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CNN - image data

→ Data Augmentation

→ Convolution Layer

Padding

Stride

→ Relu Layer &

→ Pooling Layer - Max pooling

+ code

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Webinar Chat
yes sir..
Gunanidhi Moha... to Hosts and panelists
GM yes
Ravinder to Hosts and panelists
R yes
rashmi to Hosts and panelists
R yes sir
Madhavan to Hosts and panelists
M ready
Usha Kumari to Hosts and panelists
UK yes
Urmil Shah to Hosts and panelists
US Lets go
Vivek Shinde to Hosts and panelists
VS yes sir
Santoshkumar Pa... to Hosts and panelists
SP yes Sir
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To: Hosts and panelists
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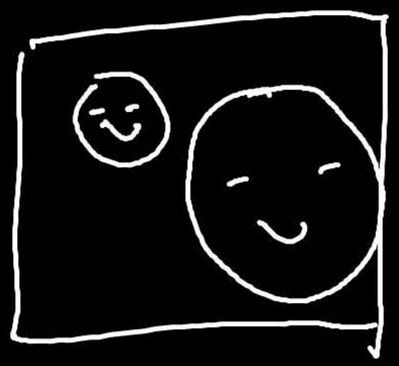
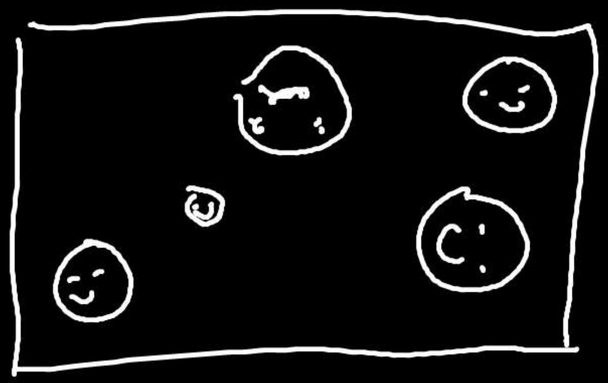
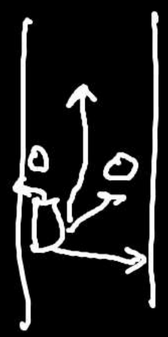
Data Augmentation - Translation Invariance





Translation variance - Computer Vision

Self-drive Car



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UK yes

Santoshkumar Pa... to Hosts and panelists
SP yes Sir

rashmi to Hosts and panelists
R yes very much problem

Usha Kumari to Hosts and panelists
UK yes sir

Urmil Shah to Hosts and panelists
US yes sir

Gunanidhi Moha... to Hosts and panelists
GM yes

rashmi to Hosts and panelists
R yes sir

Santoshkumar Pa... to Hosts and panelists
SP yes Sir

yes

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$D = \{x_i, y_i\}$

CNN Model

robust rotation, cropping, scale, flip, horizontal, vertical-shift, rotation, Zoom out/in

Invariance

means output doesn't change if input change significantly.

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Webinar Chat
Usha Kumari to Hosts and panelists
UK yes
Santoshkumar Pa... to Hosts and panelists
SP yes Sir
rashmi to Hosts and panelists
R yes very much problem
Usha Kumari to Hosts and panelists
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US yes sir
Gunanidhi Moha... to Hosts and panelists
GM yes
rashmi to Hosts and panelists
R yes sir
Santoshkumar Pa... to Hosts and panelists
SP yes Sir
yes
Who can see your messages? Recording on
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Type message here...

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Why data Augmented is useful ?

① **Invariance** - Shift invariance

$x_i \longrightarrow y$

rotation "

Zoom "

Shear "

Noise "

② Small dataset → Large dataset

1000 10K / 1 Lac

NOTE :- Data Augmentation is very very popular especially for Image dataset

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Usha Kumari to Hosts and panelists
UK yes

Madhavan to Hosts and panelists
M result is dog..output is same

Nagarajan K to Hosts and panelists
NK o/p is not affected by the relative positional changes in the I/p for invariance sir

Santoshkumar Pa... to Hosts and panelists
SP yes

yes

Sir in that case many cars driving on road - both invariance and variance will used a model to predict and handle self driving cars ?

Usha Kumari to Hosts and panelists
UK yes

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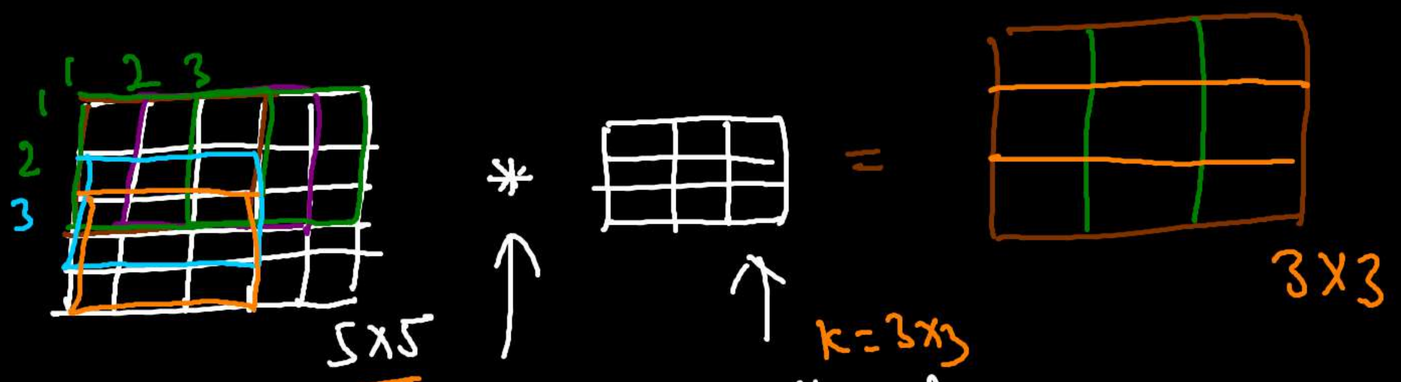
3 participants raised hand

CNN - 3 Layers

1. Convolution Layer
2. Relu layer
3. pooling layer

Convolution — Padding & Stride

Case :-



Urmil Shah

Webinar Chat

Santoshkumar Pa... to Hosts and panelists
SP
yes Sir

Usha Kumari to Hosts and panelists
UK
yes sir

rashmi to Hosts and panelists
R
yes

Vivek Shinde to Hosts and panelists
VS
yes sir

Mohamed Younus to Hosts and panelists
Yes sir, perfect

Santoshkumar Pa... to Hosts and panelists
SP
Sir all this invariance are useful or can do only in static condition or it's also during dynamic conditions ? I mean if image is continuously moving then will that be able to accurately able to identify image ?

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To: Hosts and panelists
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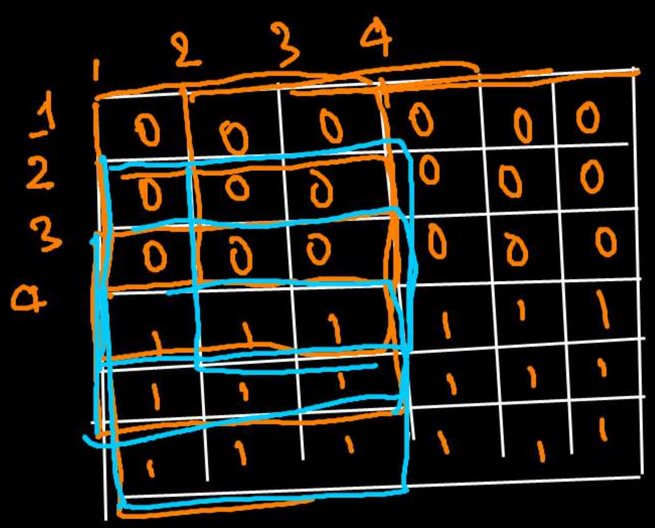
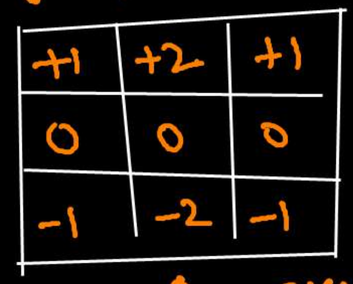
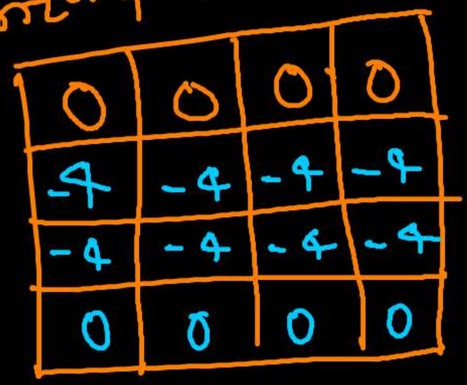


Vertical detect → Sobel edge



→ Horizontal detect

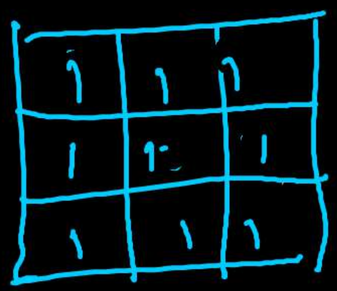


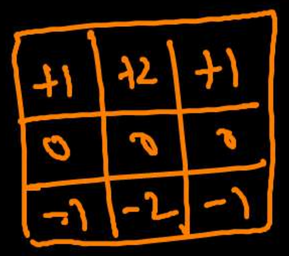
4x4

6x6

Kernel/filter

Conv





$= 0 - 4$

$1+2+1+0+0+0+1-2-1=0$

Urmil Shah

Webinar Chat

Santoshkumar Pa... to Hosts and panelists
SP
yes Sir

Usha Kumari to Hosts and panelists
UK
yes sir

rashmi to Hosts and panelists
R
yes

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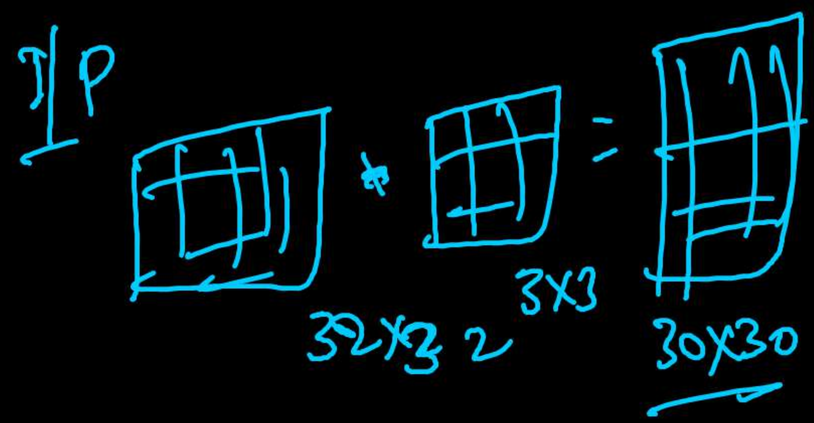
Usha Kumari
Usha Kumari

General Formula

Input = n * n

Kernel/filter = f * f



Output = Input − Kernel + 1

output = 6 − 3 + 1 = 4 * 4

32 − 3 + 1 = 30X30

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Padding

Case I :- General formula

$n \times n \xrightarrow{k * k} (n-k+1)(n-k+1)$: output

Input

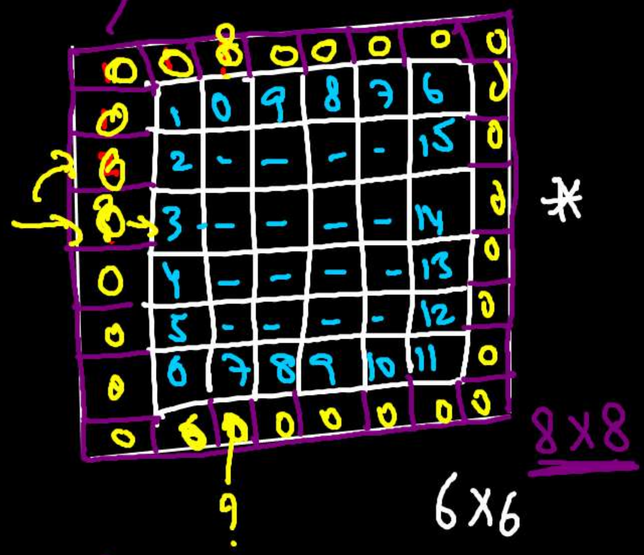
Kernel / Filter

Noise

$n = 60$

$k = 5$

output $= 60-5+1 = 56 \times 56$



Padding = 1

$n-k+1 = 8-3+1 = 6$

Value we put

(1) Z

(2) R

3x3

Output = Same

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saying don't reduce image size

Usha Kumari to Hosts and panelists
UK
1

Urmil Shah to Hosts and panelists
US
If we put same value, can the image change?

Usha Kumari to Hosts and panelists
UK
20

3

yes

Santoshkumar Pa... to Hosts and panelists
SP
yes Sir

rashmi to Hosts and panelists
R
can u pls repeat this 0 thing

Santoshkumar Pa... to Hosts and panelists
SP
understanding

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Case 1 :- Padding

$$n \times n \xrightarrow[K \times K]{P=1} (n-K+2P+1)(n-K+2P+1)$$

$n = 6$
$K = 3$
$P = 1$

output $= 6-3+2*1+1$
$= \underline{6 \times 6}$

Padding

Valid

Same

$n = 60$
$K = 3$
$P = 1$

output $= 60-3+2*1+1$
$= \underline{60 \times 60}$

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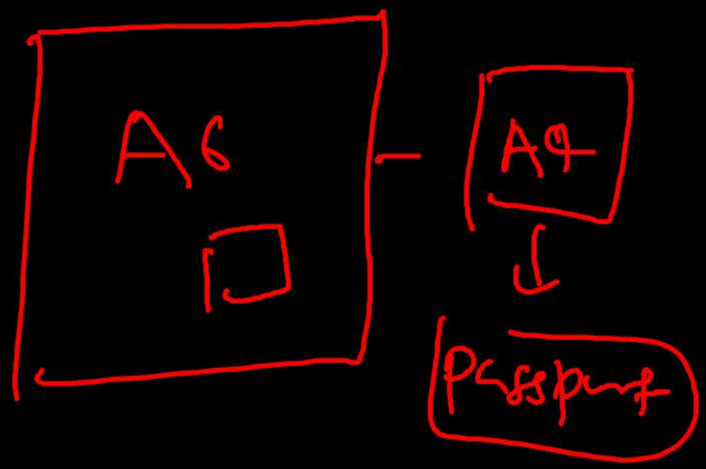
Strides



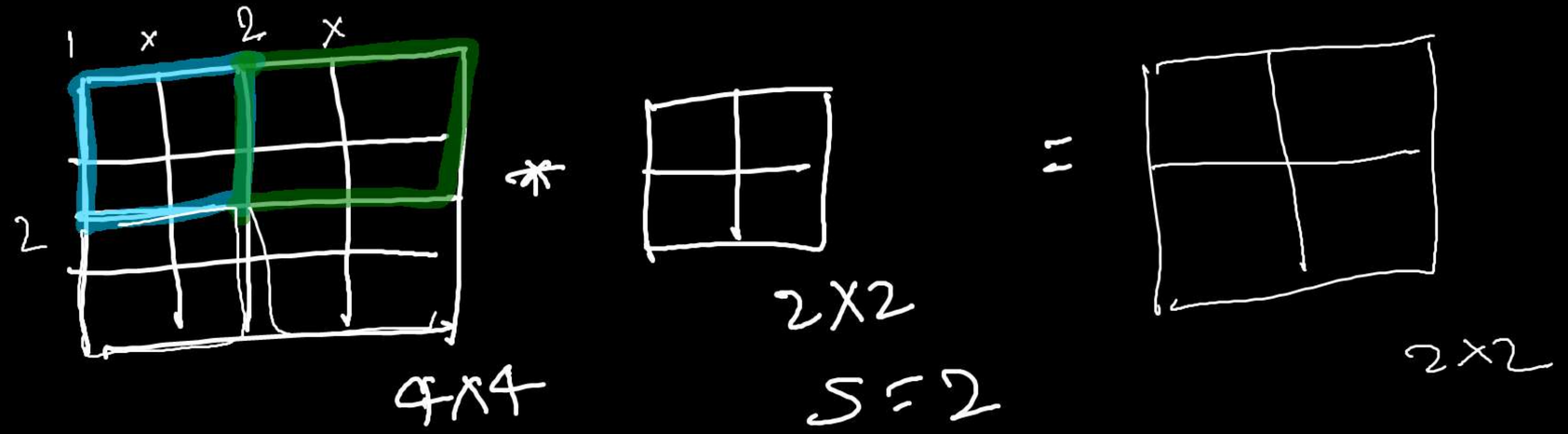
Strides → shifted by 1 = Stride by 1

Shifted by 2 = Stride by 2

↳

S = 2 : Shifting horizontally & vertically by 2 Pixel

by default System considers Stride = 1



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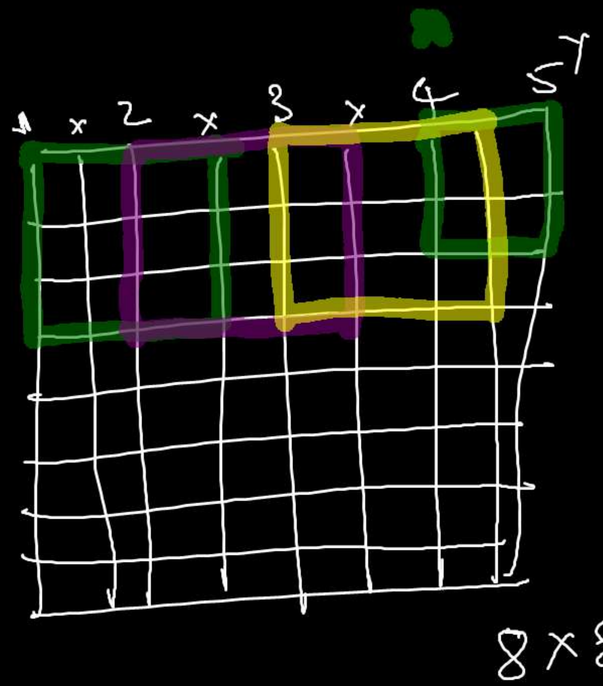

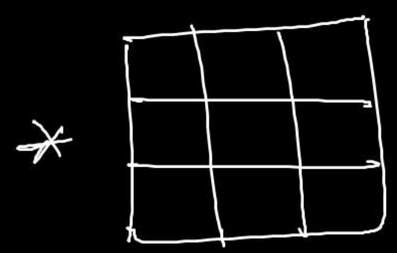

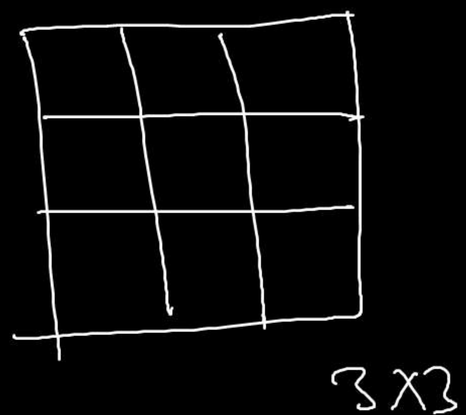

$n = 60$

$k = 3$

$s = 2$

$s = 2$

$$\frac{60-3}{2}+1$$

$$= \frac{57}{2}+1$$

$$= 28.+1$$

$$= 29 \times 29$$

Case III :- Stride

$$n \times n \xrightarrow[k*k]{s=s} \left(\frac{n-k}{s}+1\right)\left(\frac{n-k}{s}+1\right)$$

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how the numbers are coming please do

tilak to Hosts and panelists
T
sir, what is the None here in the output shape?

rashmi to Hosts and panelists
R
yes

Usha Kumari to Hosts and panelists
UK
yes

Aishwarya Singh to Hosts and panelists
AS
clear

rashmi to Hosts and panelists
R
no

Usha Kumari to Hosts and panelists
UK
yes

Vivek Shinde to Hosts and panelists
VS
no

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Case IV :- This is the best idea to remember

$$n \times n \xrightarrow[P,S]{k \times k} \left(\frac{n-k+2P}{S}+1\right)\left(\frac{n-k+2P}{S}+1\right)$$

$n = 6$

$k = 3$

$S = 1$ = by default

$P = 0$ - No padding / valid

$$\text{output} = \frac{6-3+2*0}{1}+1 = 4 \times 4 = \text{General for Case I}$$

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there is no difference as because by default shift is one and we also giving stride = 1

Usha Kumari to Hosts and panelists

UK yes

yes

Nagarajan K to Hosts and panelists

NK kernel size is a hyperparameter ?

rashmi to Hosts and panelists

R yes

Usha Kumari to Hosts and panelists

UK yes

Sahas Swamy to Hosts and panelists

SS yes sir

Aishwarya Singh to Hosts and panelists

AS can you please go to the code where stride is 2?

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Type message here...

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$n = 6$

$K = 3$

$S = 1$: by default

$P = 1$

$$\text{output} = \frac{n-K+2P}{S} + 1 = \frac{6-3+2*1}{1} + 1 = 6 \times 6$$

Case I

Padding concept

$n = 6$

$K = 3$

$S = 2$

$P = 0$

$$\text{output} = \frac{n-K+2P}{S} + 1 = \frac{6-3*2+2*0}{2} + 1 = 2 \times 2$$

Strides

Case II

$n = 6 \quad S = 2$

$K = 3 \quad P = 1$

$$= \frac{6-3+2*1}{2} + 1 = 2 + 1 = 3 \times 3$$

Both

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Vivek Shinde to Hosts and panelists
VS: no

Aishwarya Singh to Hosts and panelists
AS: there will be loss of image in stride

Usha Kumari to Hosts and panelists
UK: stride =1 means nothing but case 1 discussed

Santoshkumar Pa... to Hosts and panelists
SP: there is no difference as because by default shift is one and we also giving stride = 1

Usha Kumari to Hosts and panelists
UK: yes

yes

Nagarajan K to Hosts and panelists
NK: kernel size is a hyperparameter ?

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To: Hosts and panelists

Type message here...