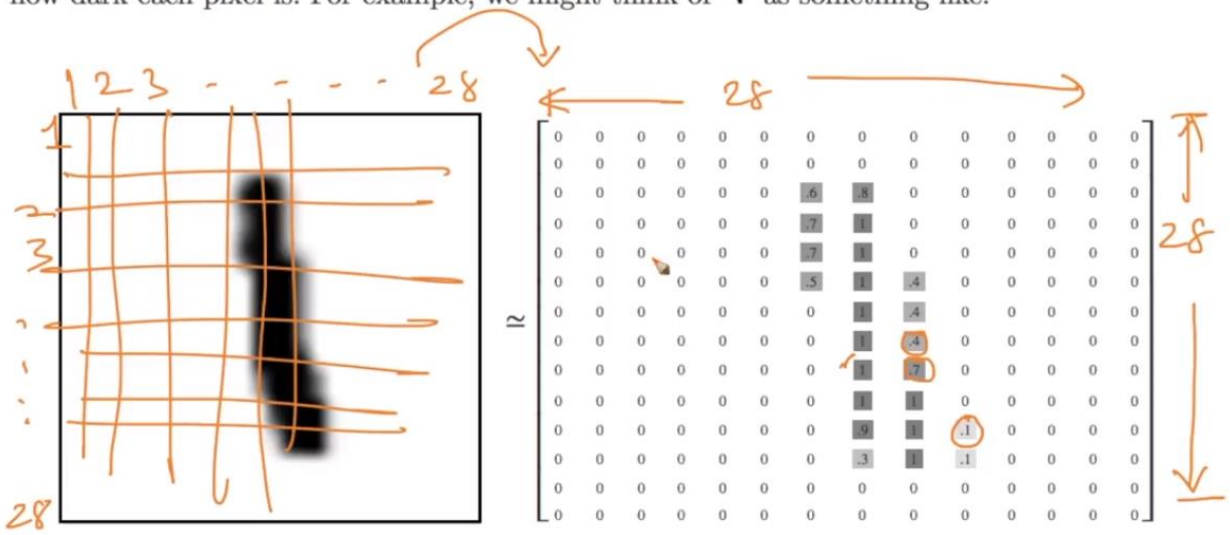
how dark each pixel is. For example, we might think of 1 as something like:



Since each image has 28 by 28 pixels, we get a 28x28 array. We can flatten each array into a 28 *

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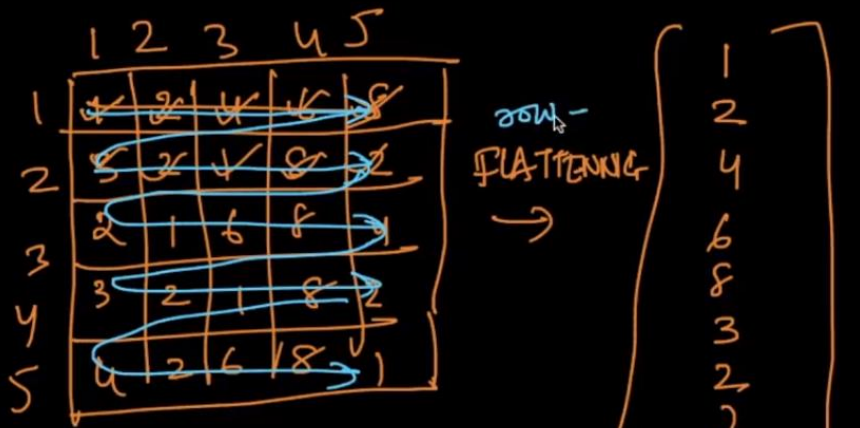

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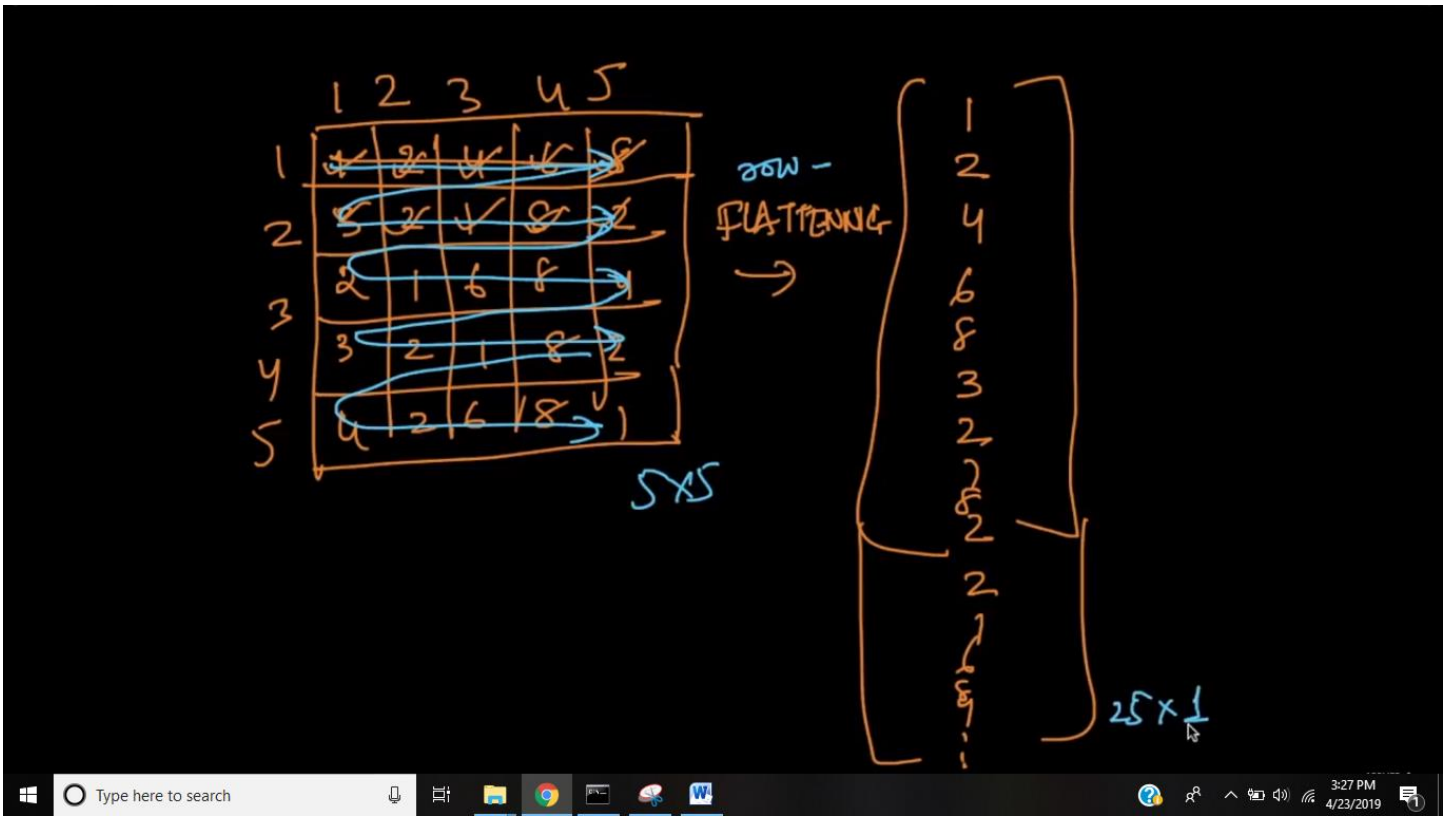
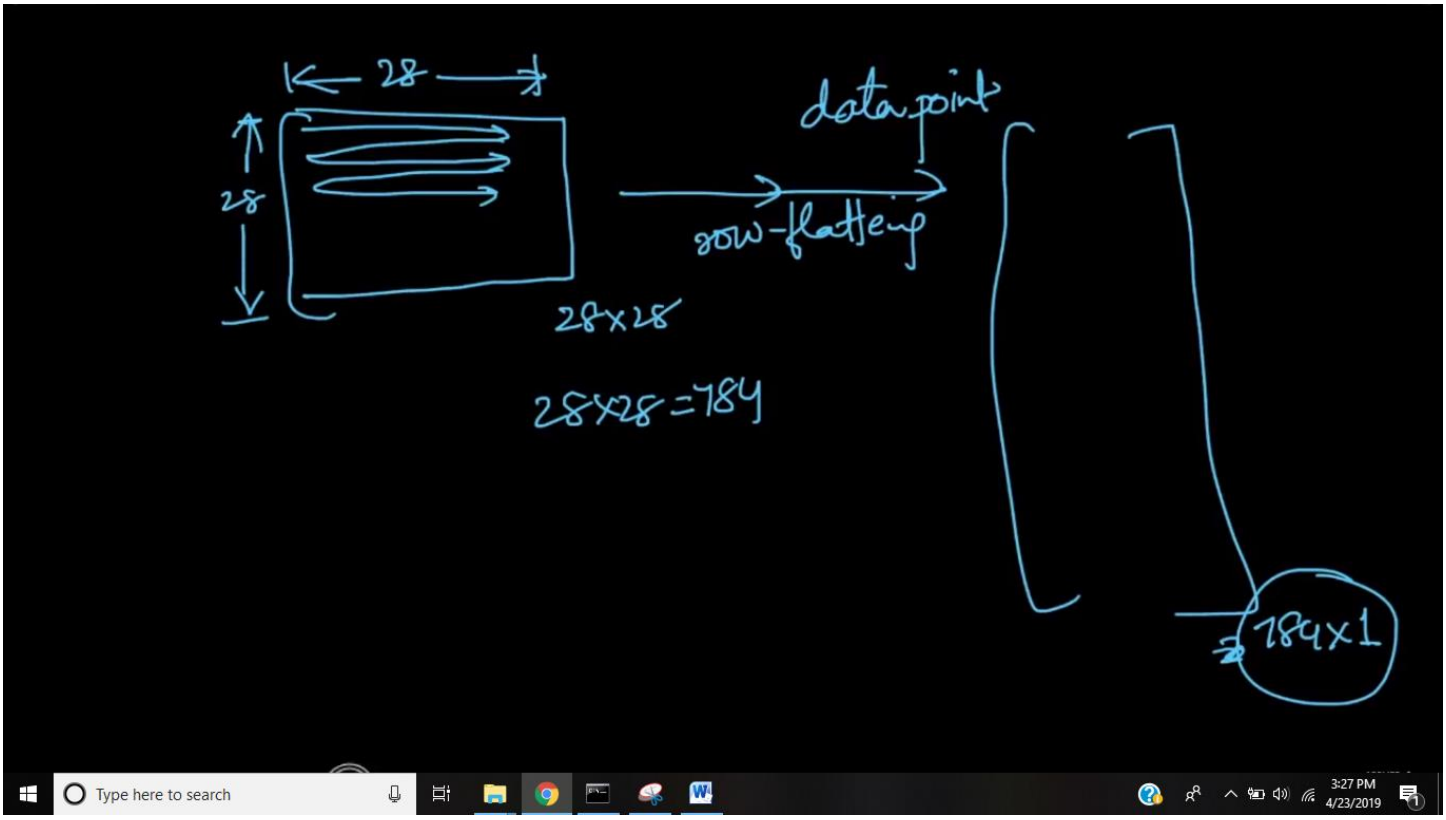
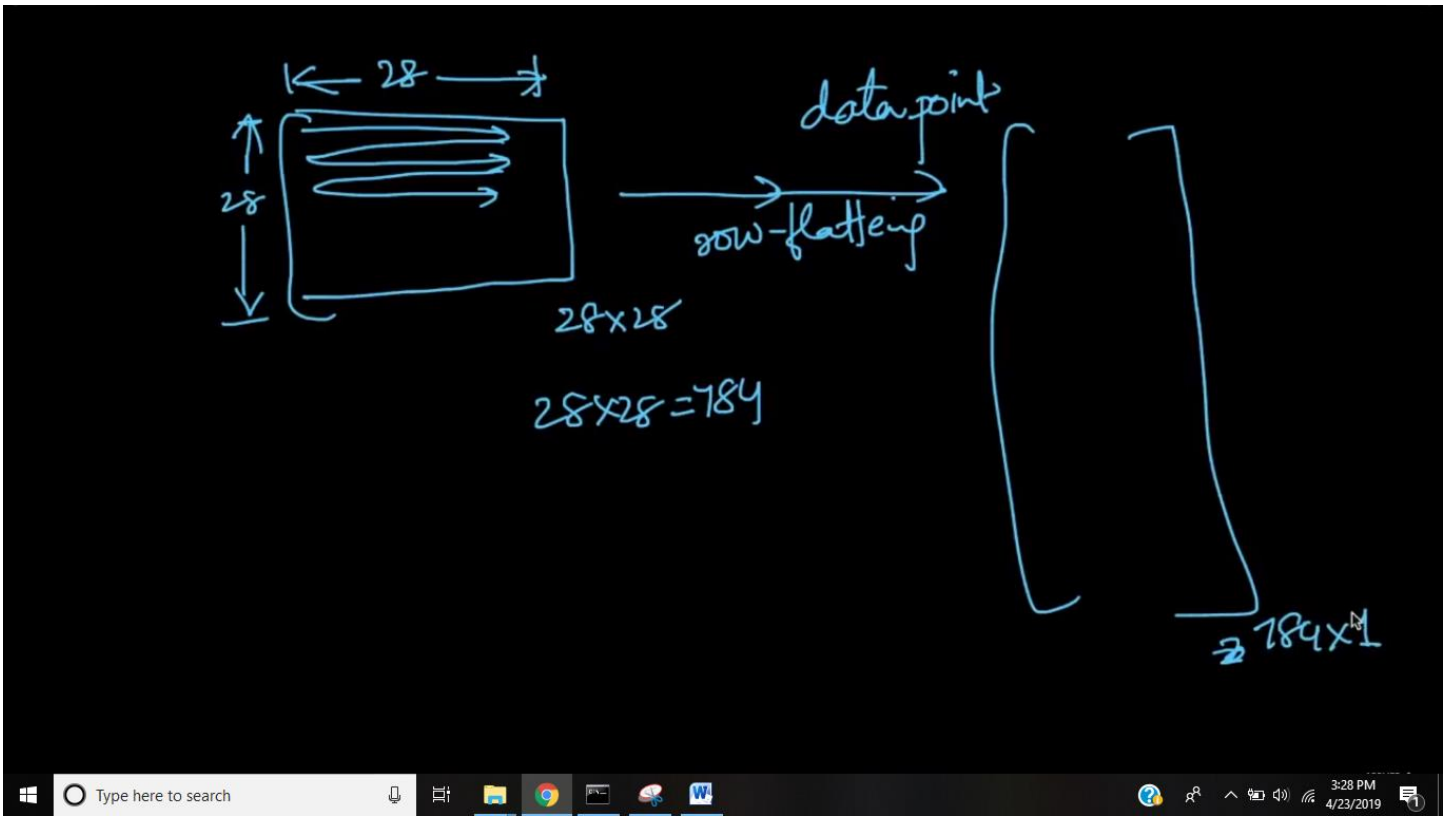
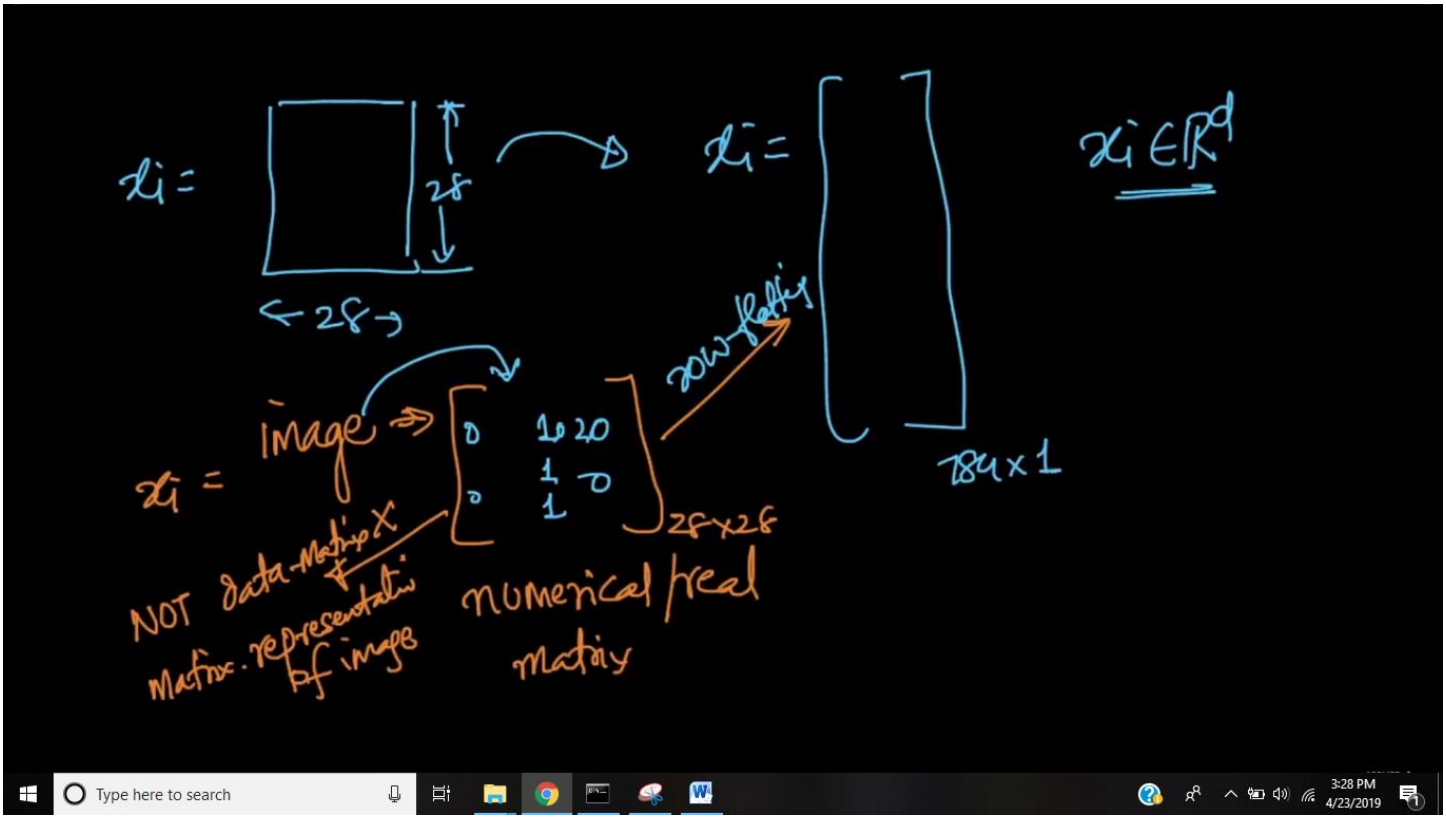
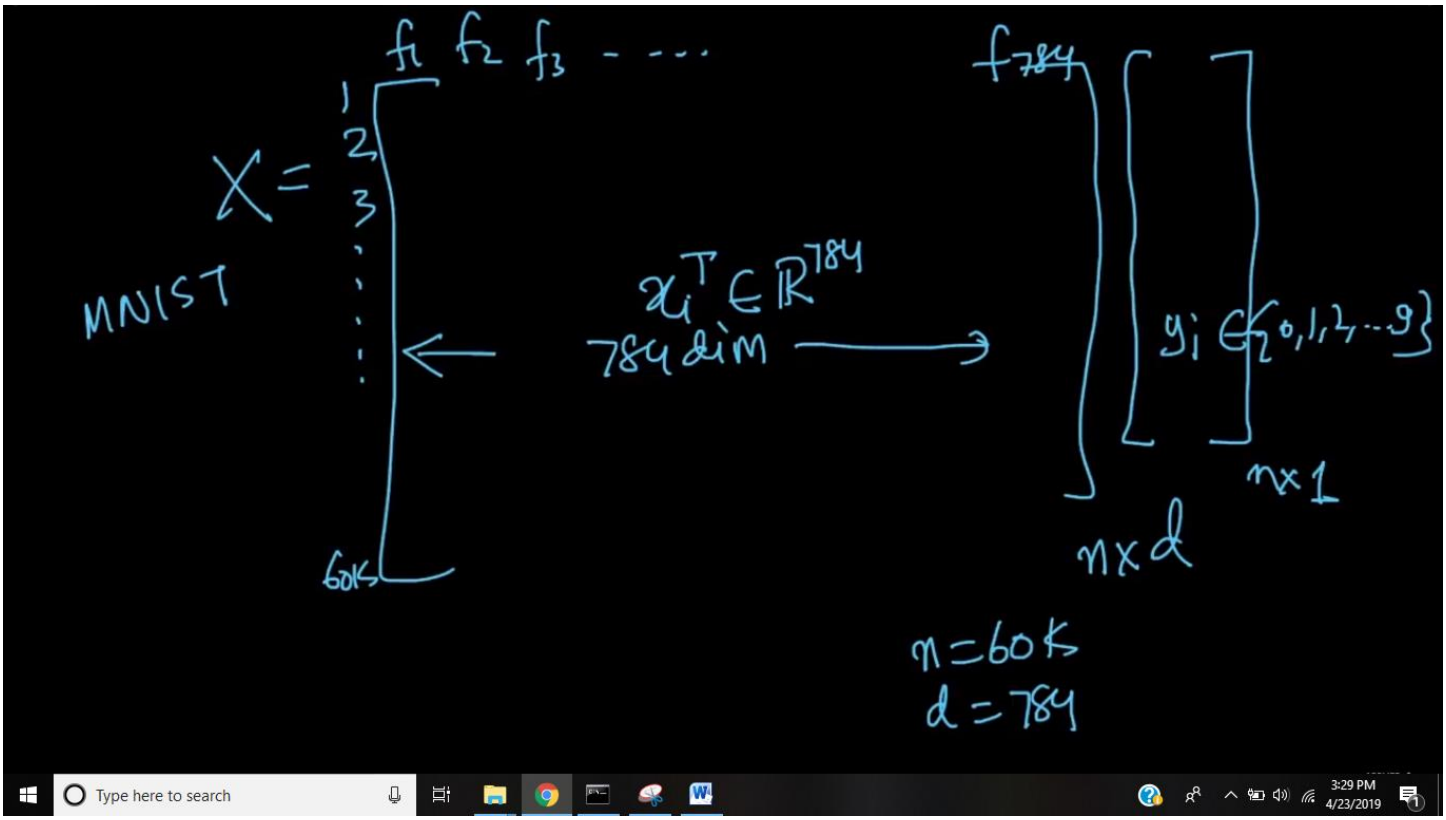
APPLIED COURSE

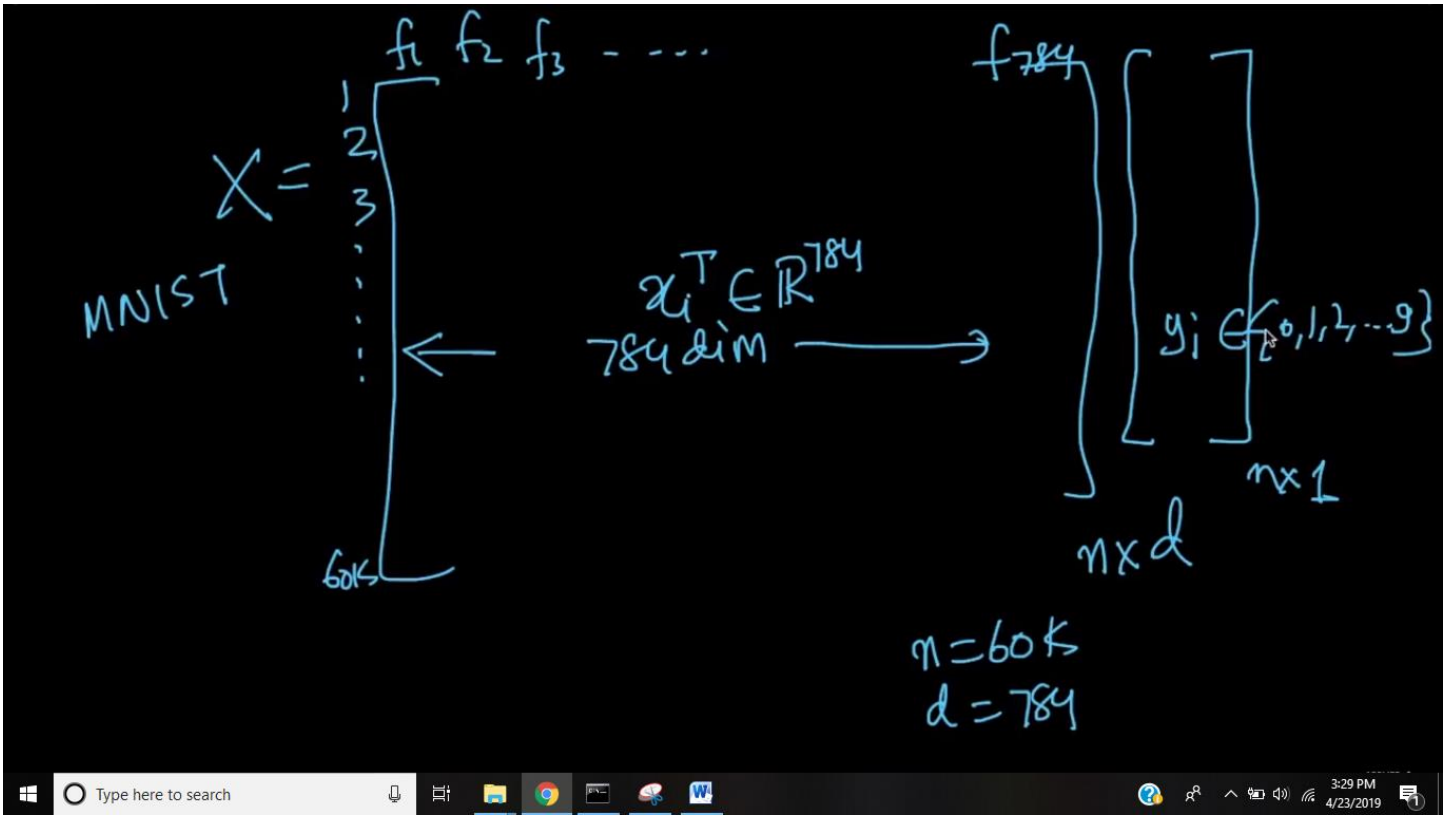

row - FLATTENING
5X5
25 x 1


28
28
data point
row-flatten
28x28
28x28=784
784x1


28
28
28x28
28x28=784
data point
row-flattening
784x1


$x_i =$
28
28
$x_i =$
$x_i \in \mathbb{R}^d$
$x_i =$
image
0 10 20
1 0
0 1
28x28
row-flattening
784x1
NOT data-matrix X
Matrix representation of image
numerical/real matrix


f1 f2 f3 - ...
f784
X =
1
2
3
60K
MNIST
$x_i^T \in \mathbb{R}^{784}$
784 dim
$y_i \in \{0,1,2 \cdots 9\}$
n x 1
n x d
n = 60k
d = 784
Type here to search
3:29 PM
4/23/2019


f1 f2 f3 - ...
f784
X =
1
2
3
60K
MNIST
$x_i^T \in \mathbb{R}^{784}$
784 dim
$y_i \in \{0,1,2 \cdots 9\}$
n x 1
n x d
n = 60k
d = 784
Type here to search
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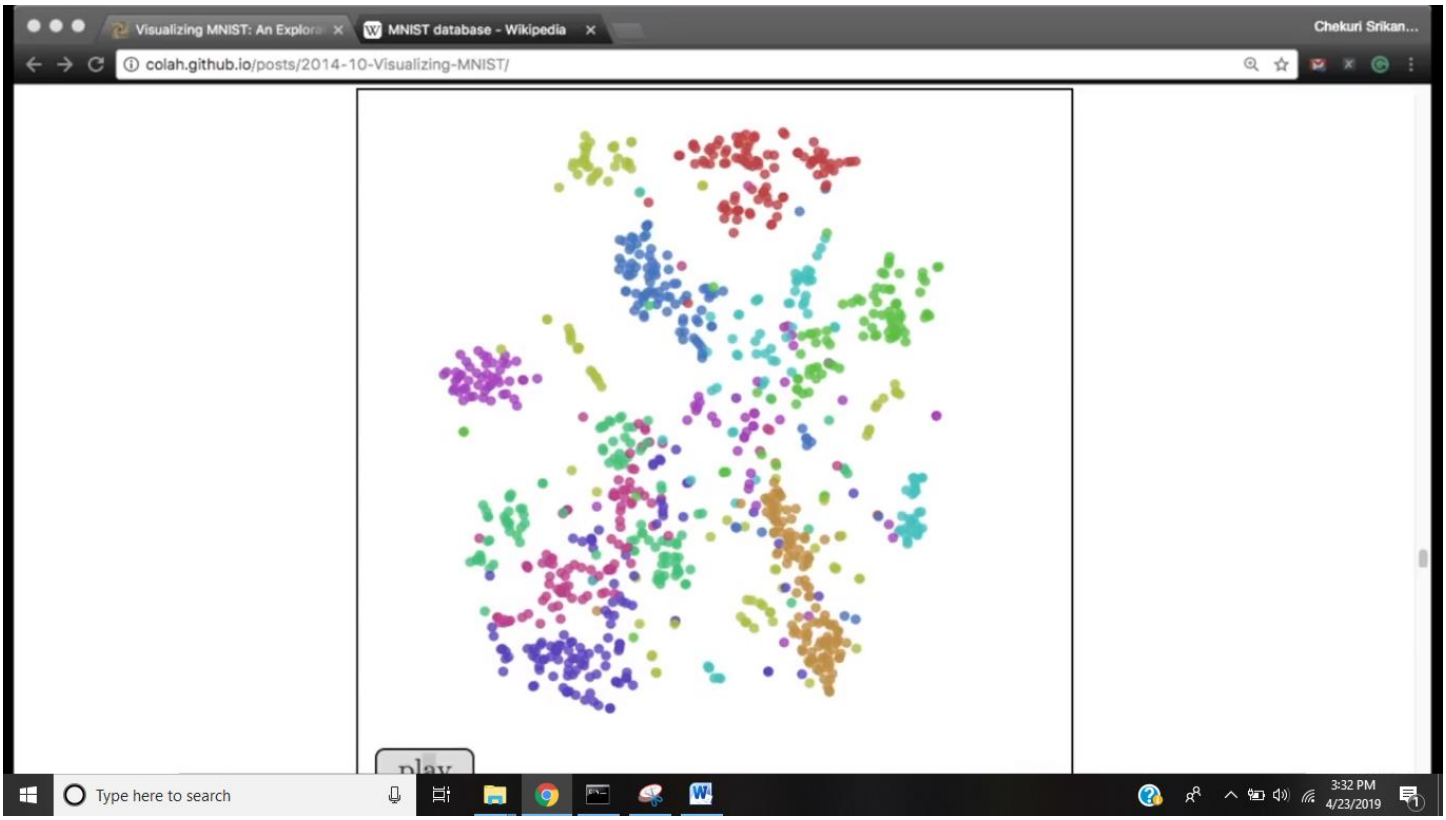
4/23/2019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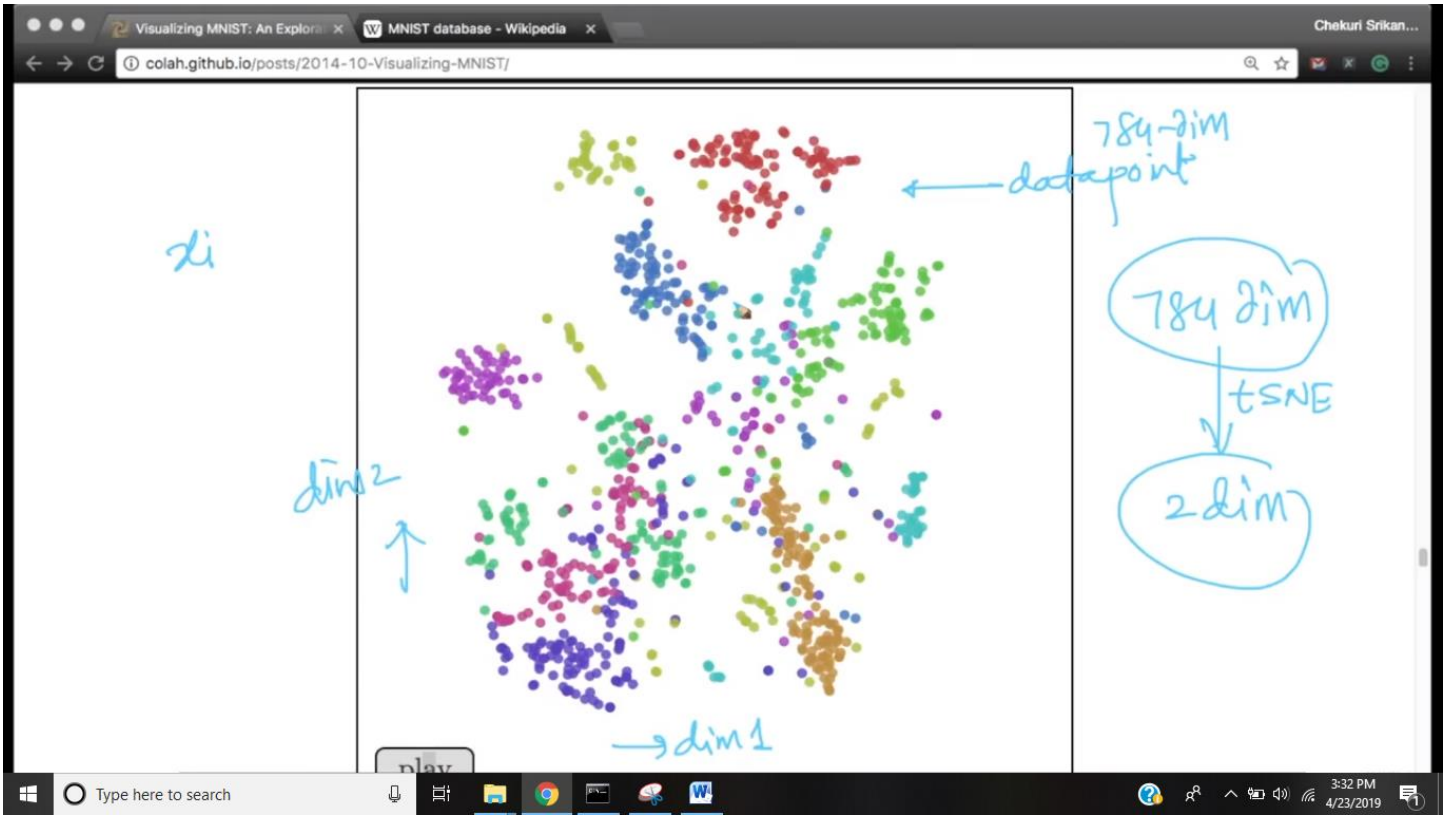
play
Type here to search
3:32 PM
4/23/2019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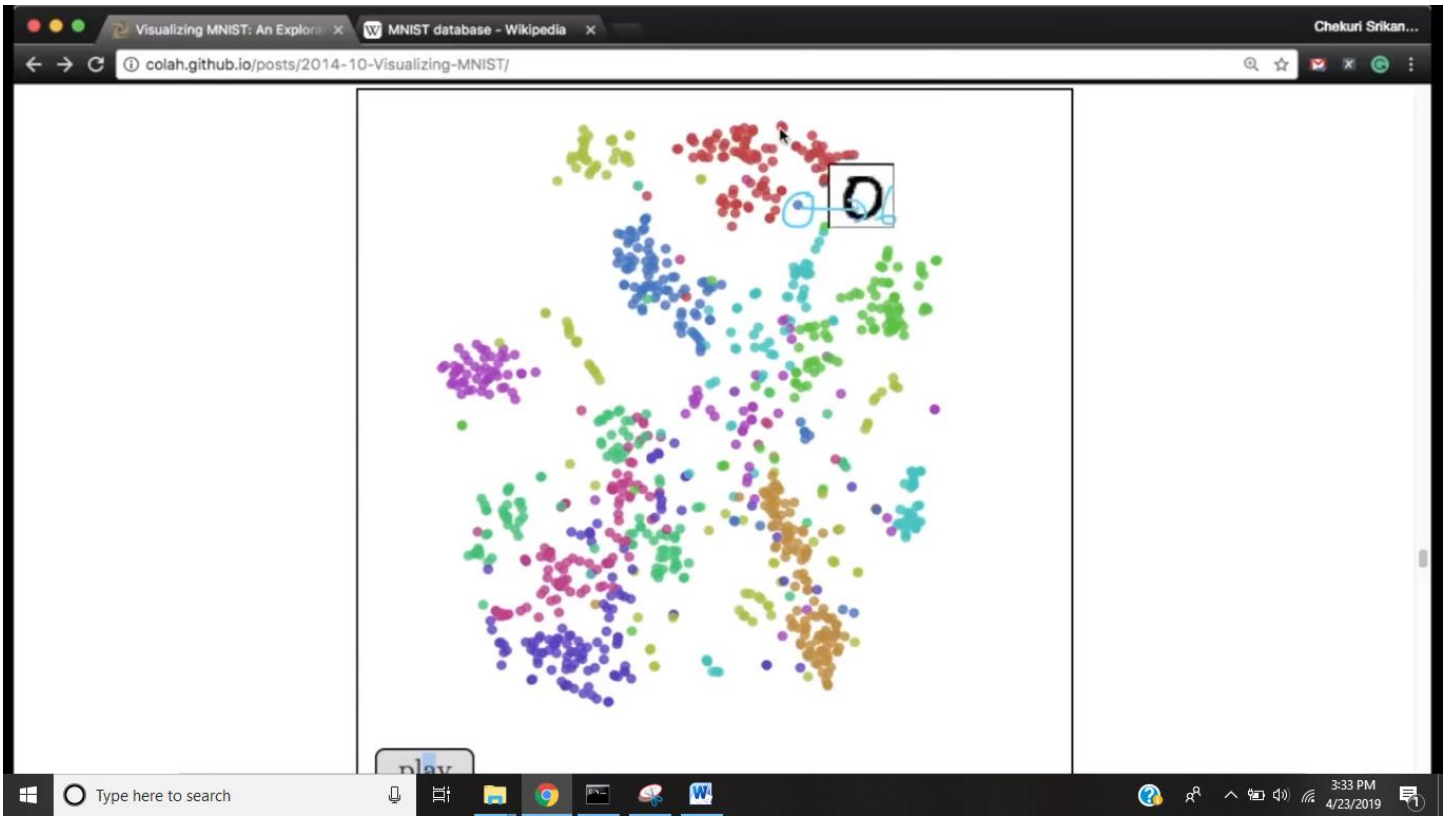
784-dim
datapoint
xi
784 dim
tSNE
2 dim
dim 2
dim 1
play
Type here to search
3:32 PM
4/23/2019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play
Type here to search
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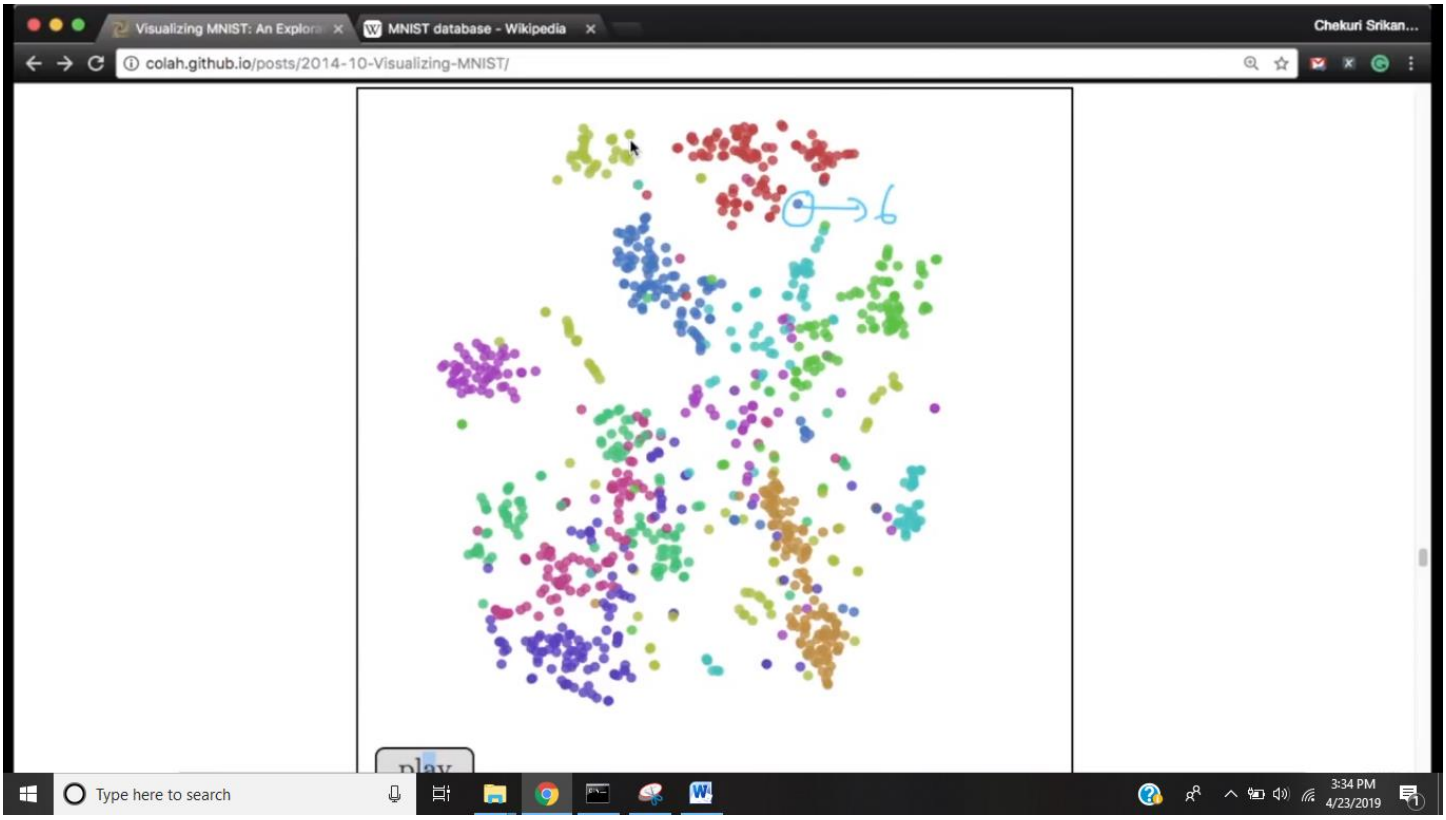
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Type here to search
3:34 PM
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