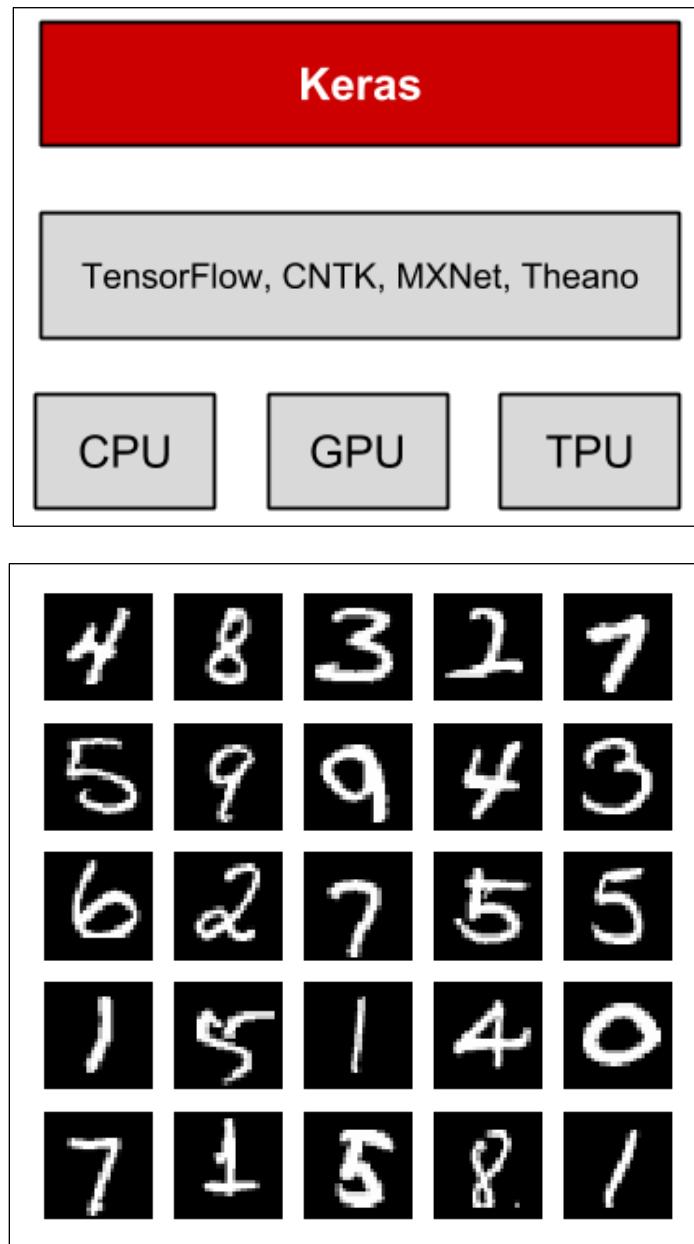
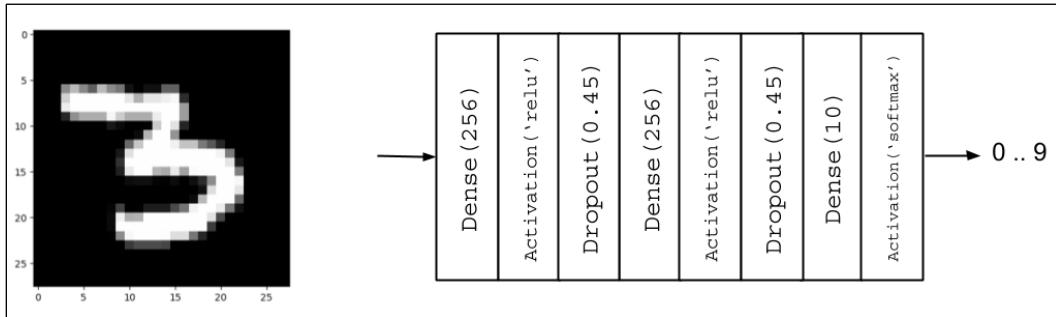
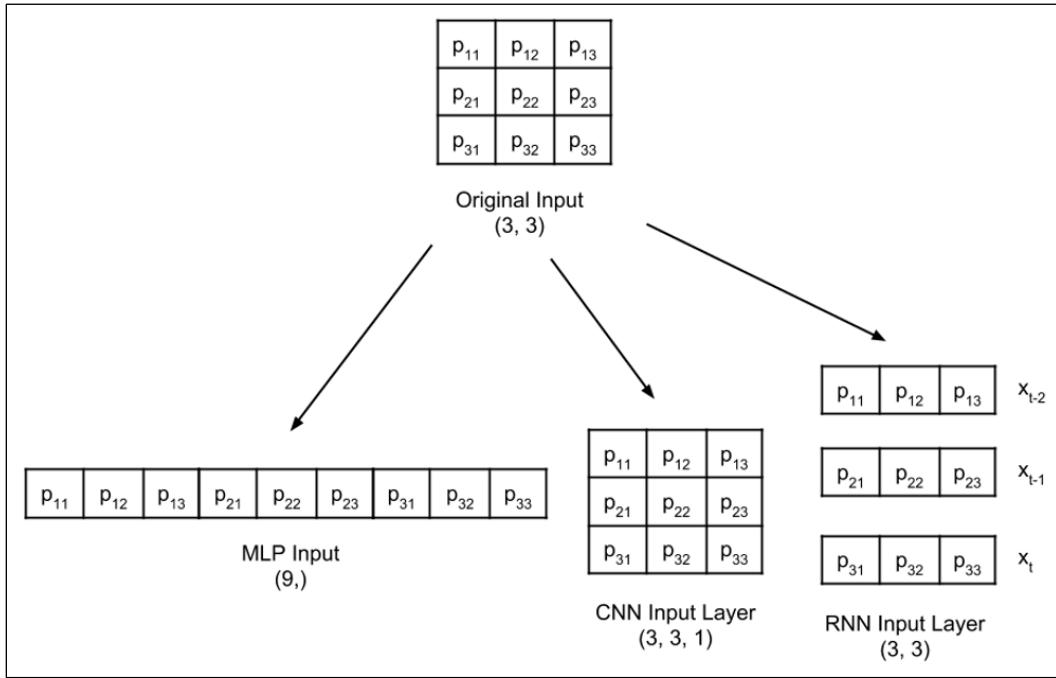
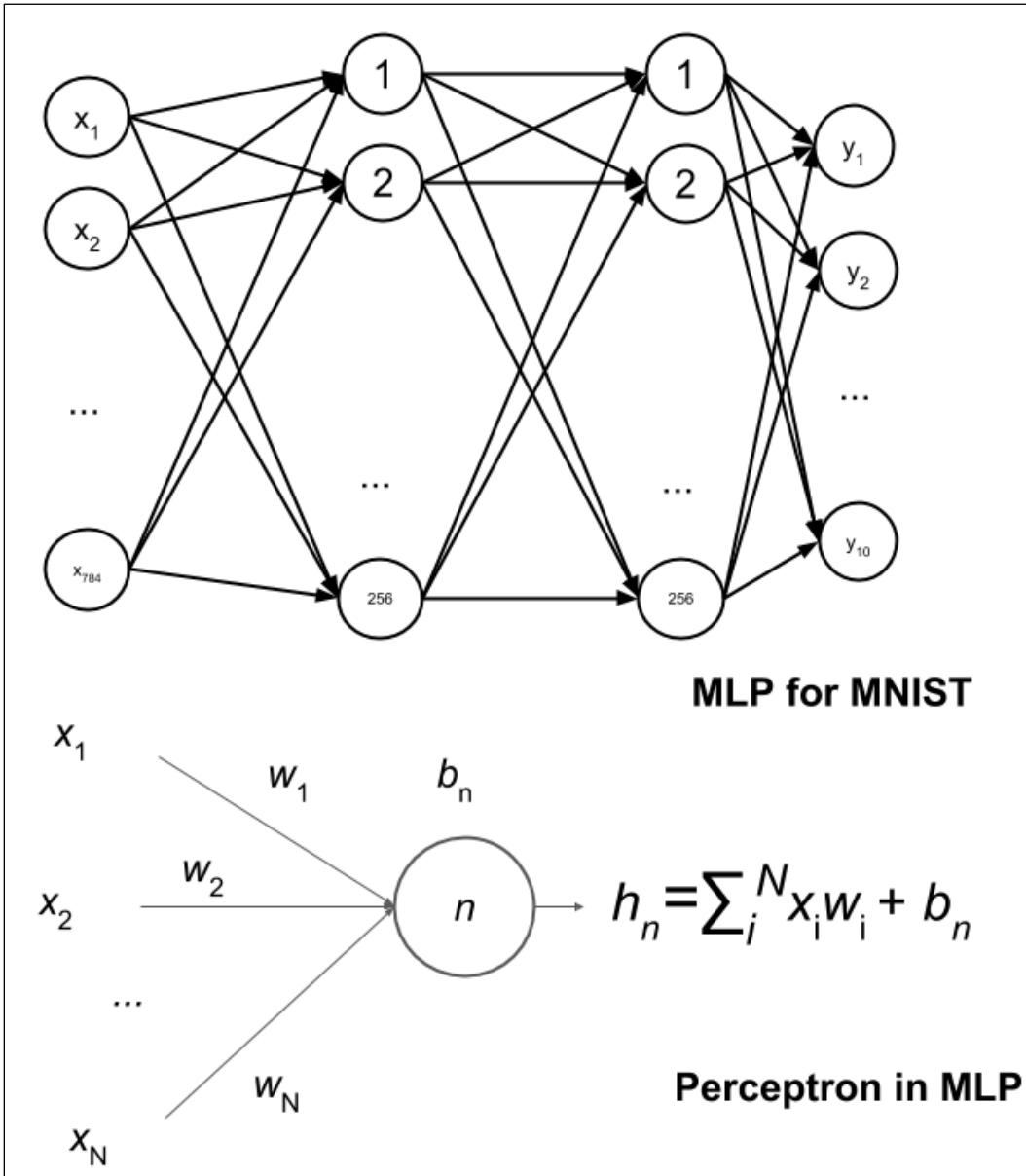
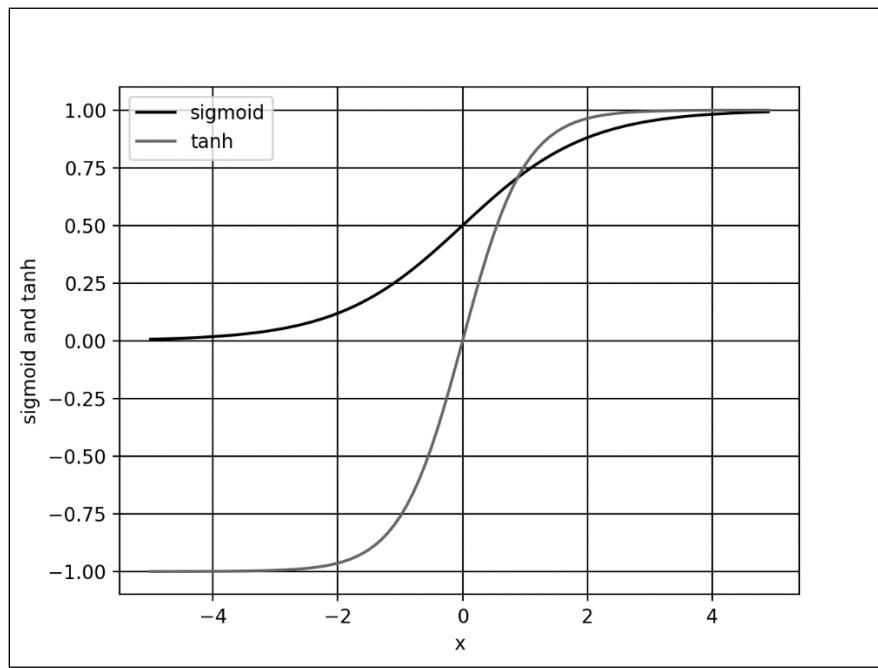
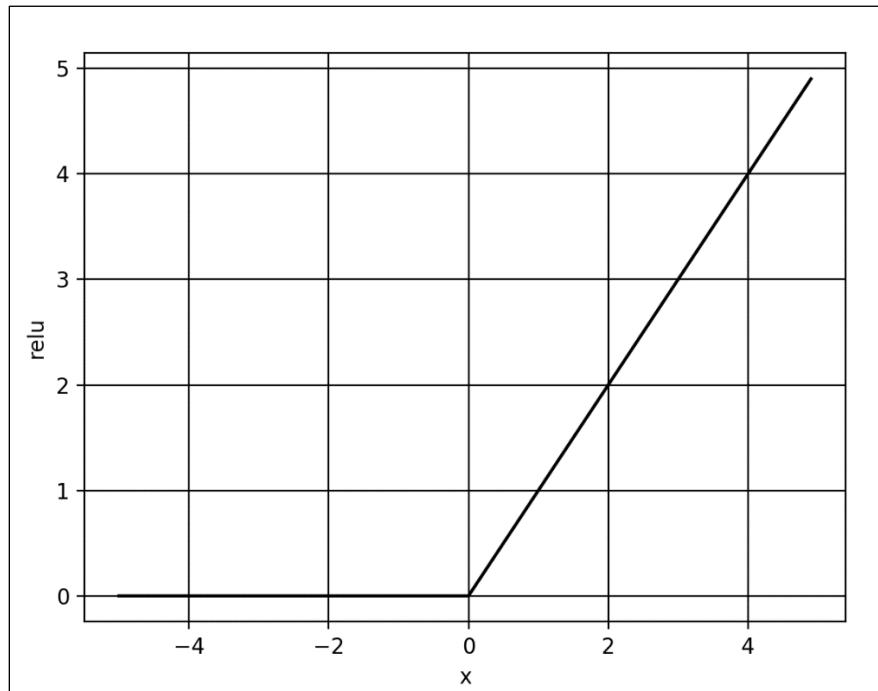


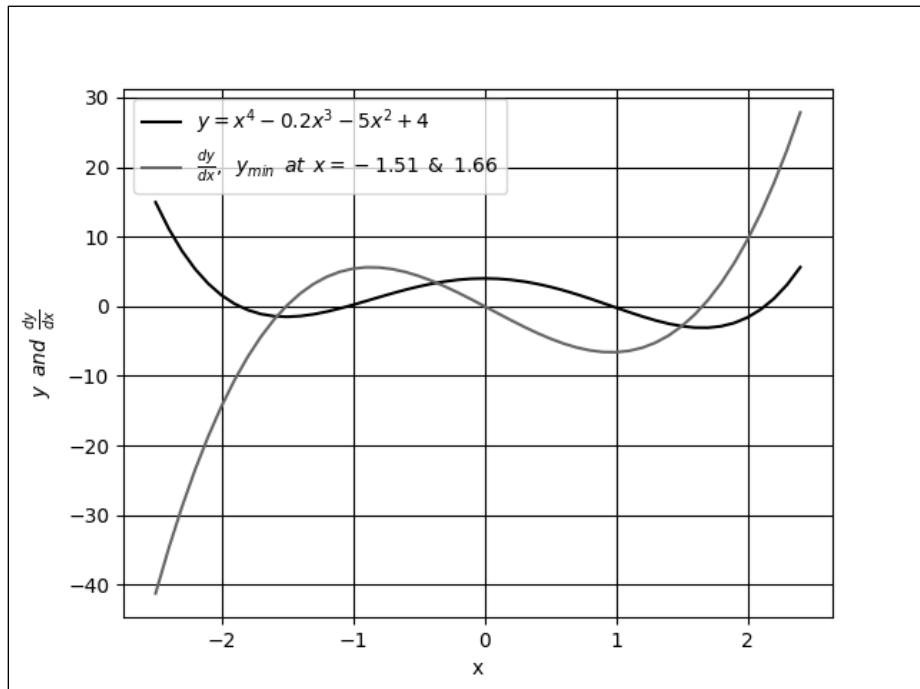
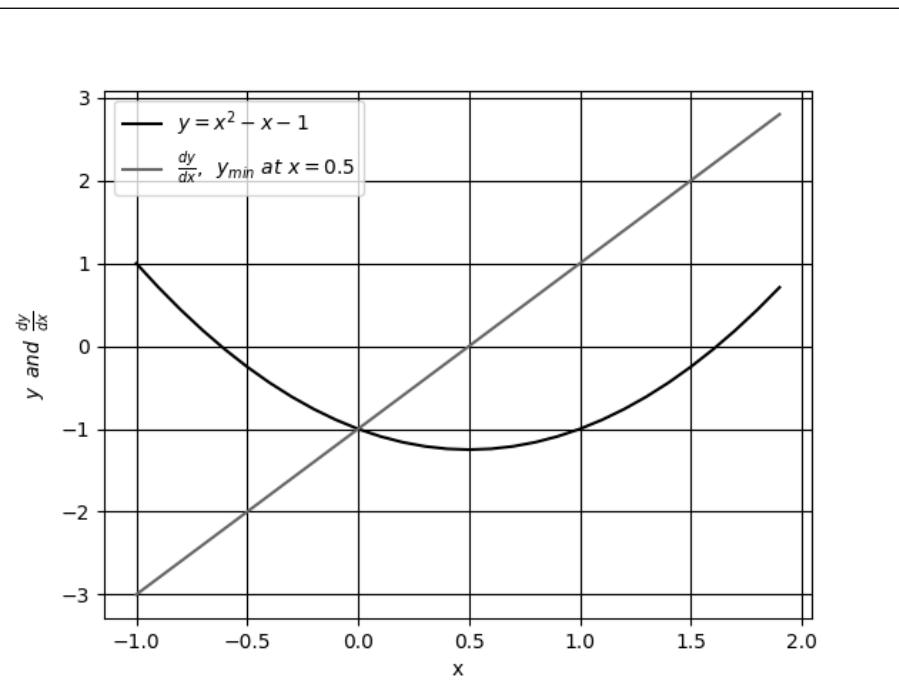
## Chapter 1: Introducing Advanced Deep Learning with Keras

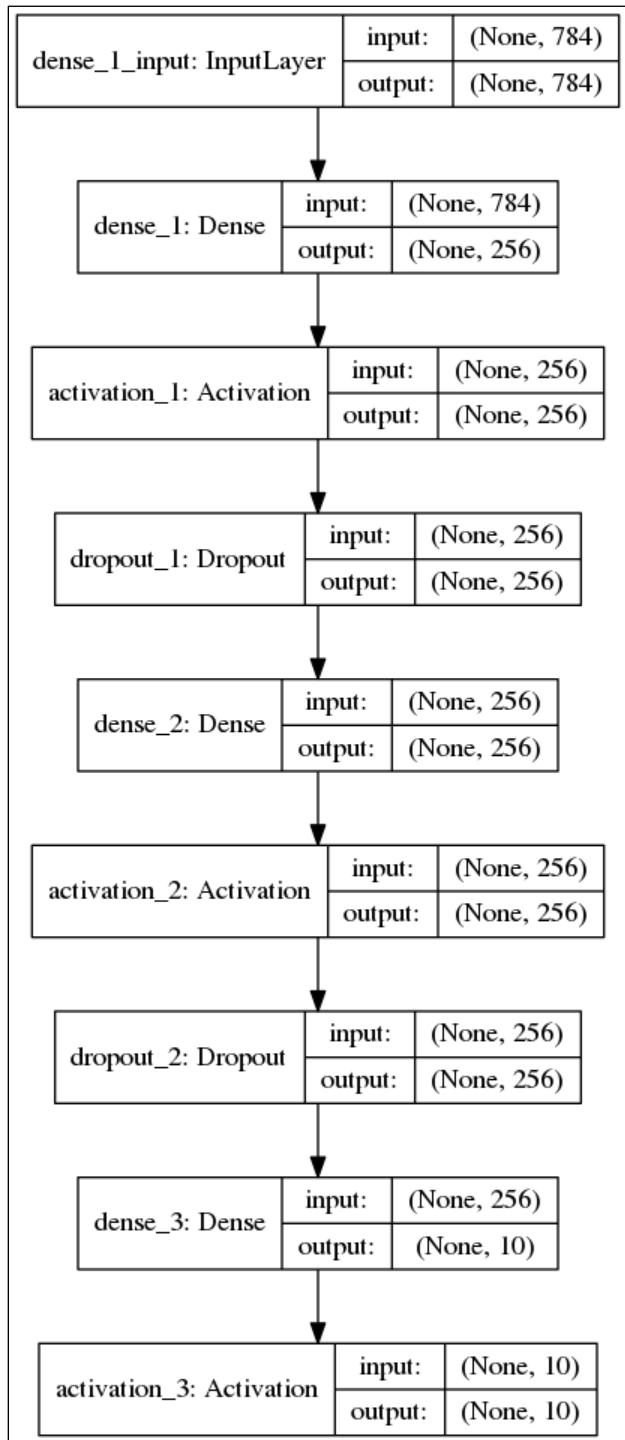


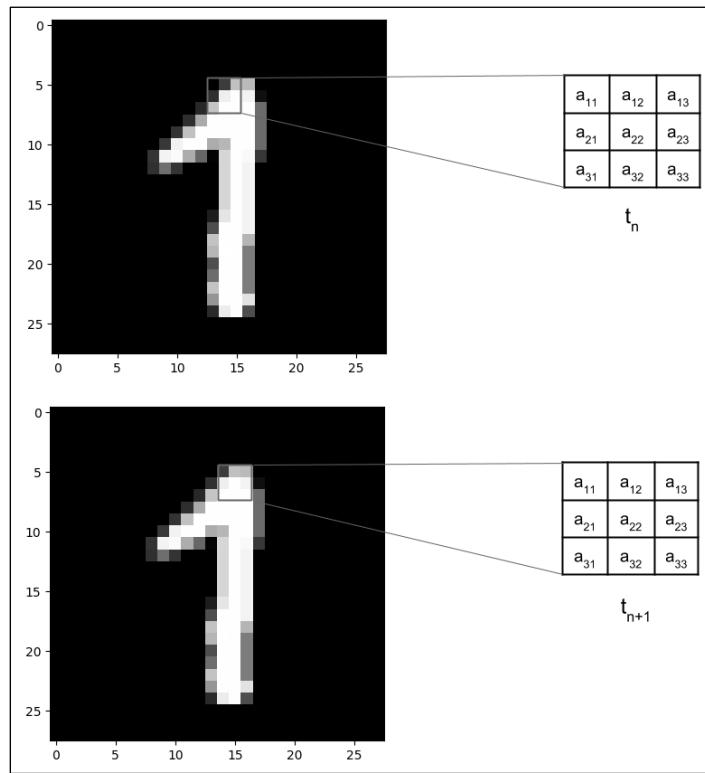
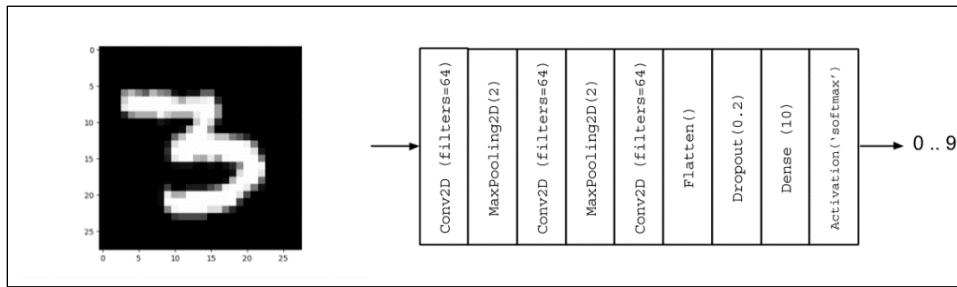












$p_{11}$	$p_{12}$	$p_{13}$	$p_{14}$	$p_{15}$
$p_{21}$	$p_{22}$	$p_{23}$	$p_{24}$	$p_{25}$
$p_{31}$	$p_{32}$	$p_{33}$	$p_{34}$	$p_{35}$
$p_{41}$	$p_{42}$	$p_{43}$	$p_{44}$	$p_{45}$
$p_{51}$	$p_{52}$	$p_{53}$	$p_{54}$	$p_{55}$

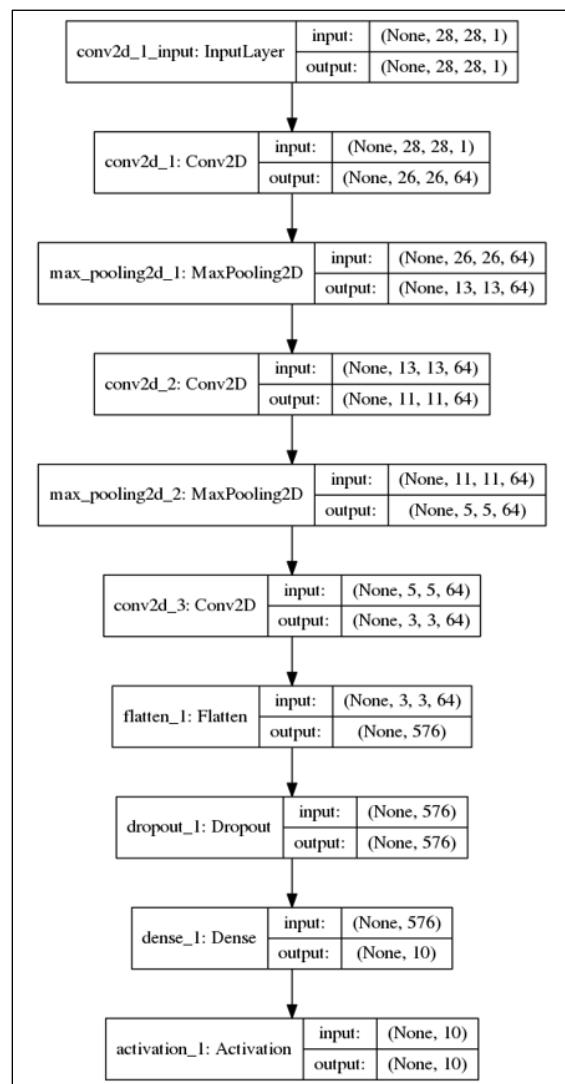
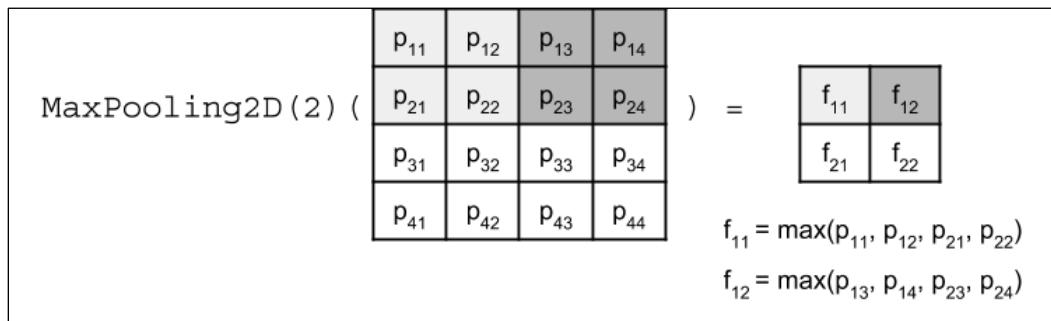
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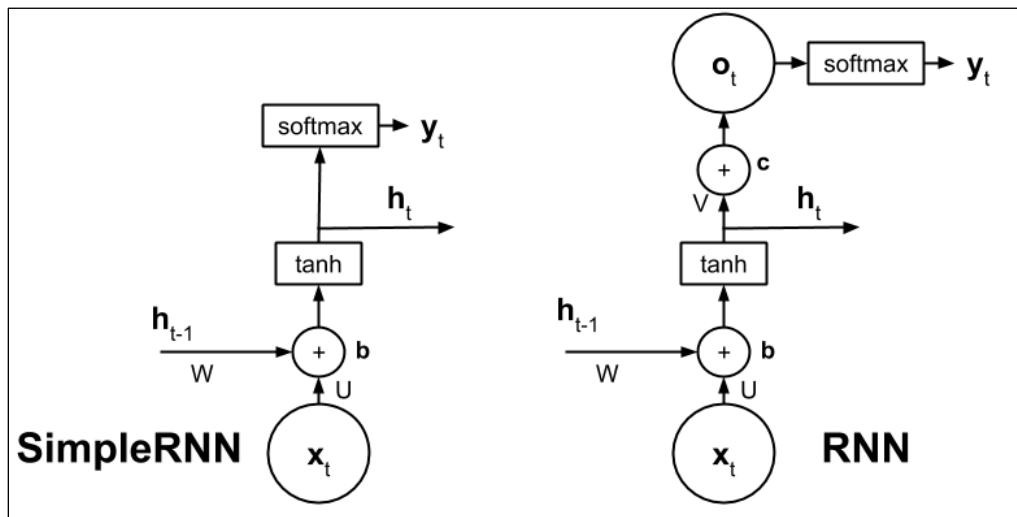
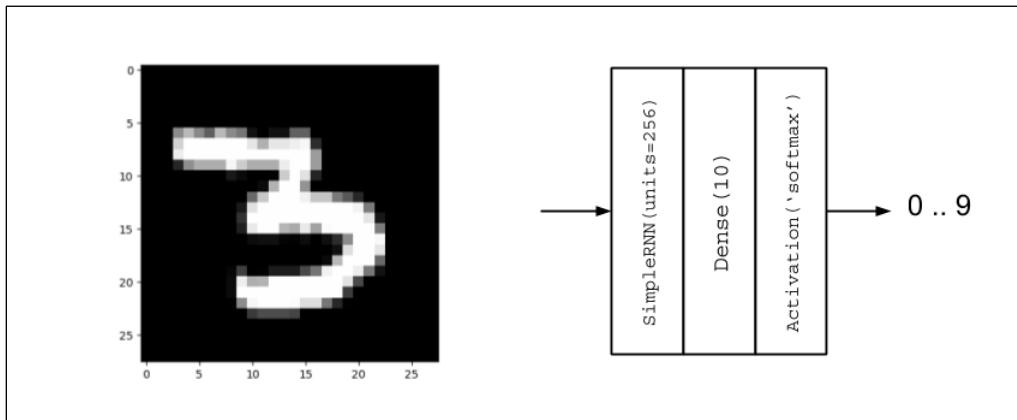
$a_{11}$	$a_{12}$	$a_{13}$
$a_{21}$	$a_{22}$	$a_{23}$
$a_{31}$	$a_{32}$	$a_{33}$

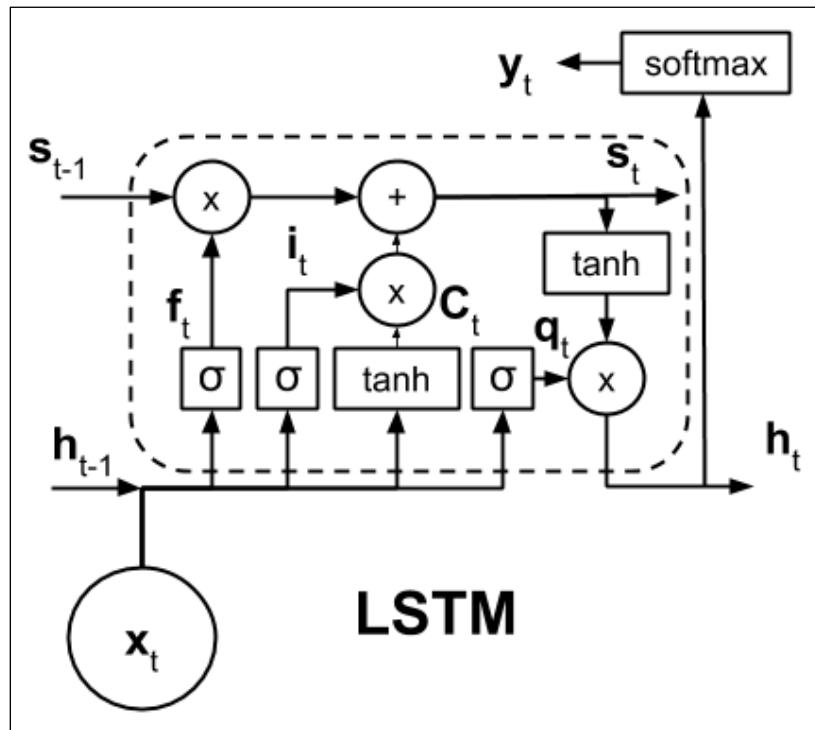
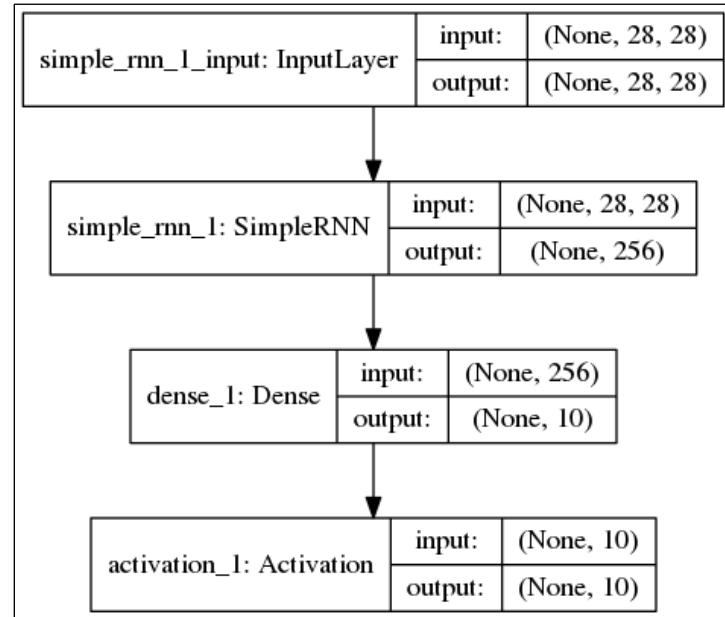
$=$

$f_{11}$	$f_{12}$	$f_{13}$
$f_{21}$	$f_{22}$	$f_{23}$
$f_{31}$	$f_{32}$	$f_{33}$

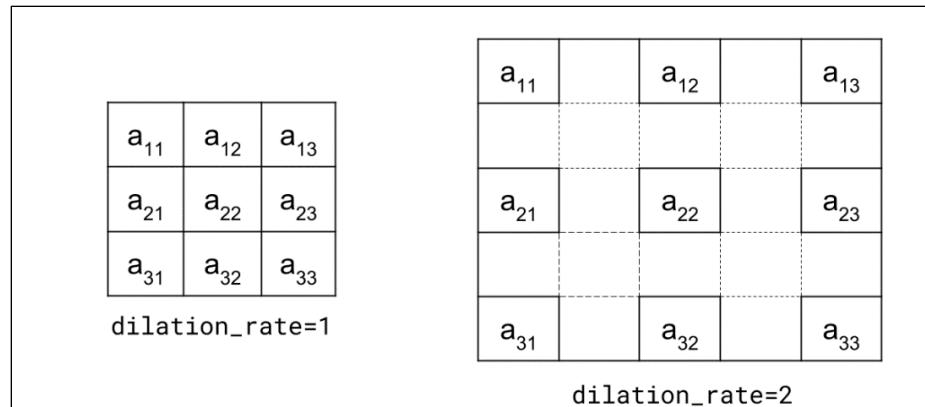
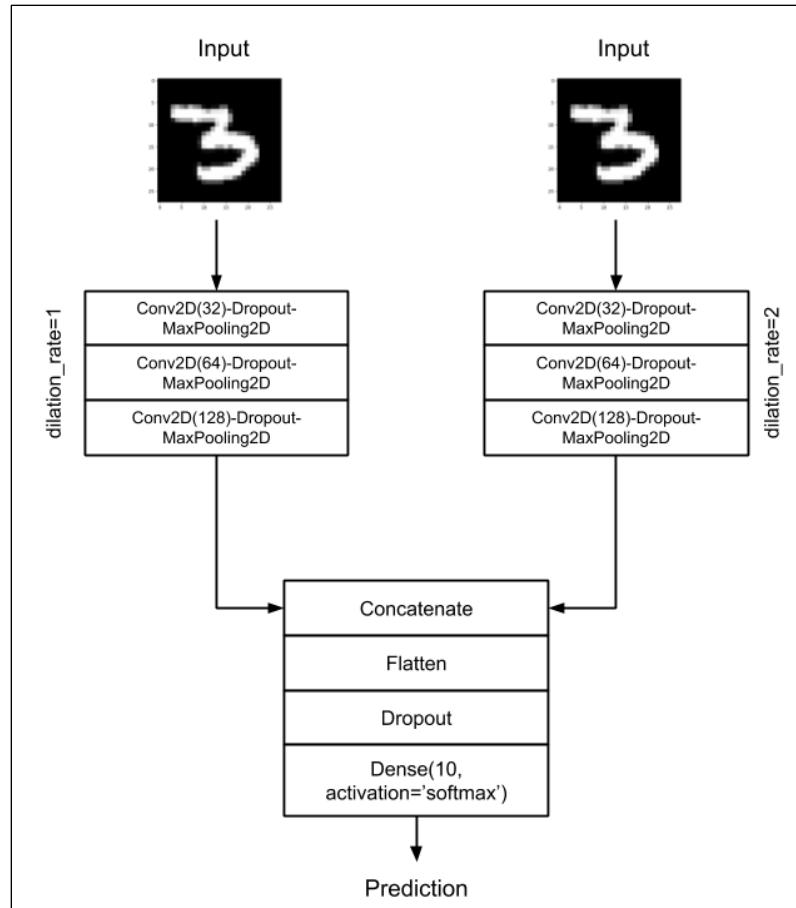
$$f_{11} = p_{11}a_{11} + p_{12}a_{12} + p_{13}a_{13} \\ + p_{21}a_{21} + p_{22}a_{22} + p_{23}a_{23} \\ + p_{31}a_{31} + p_{32}a_{32} + p_{33}a_{33}$$

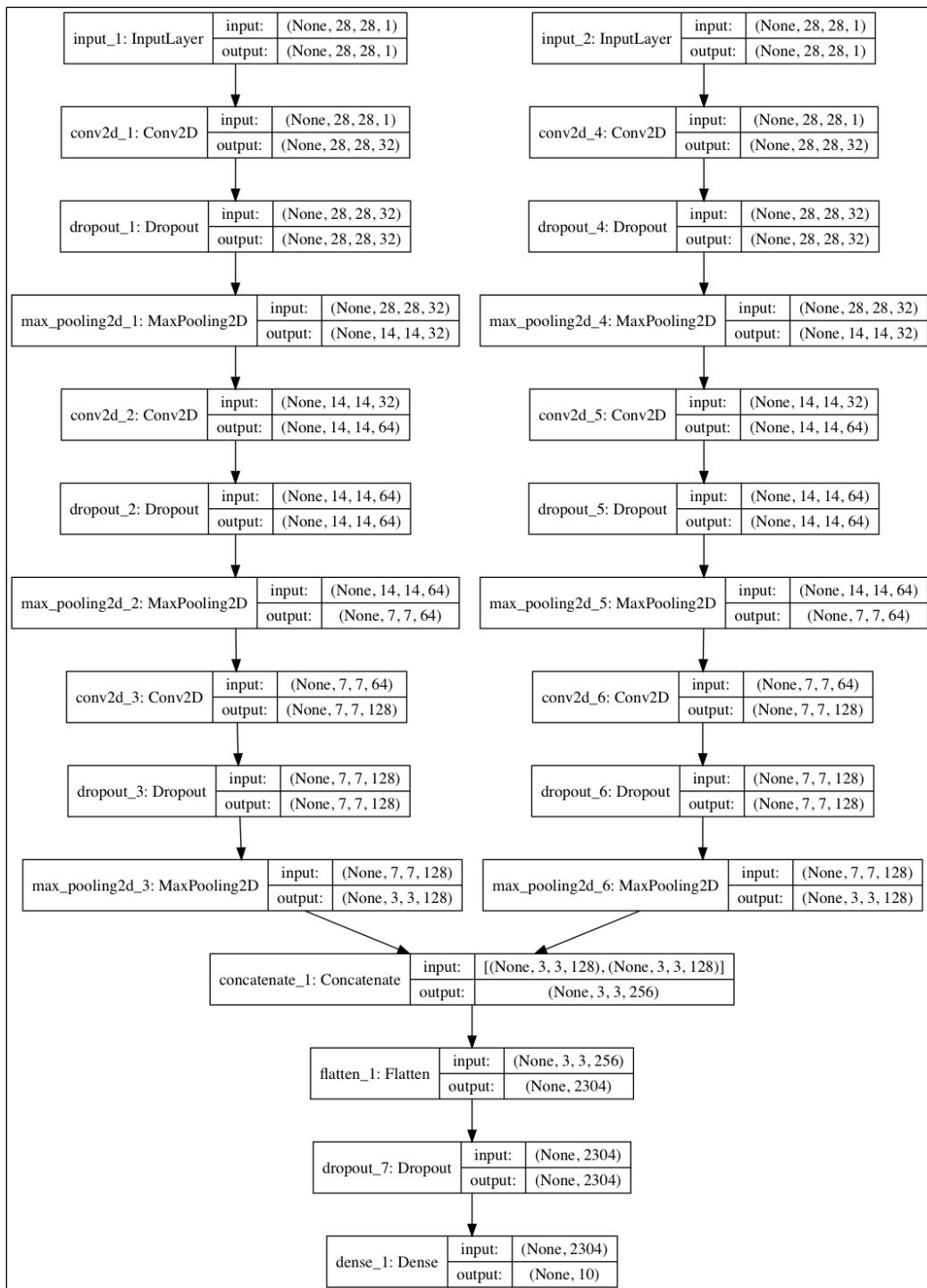


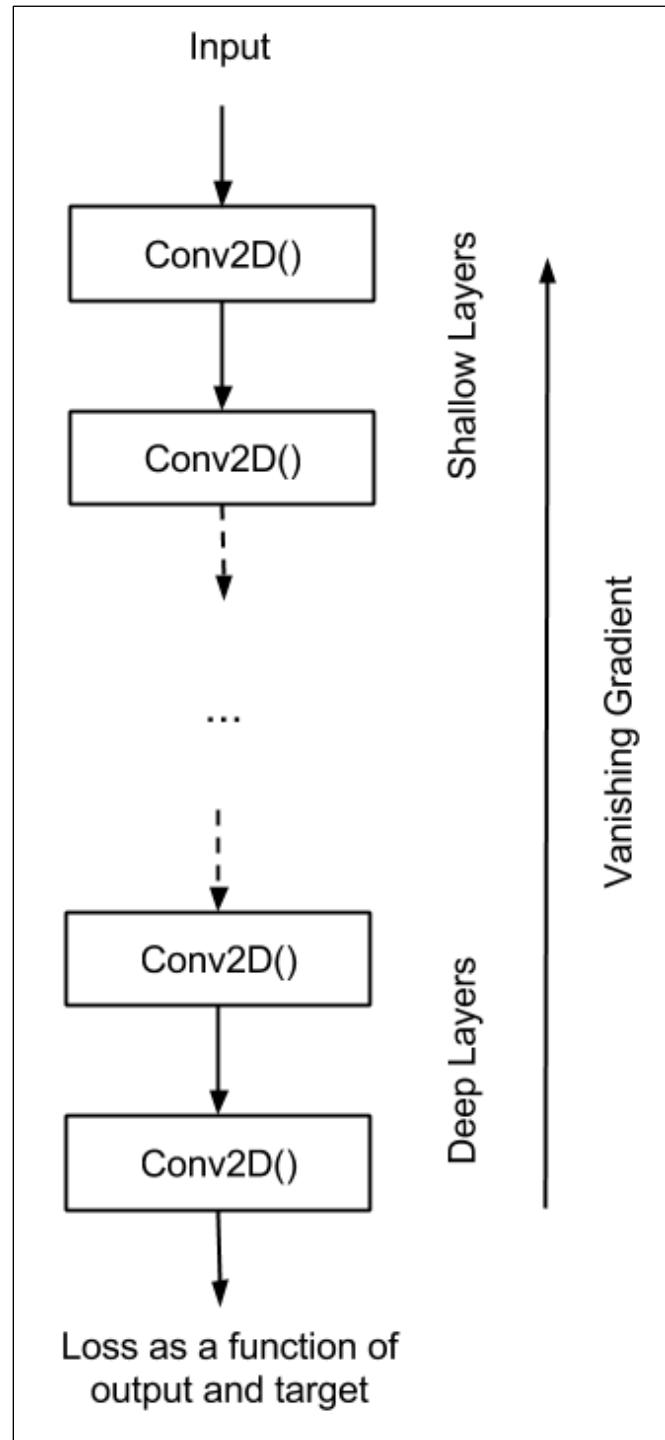


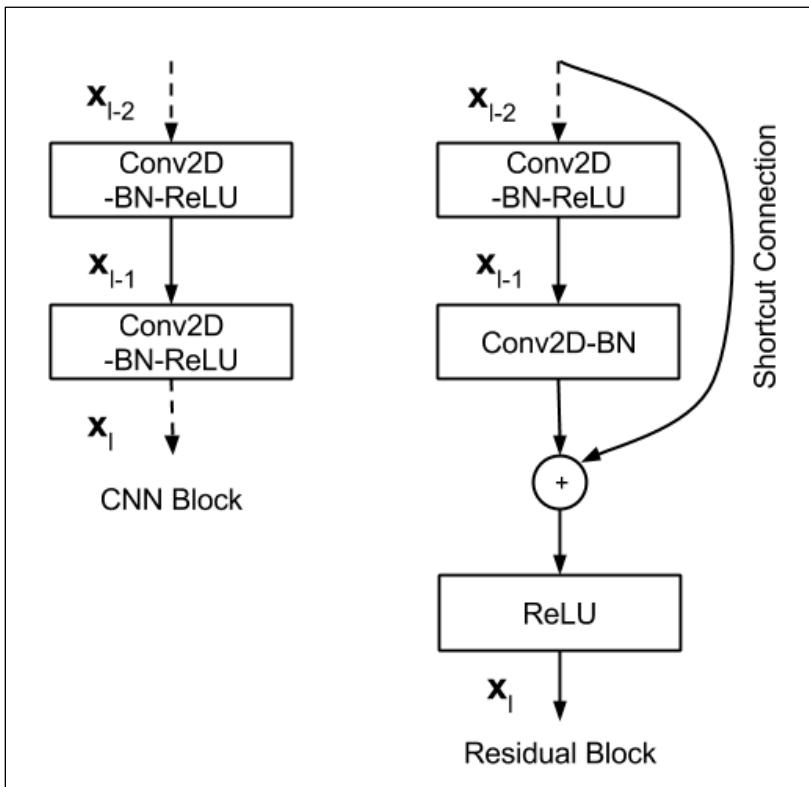
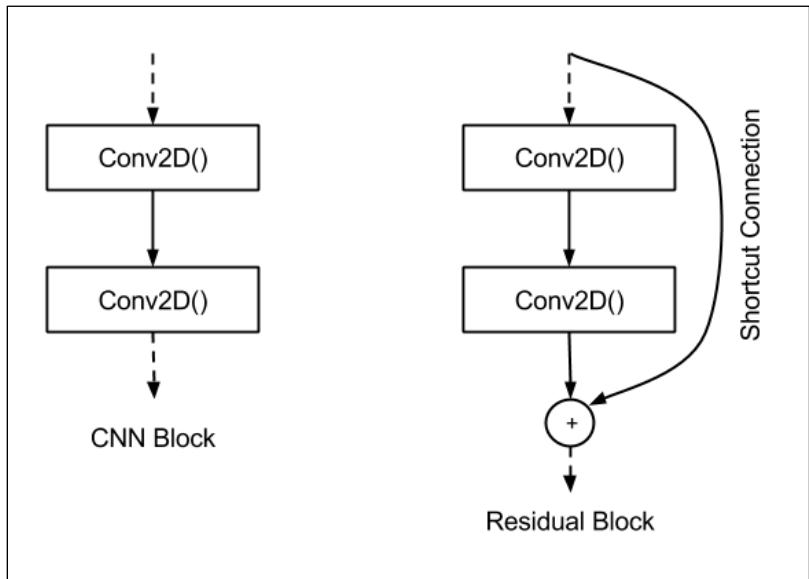


## Chapter 2: Deep Neural Networks

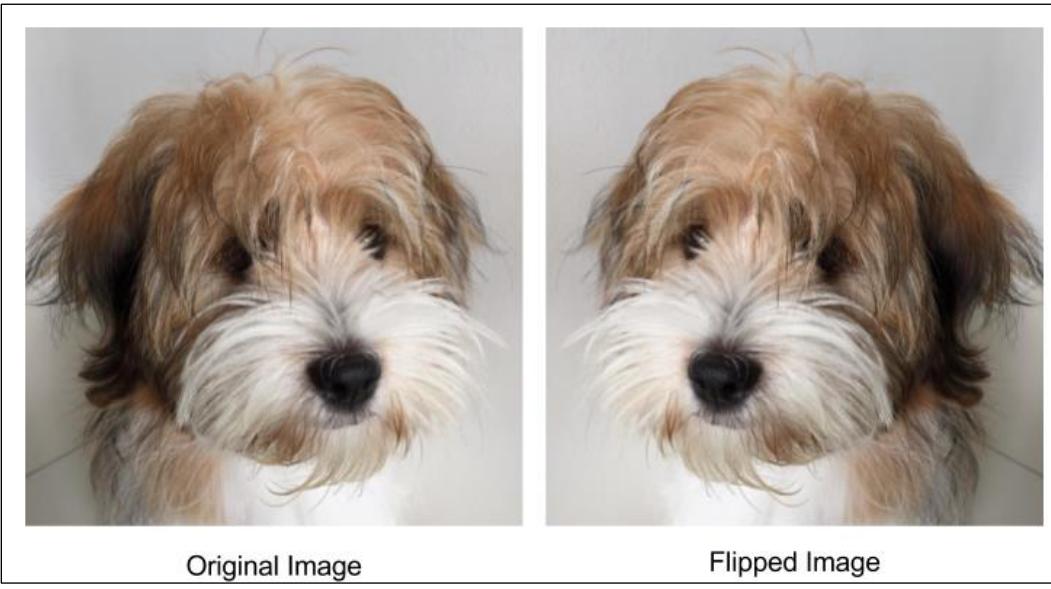
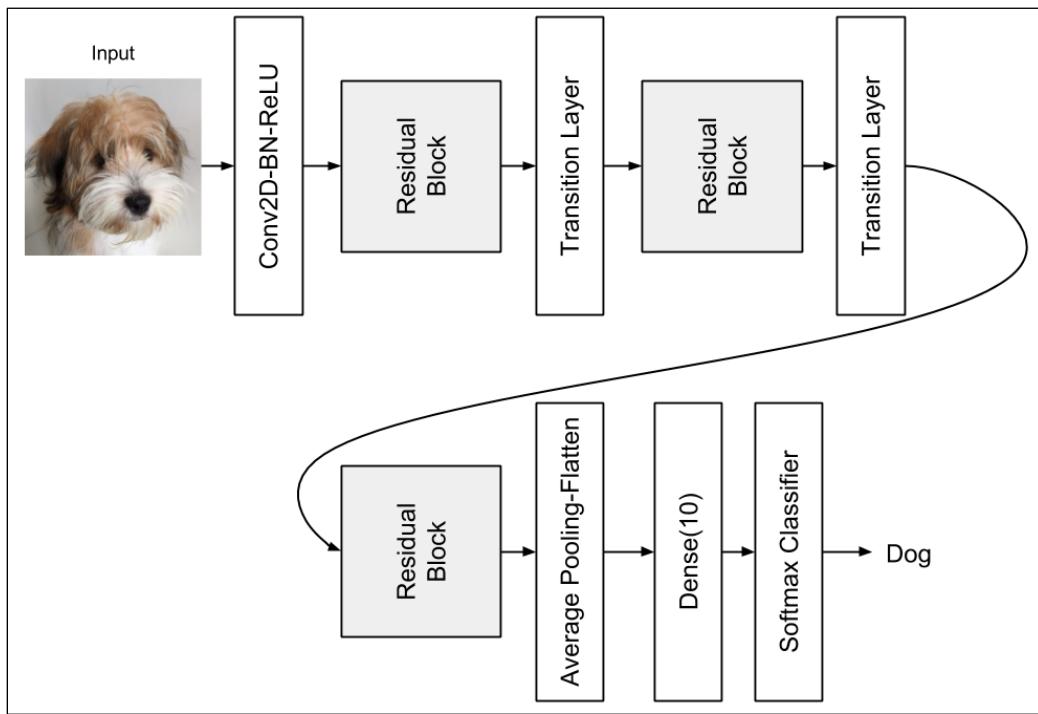


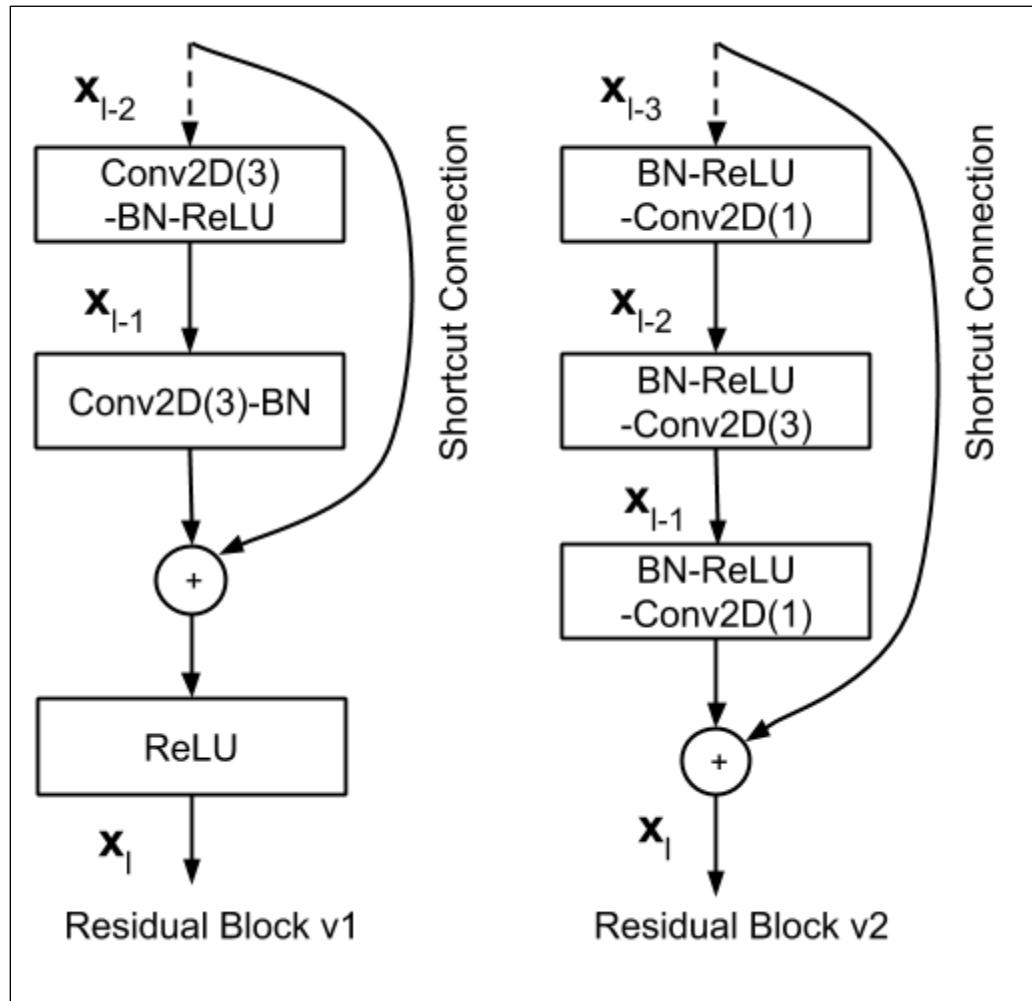


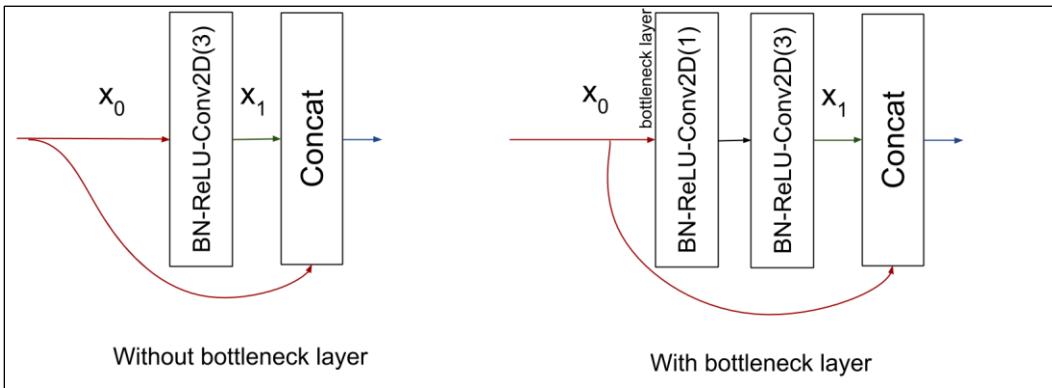
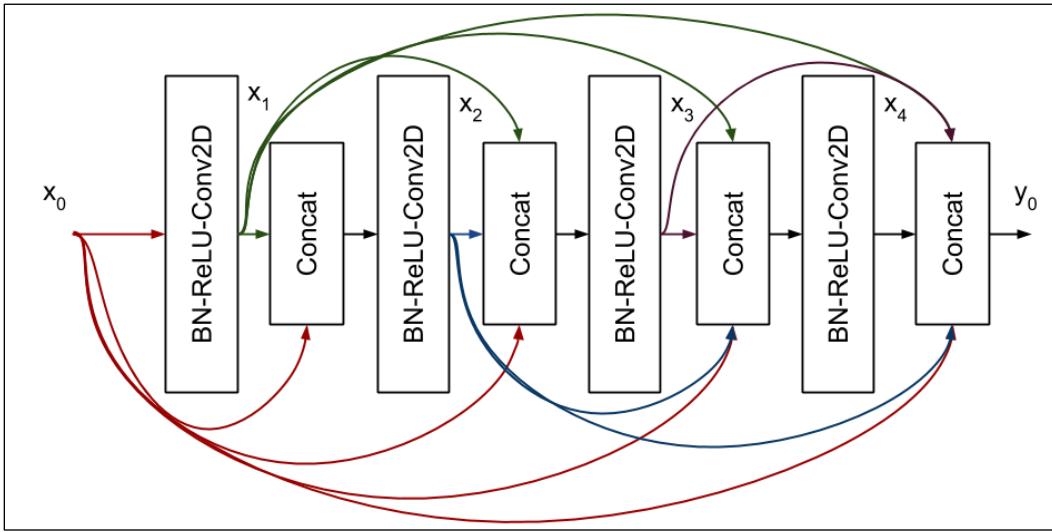


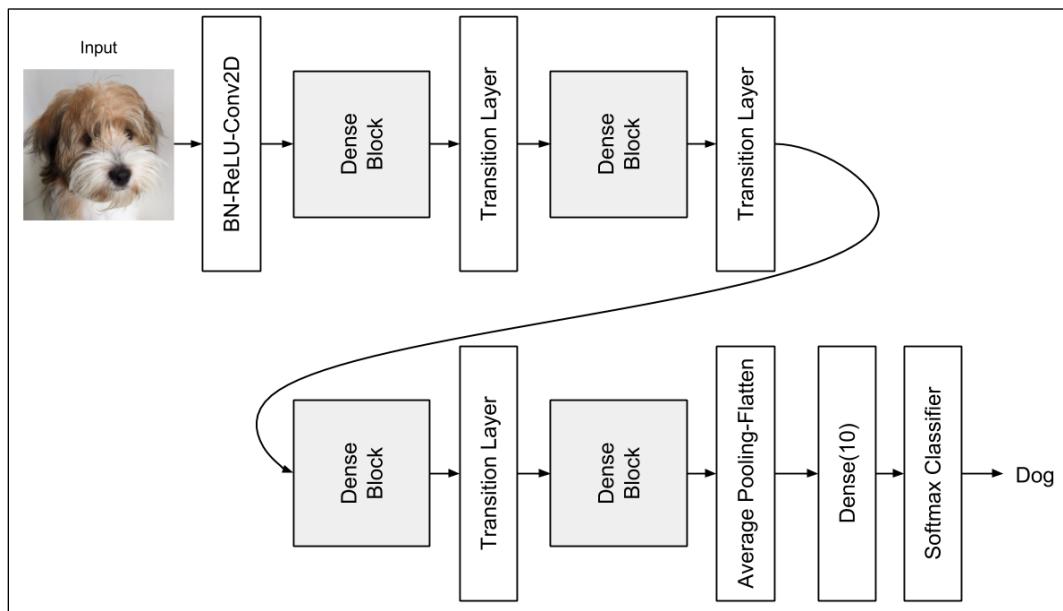
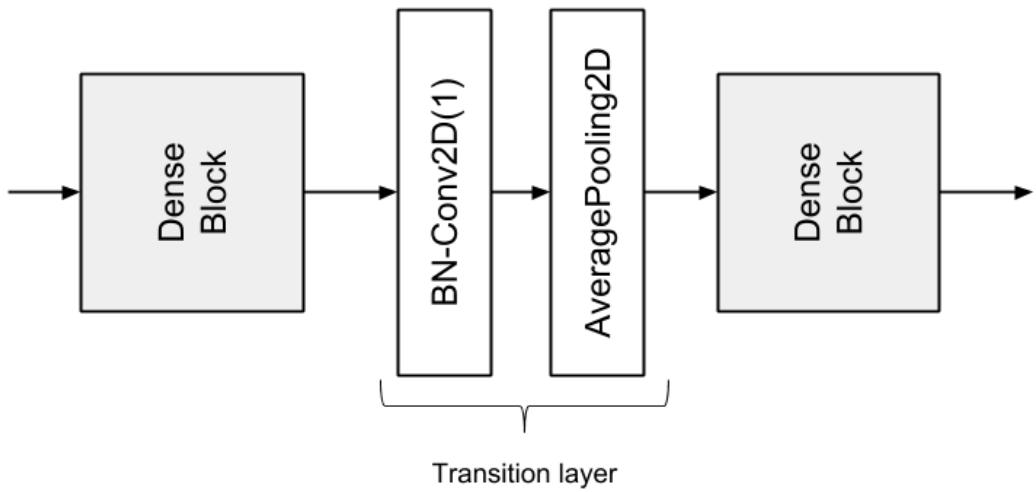




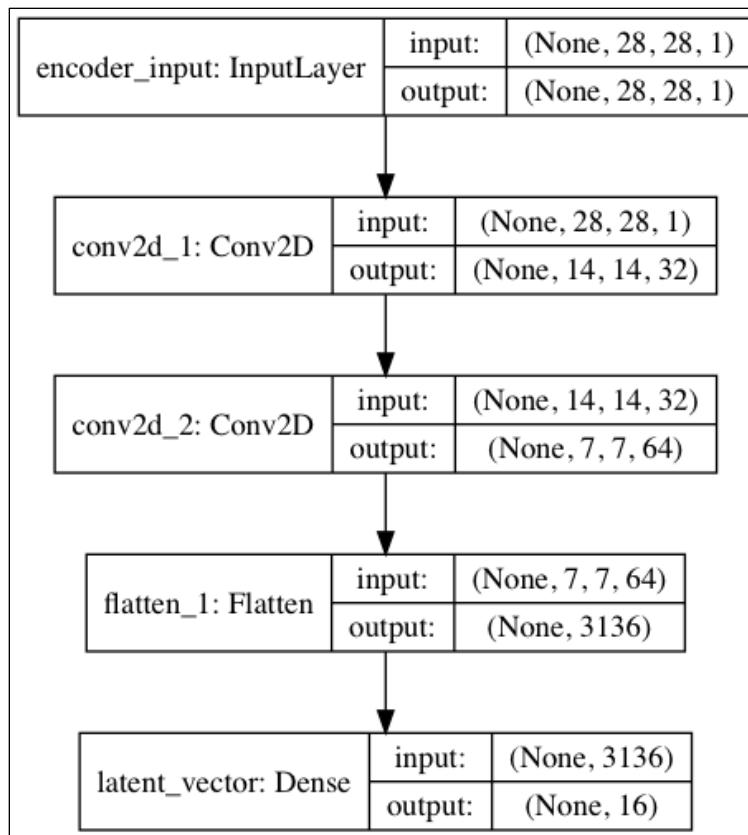
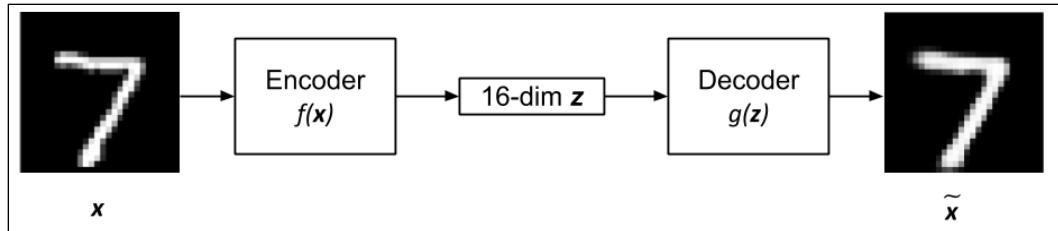
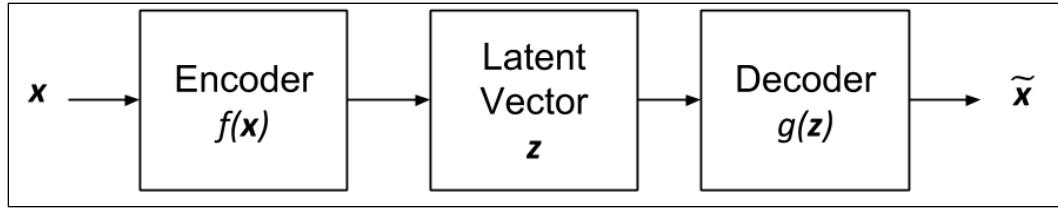


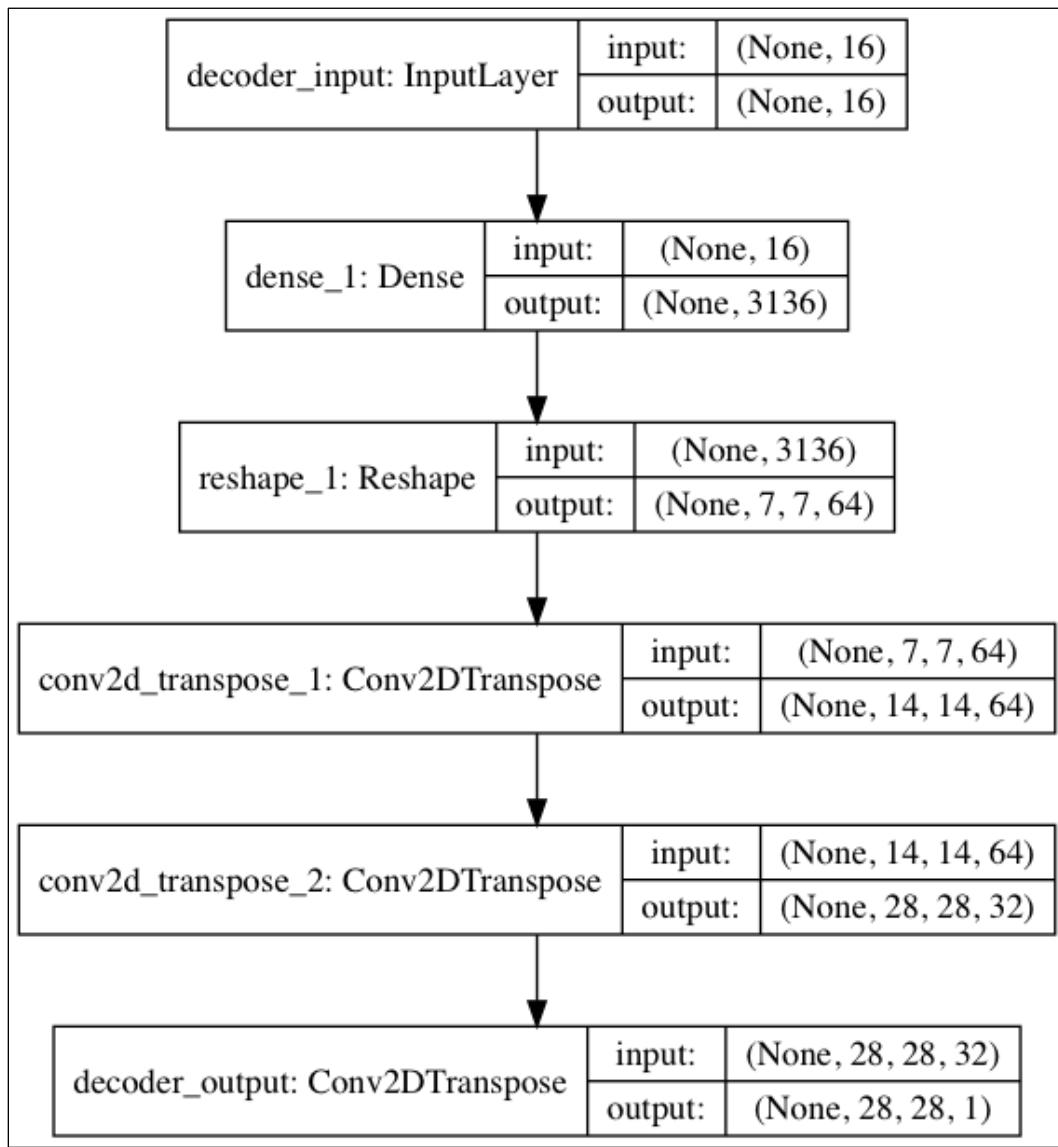


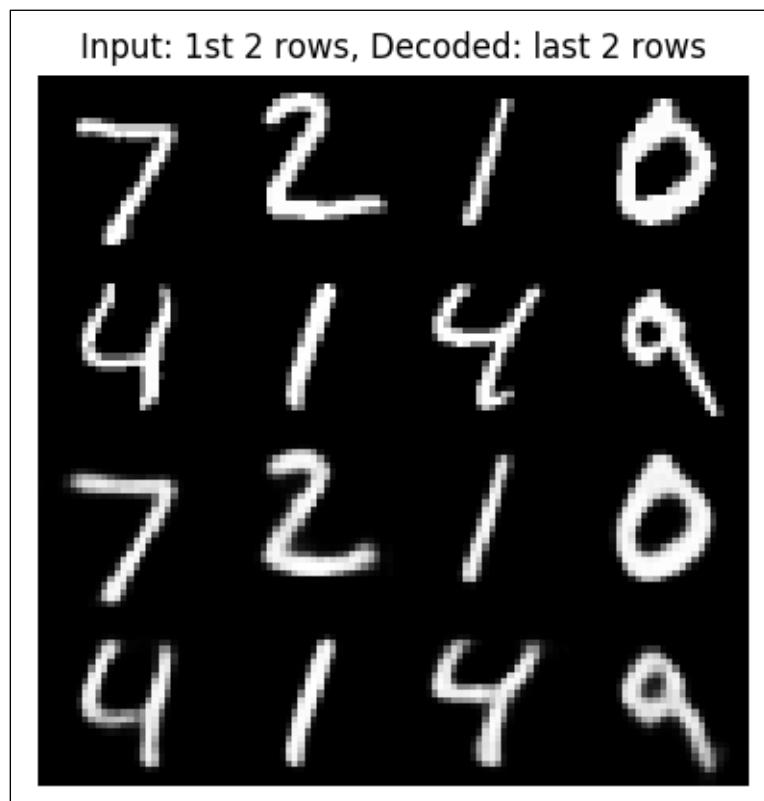
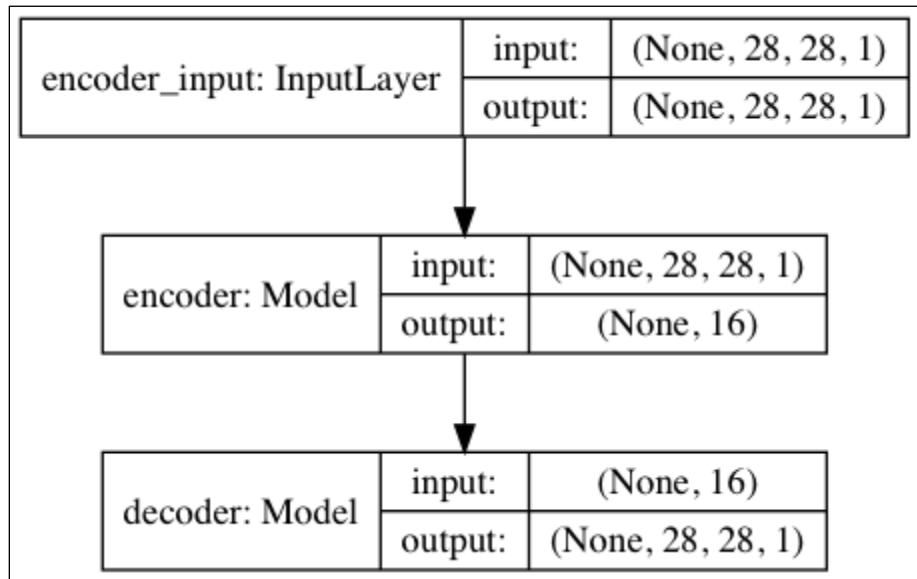


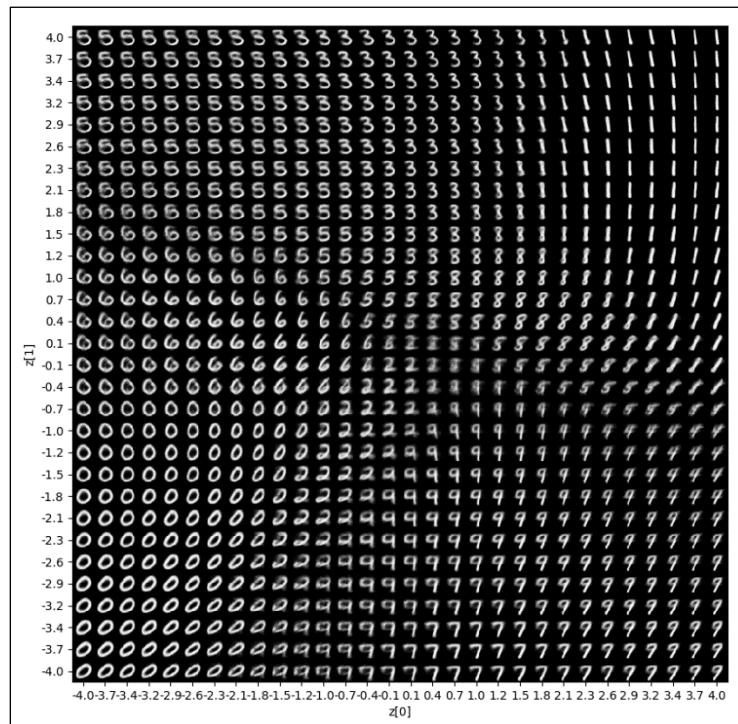
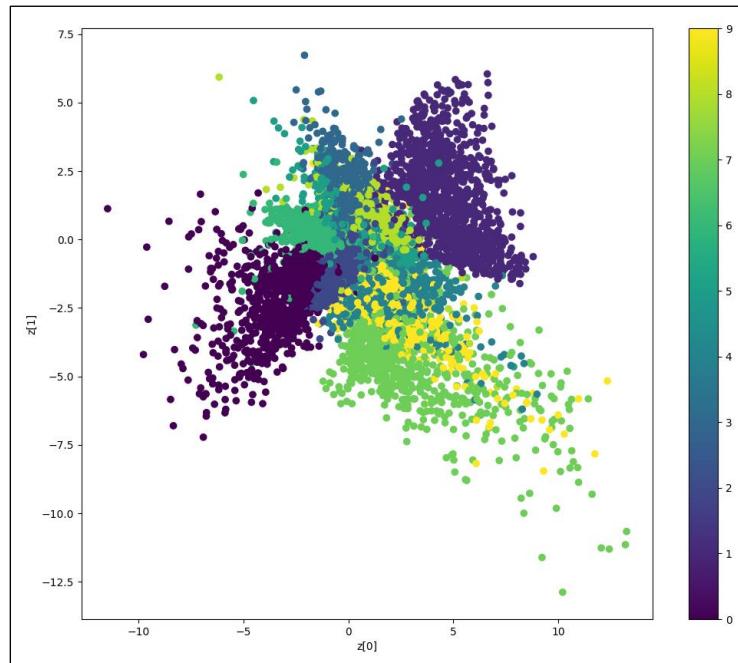


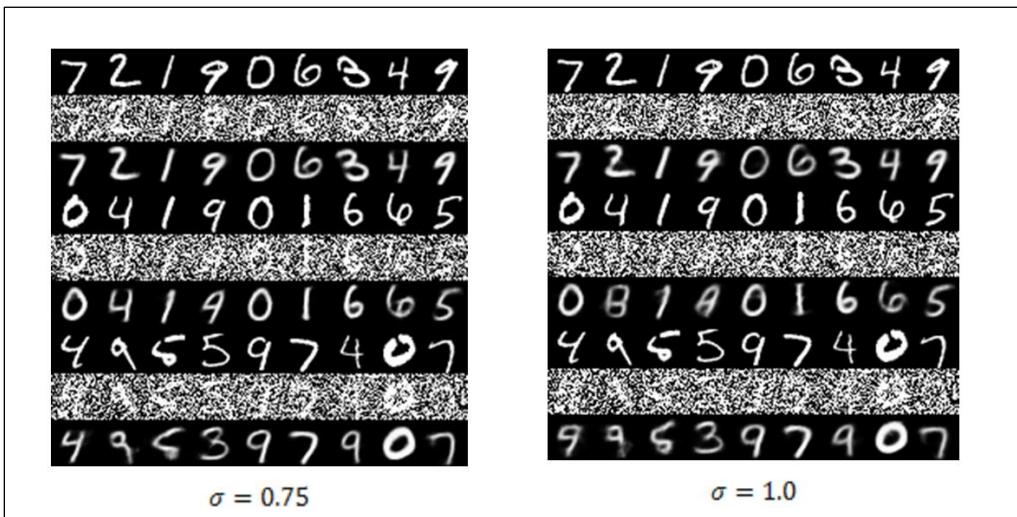
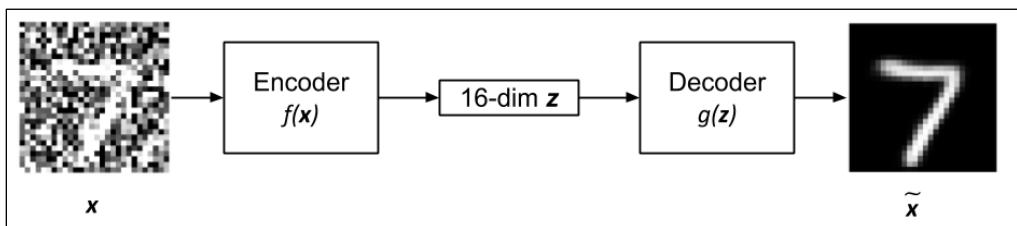
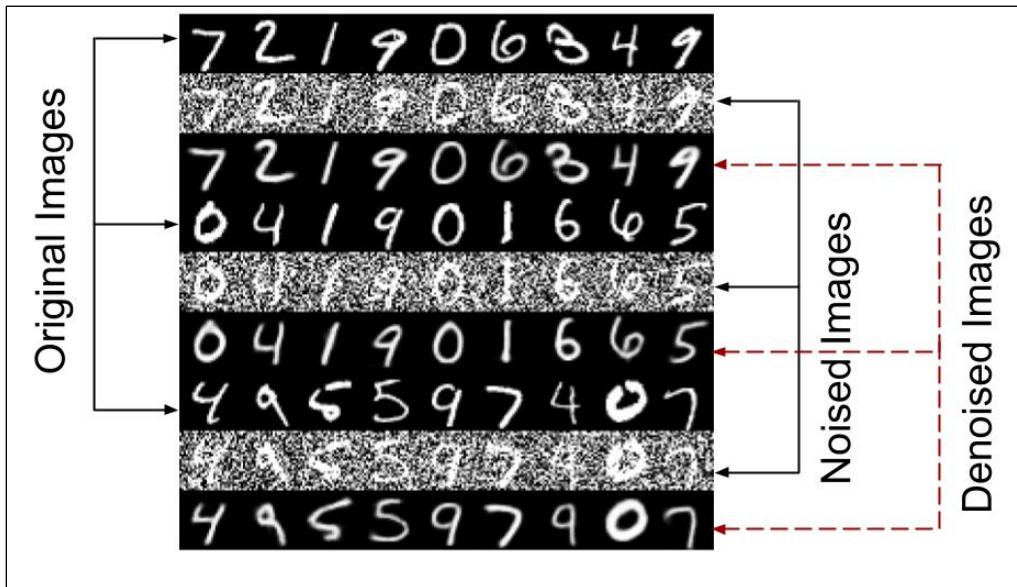
## Chapter 3: Autoencoders

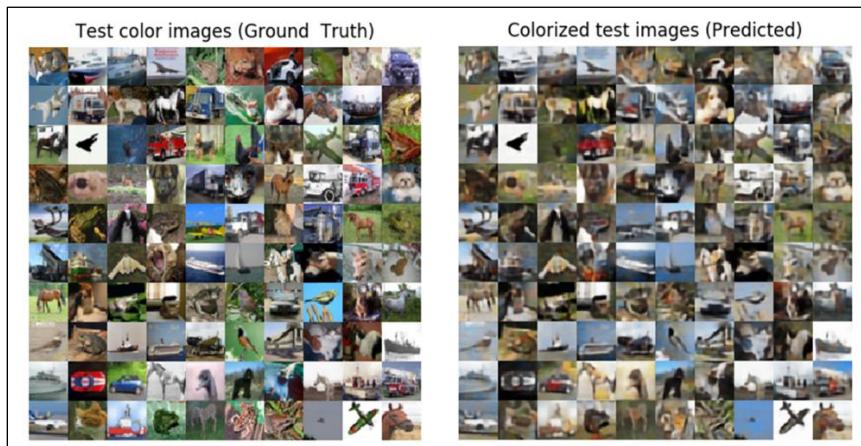
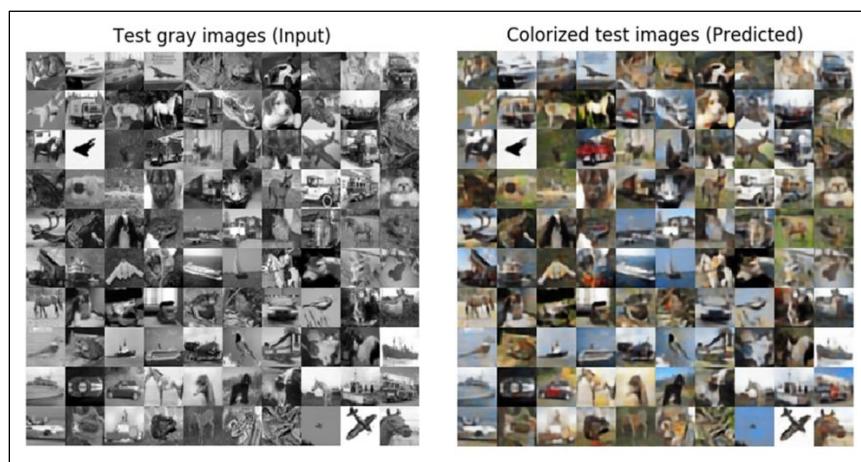




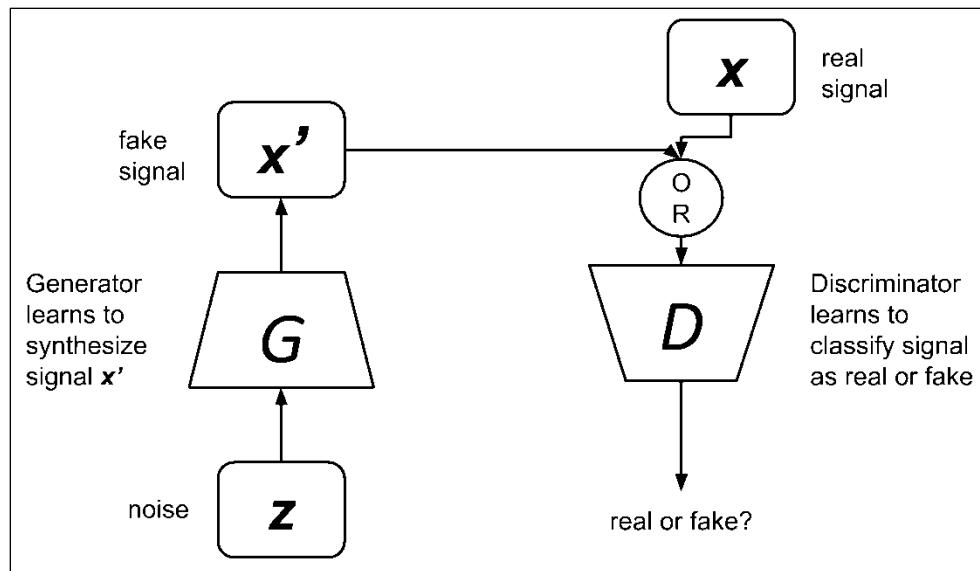
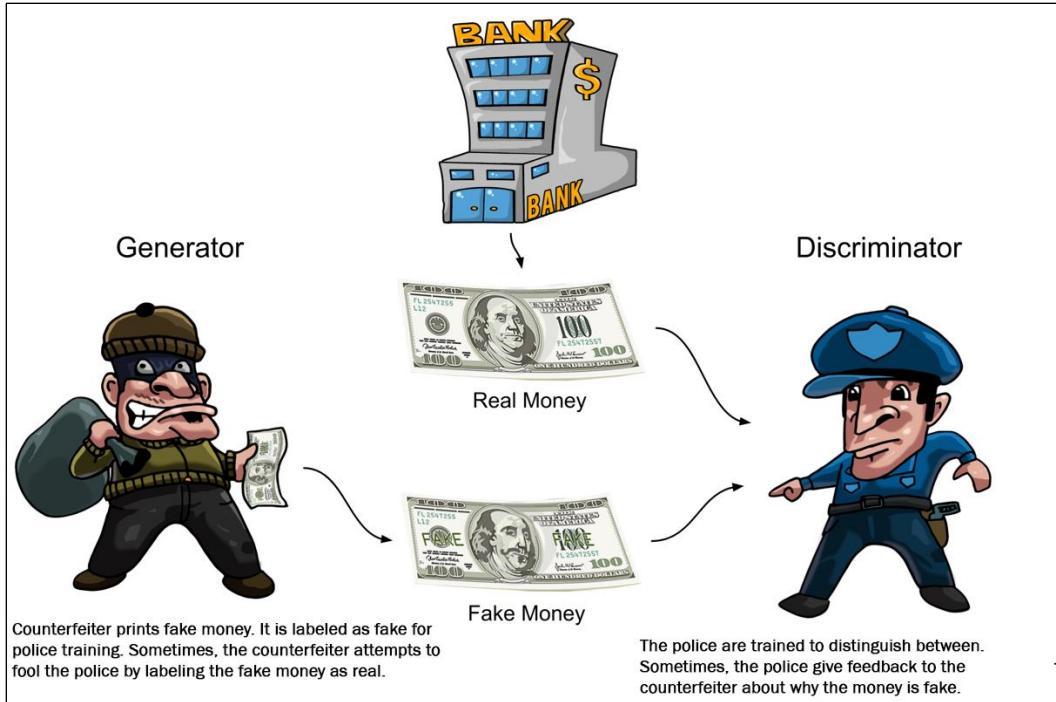


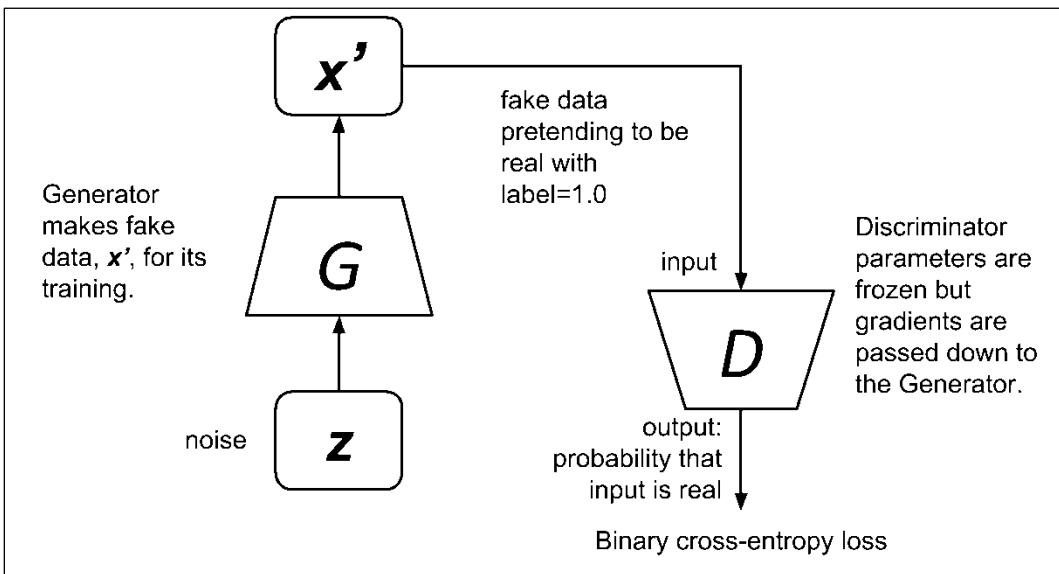
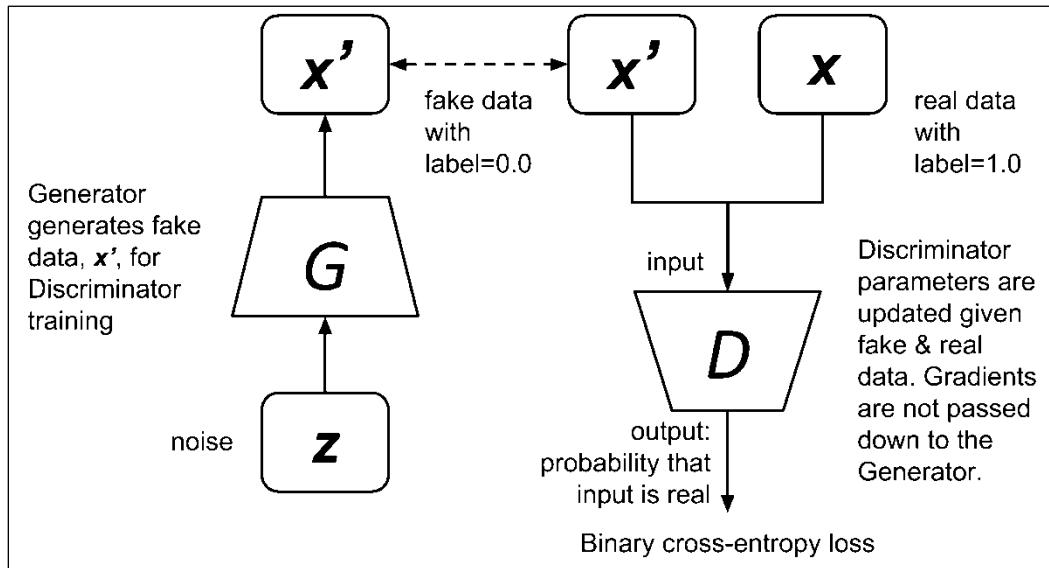


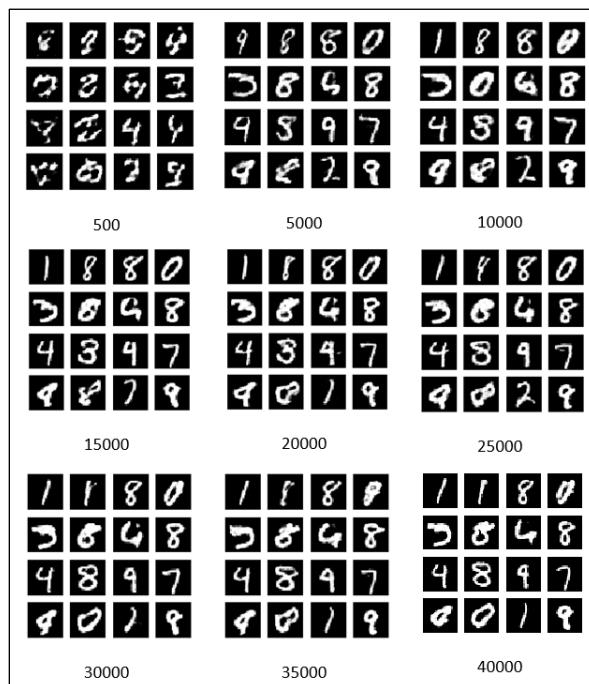
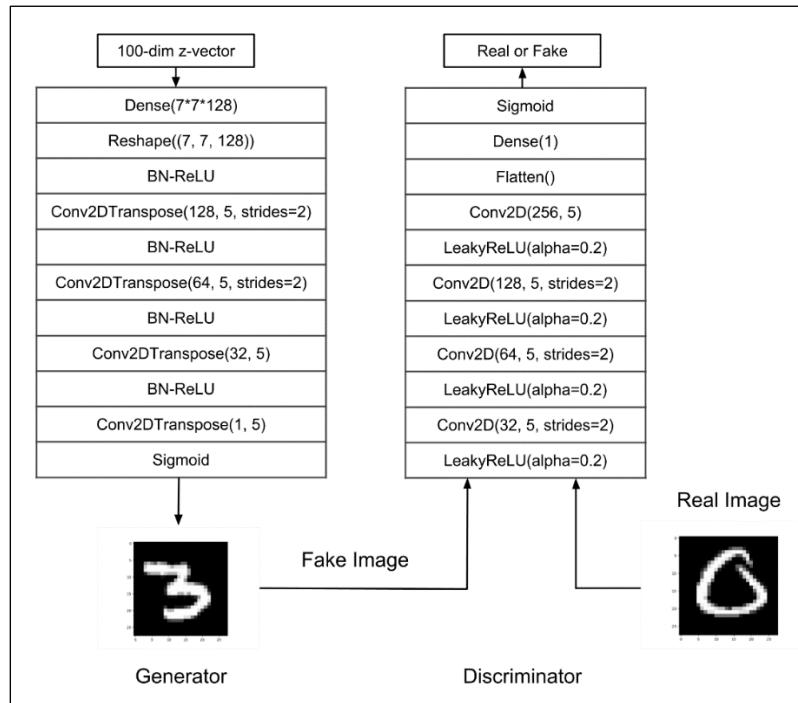


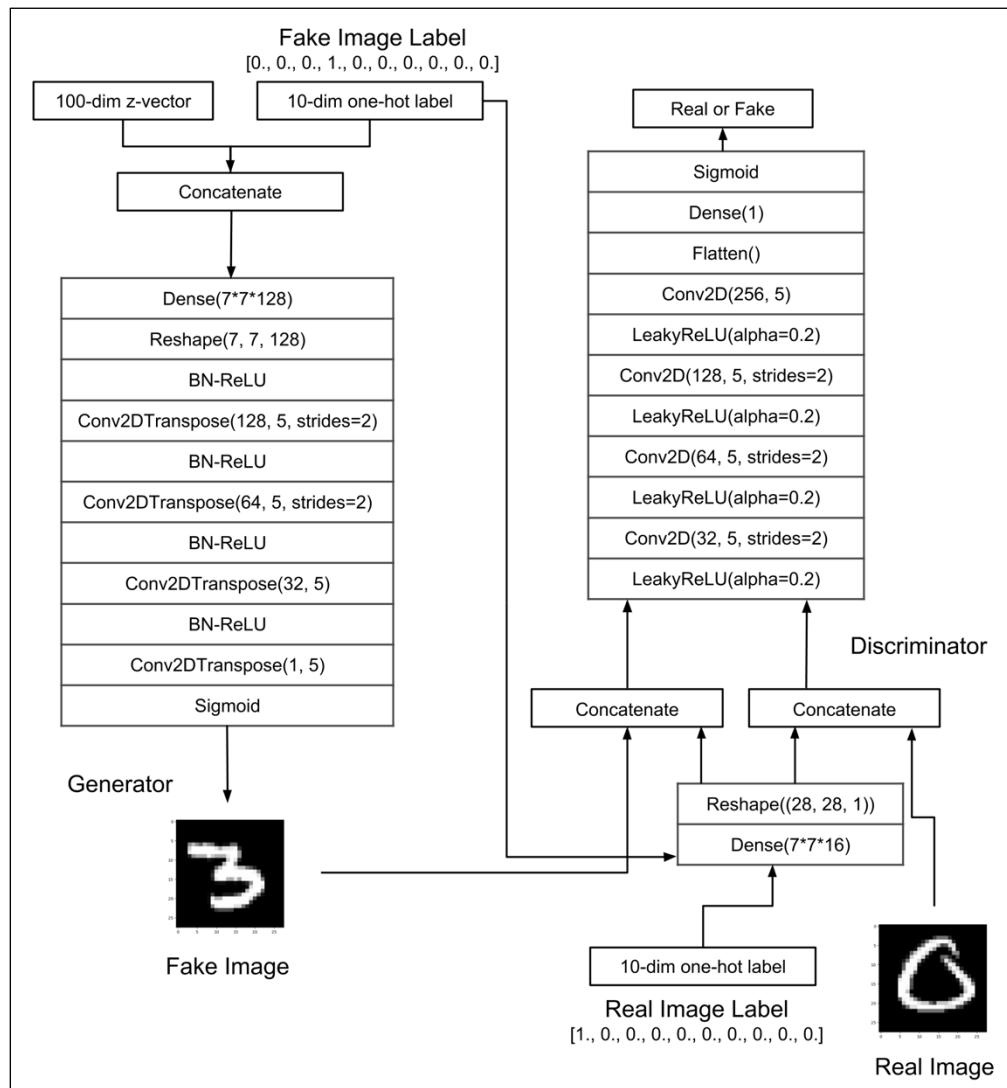


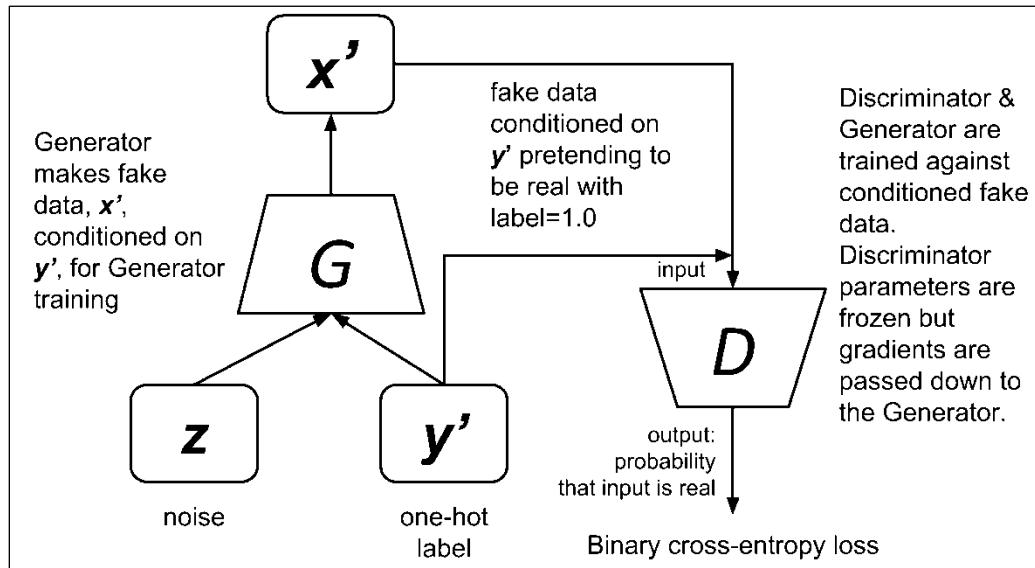
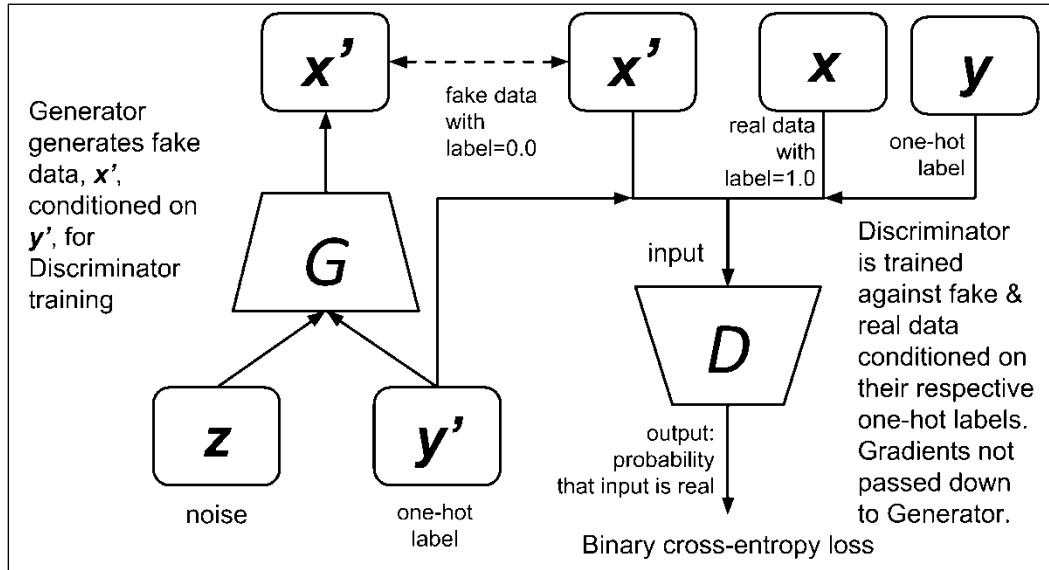
## Chapter 4: Generative Adversarial Networks (GANs)

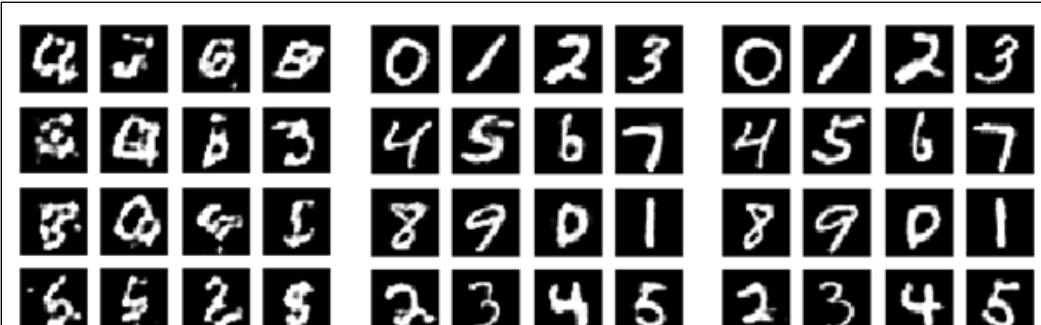












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5000

10000



15000

20000

25000

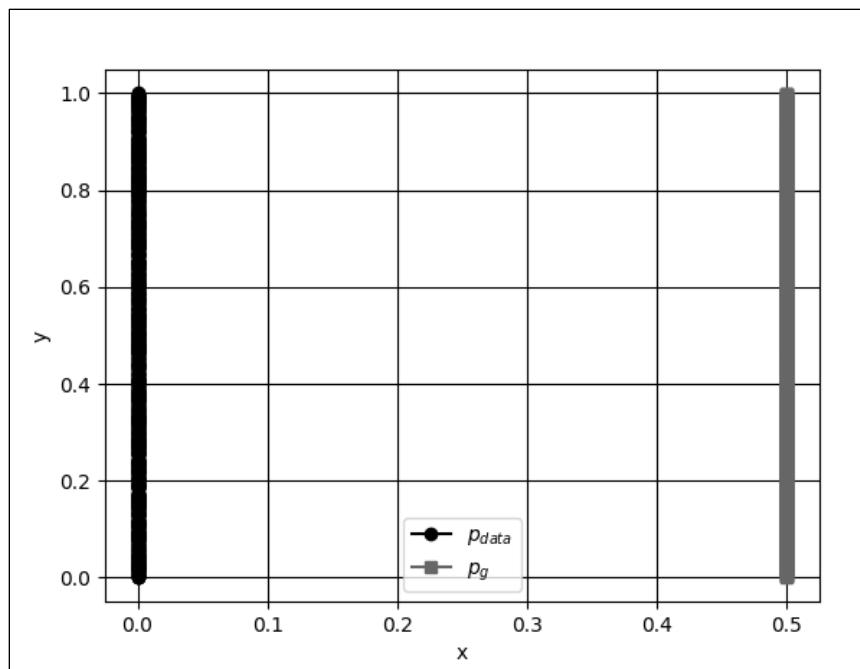
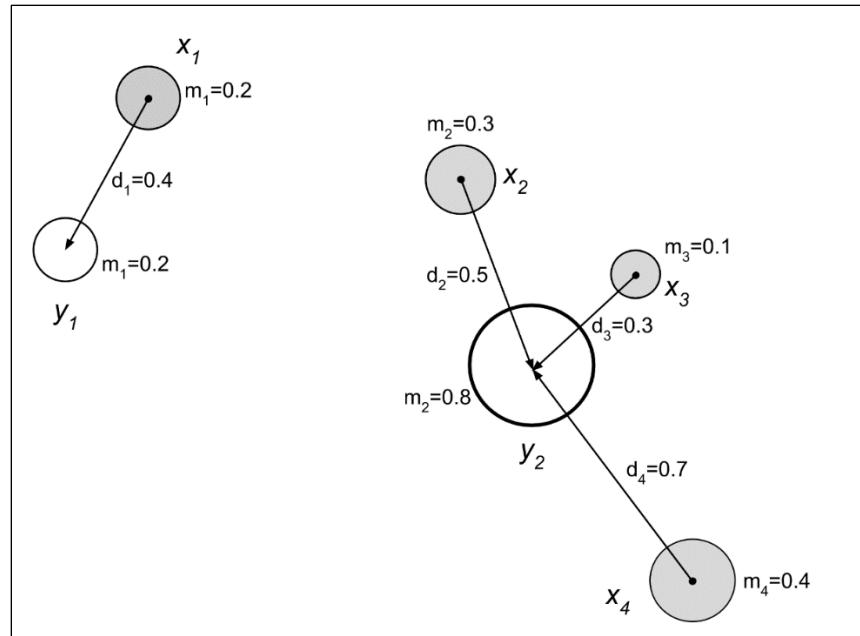


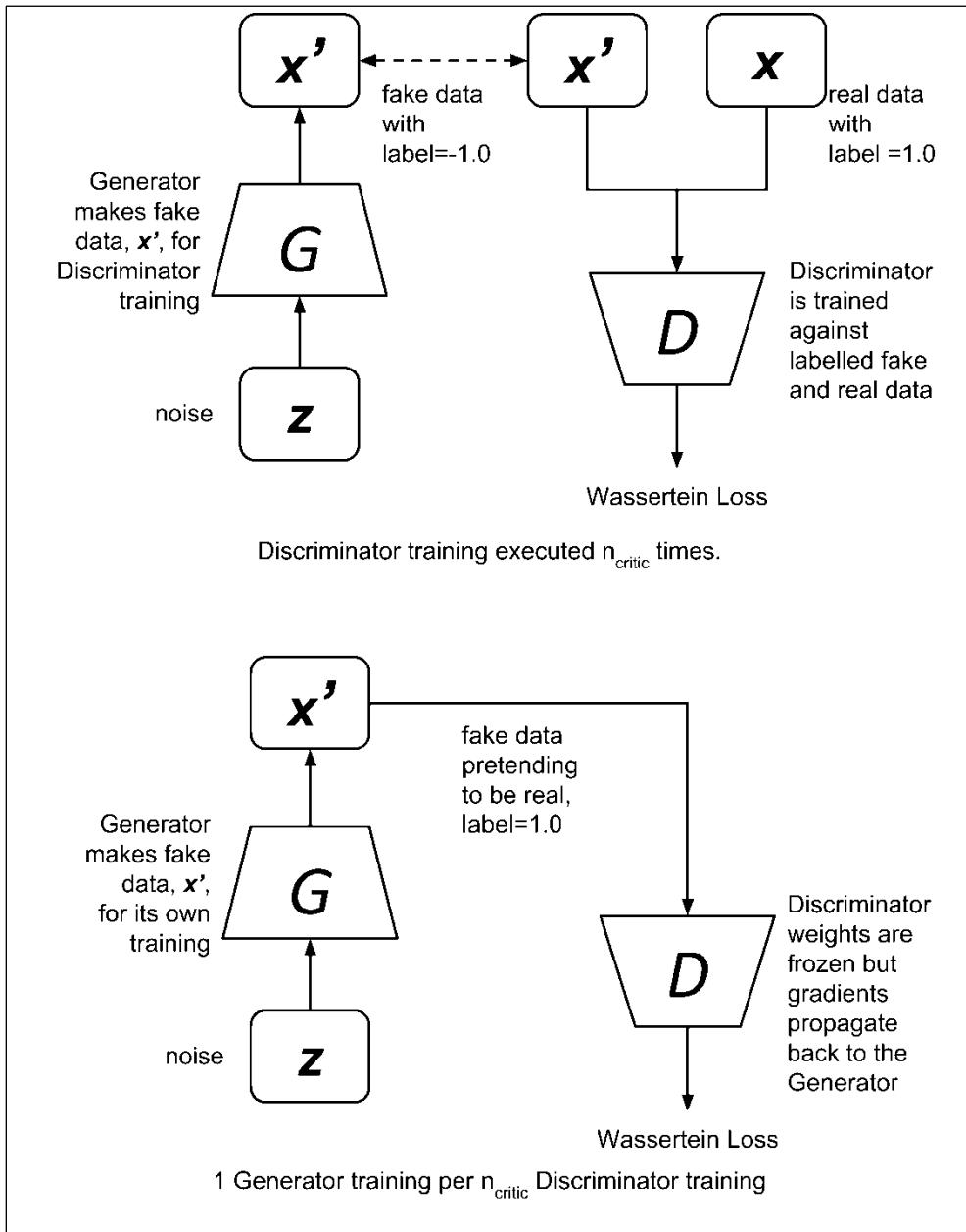
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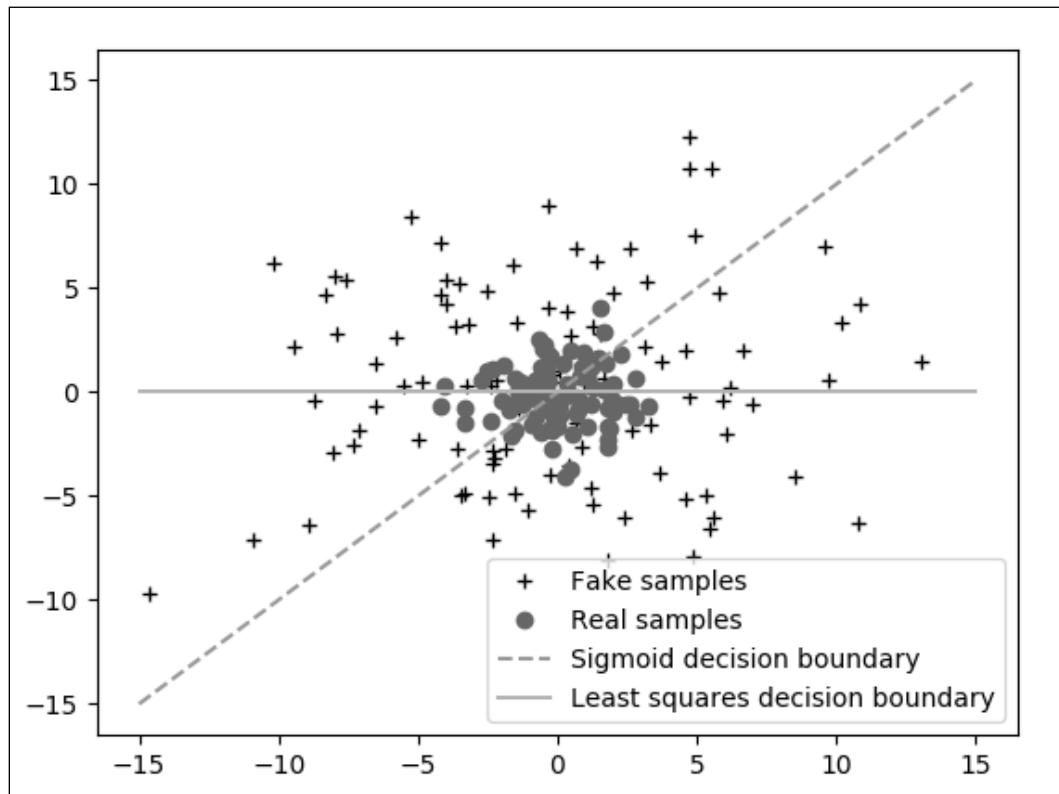
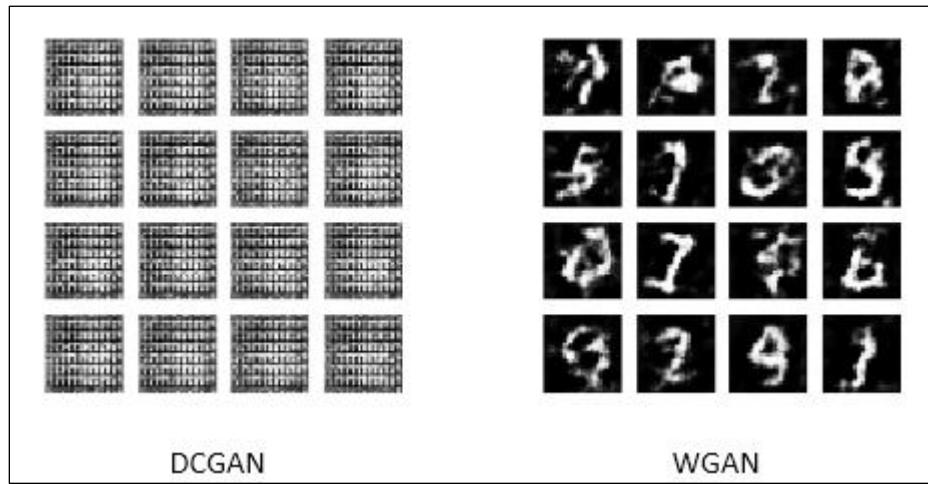
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## Chapter 5: Improved GANs



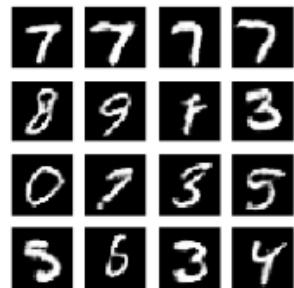


		
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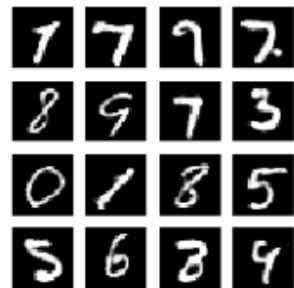




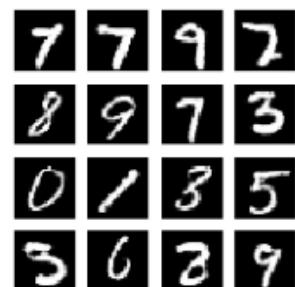
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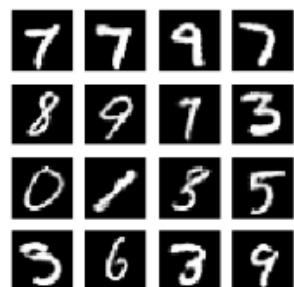
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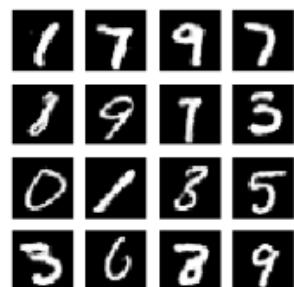
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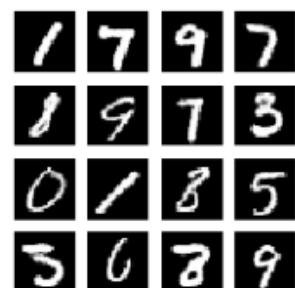
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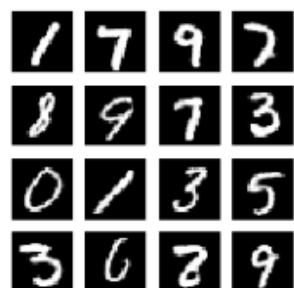
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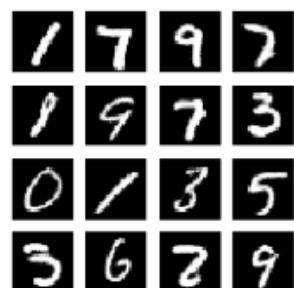
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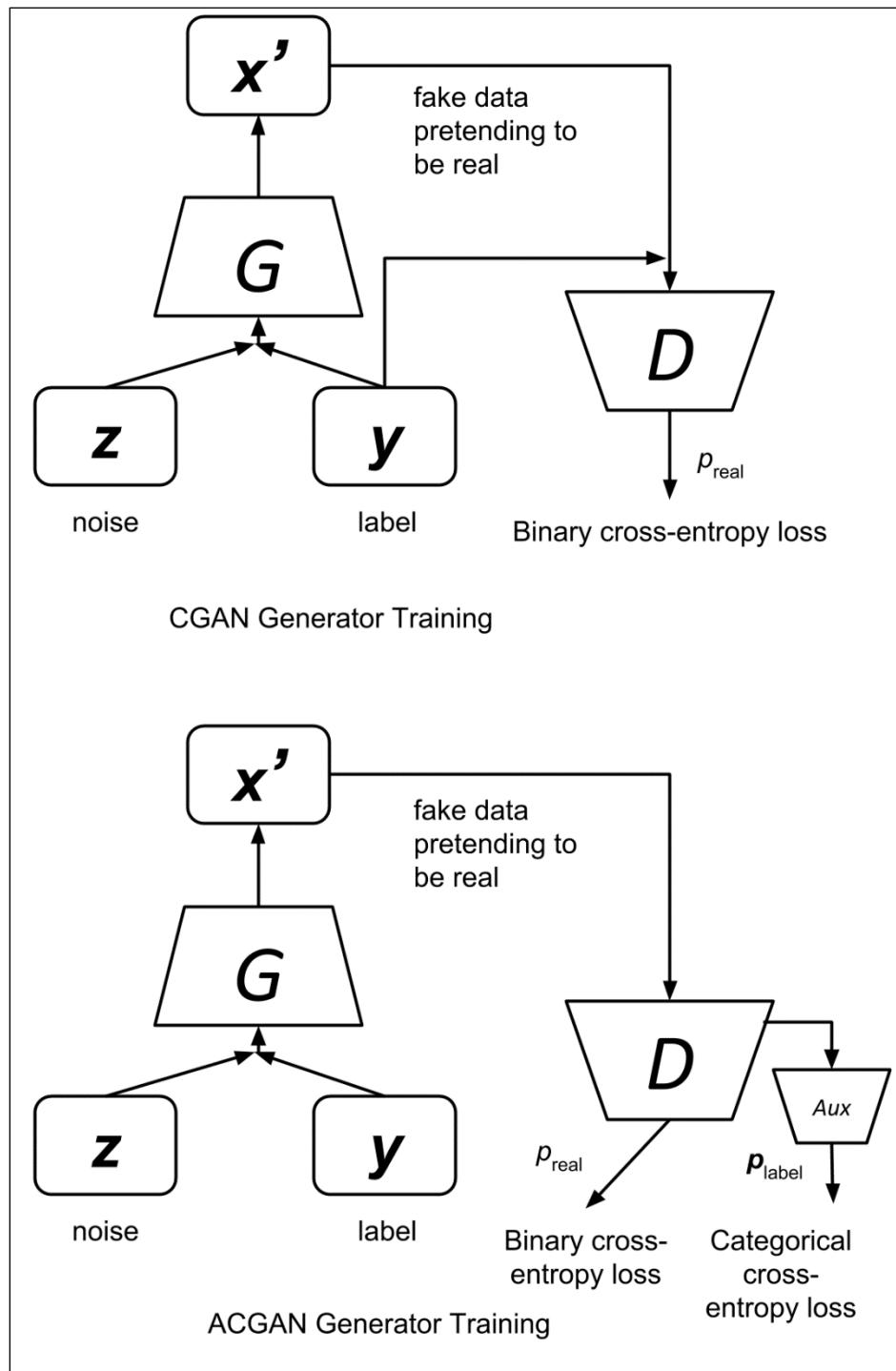
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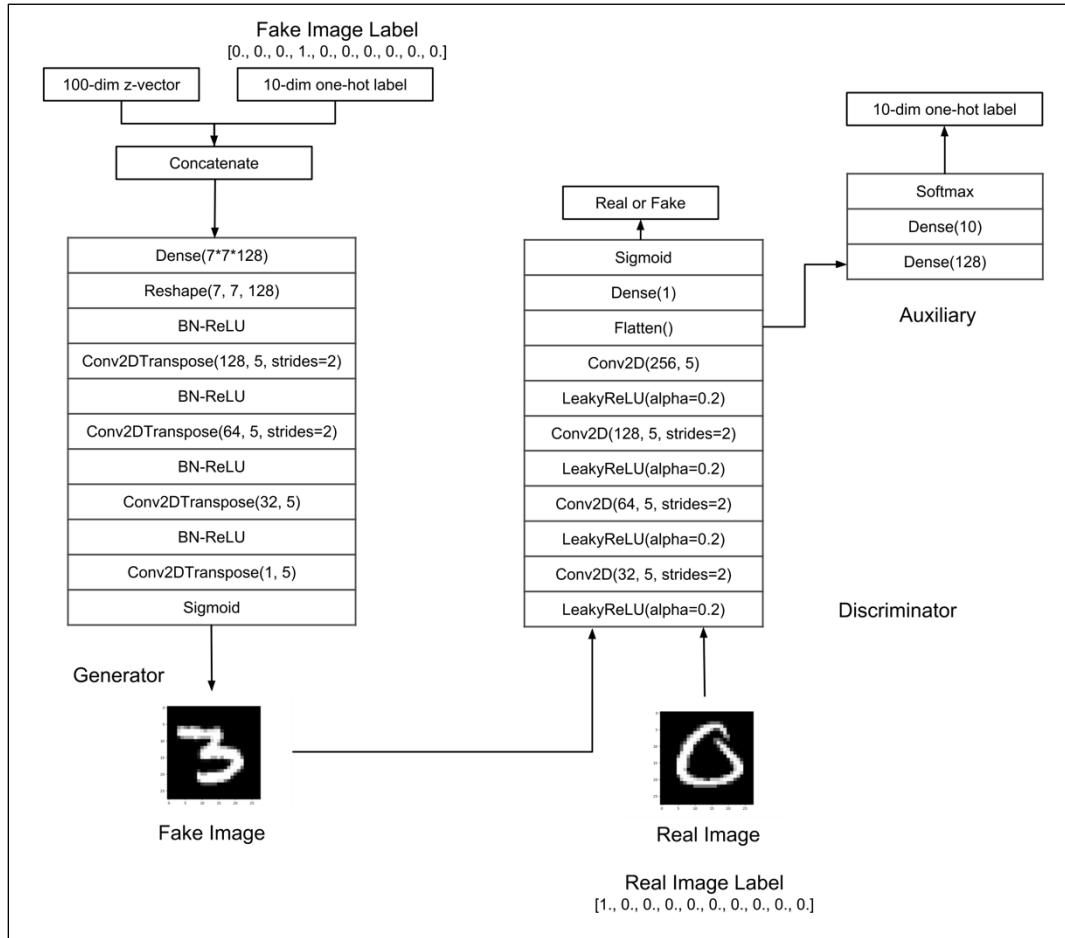


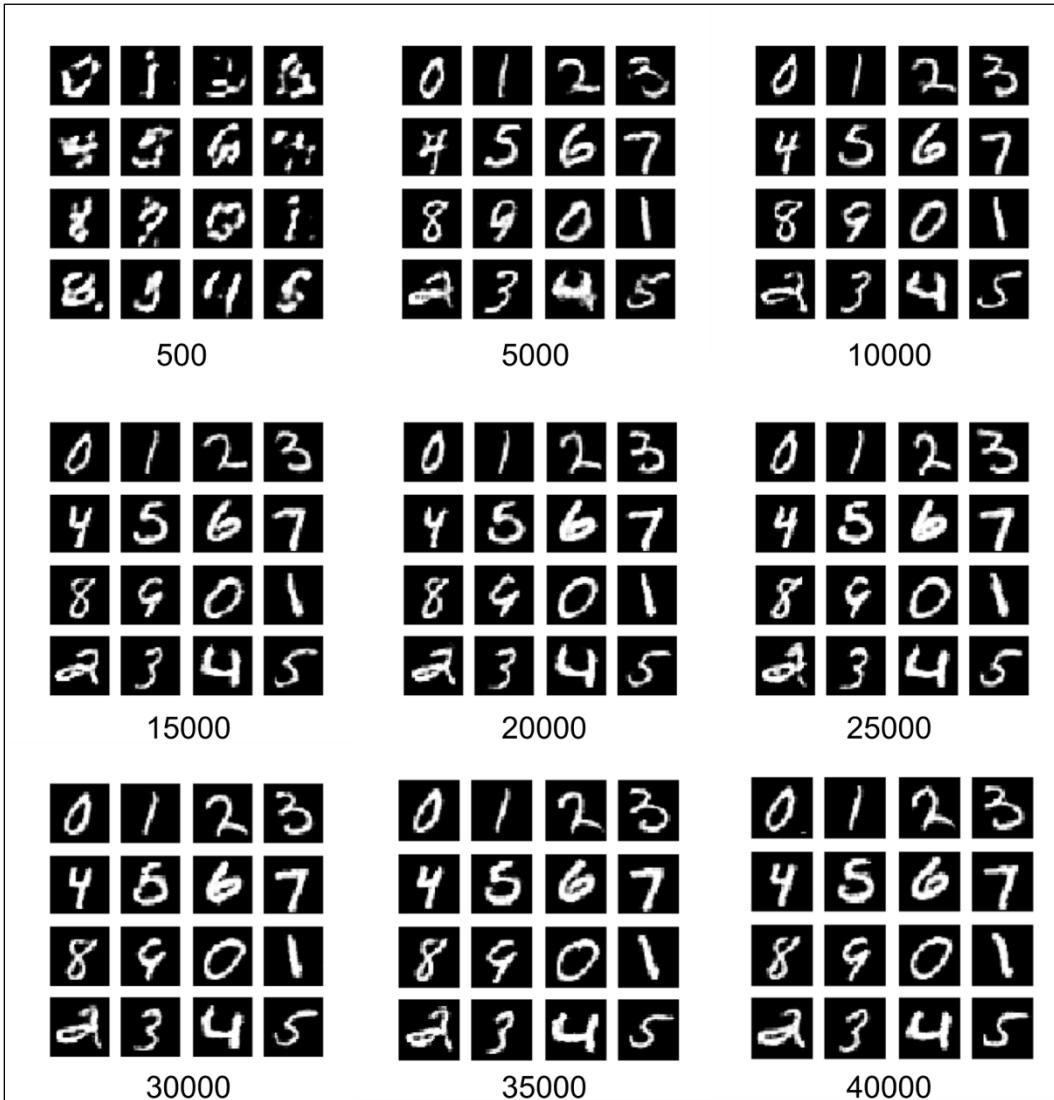
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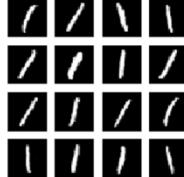
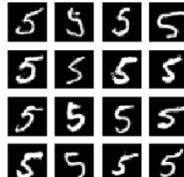


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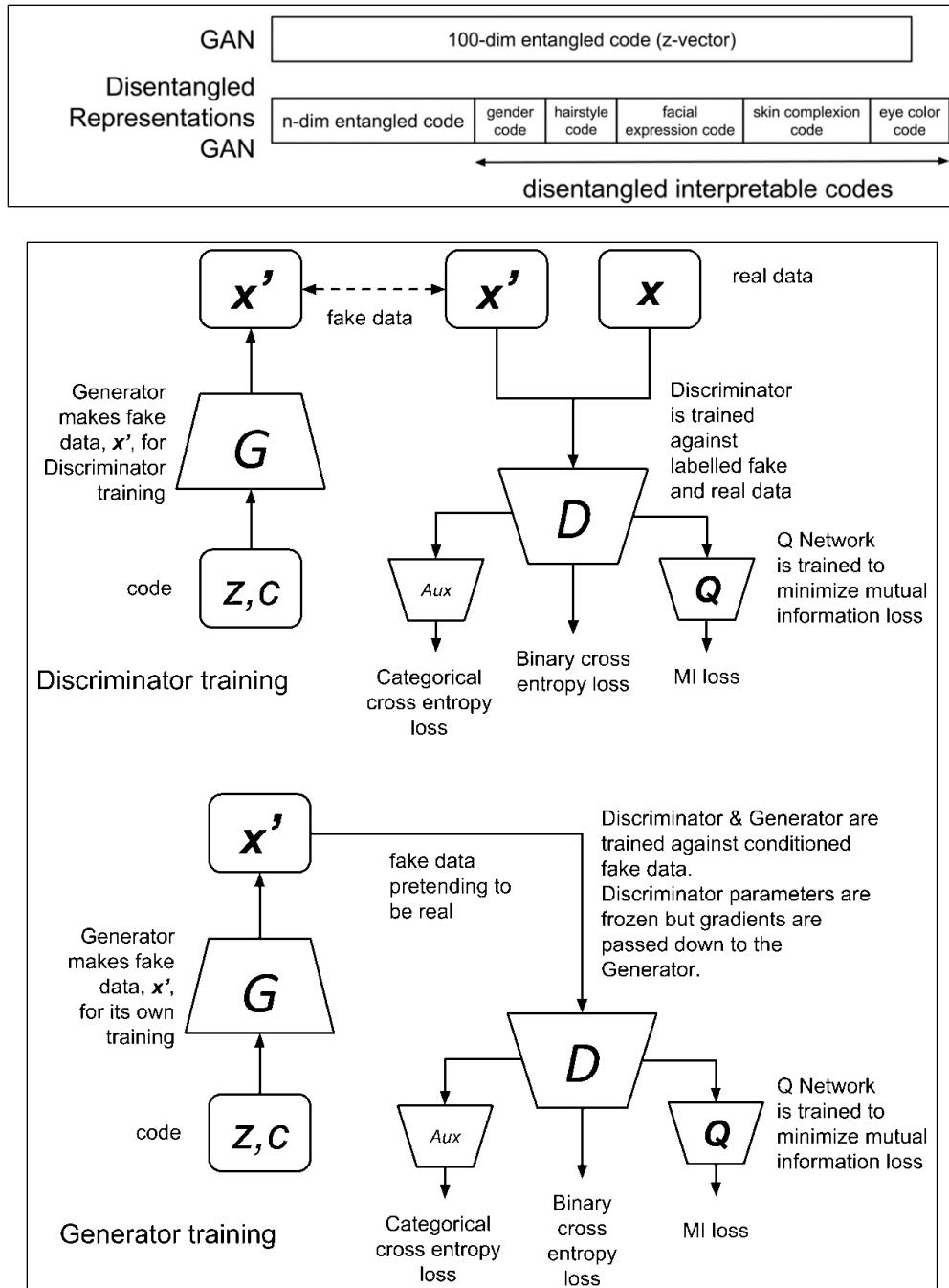


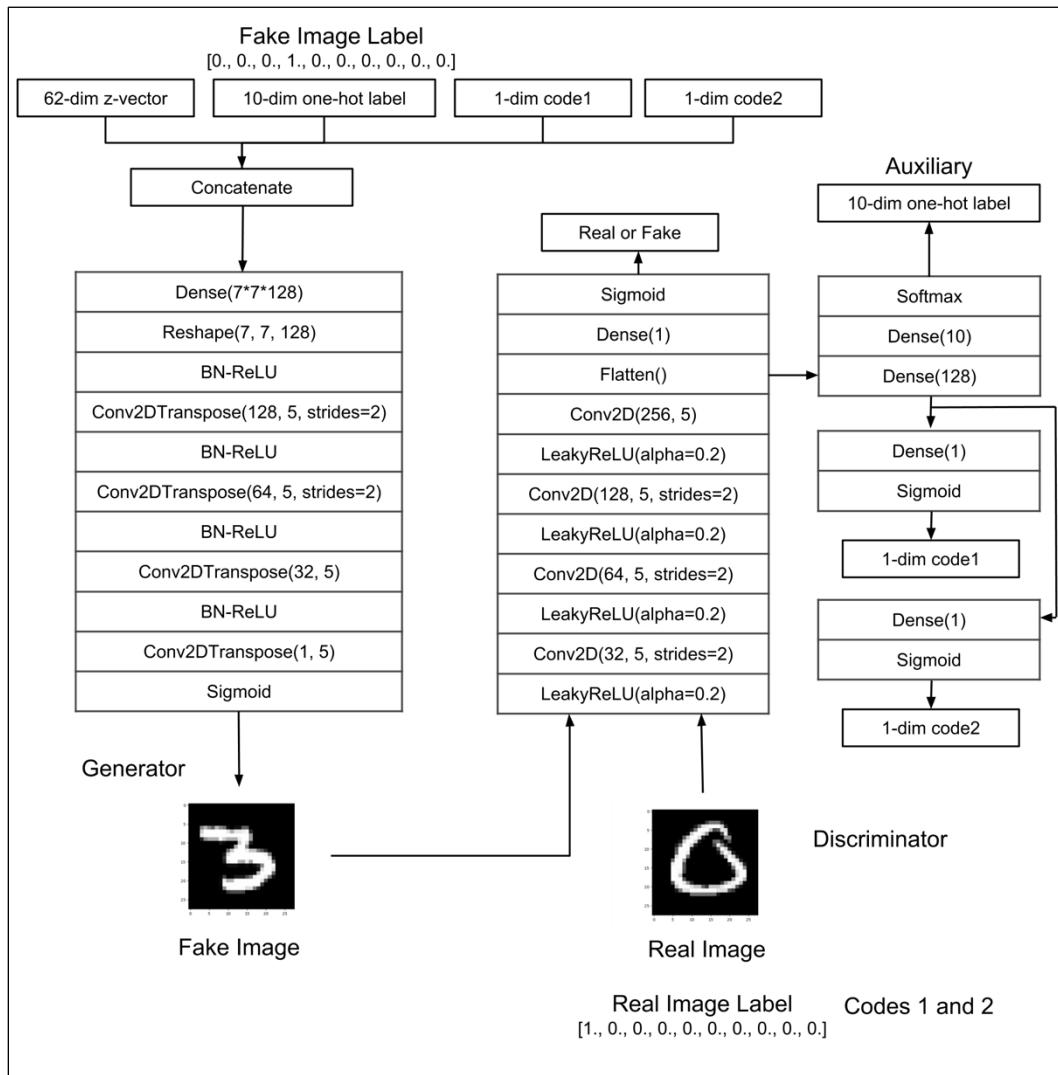
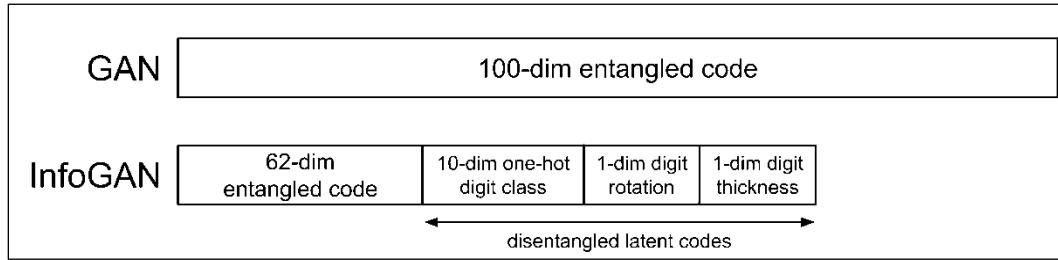




			
			
			
			
			
CGAN	ACGAN	CGAN	ACGAN

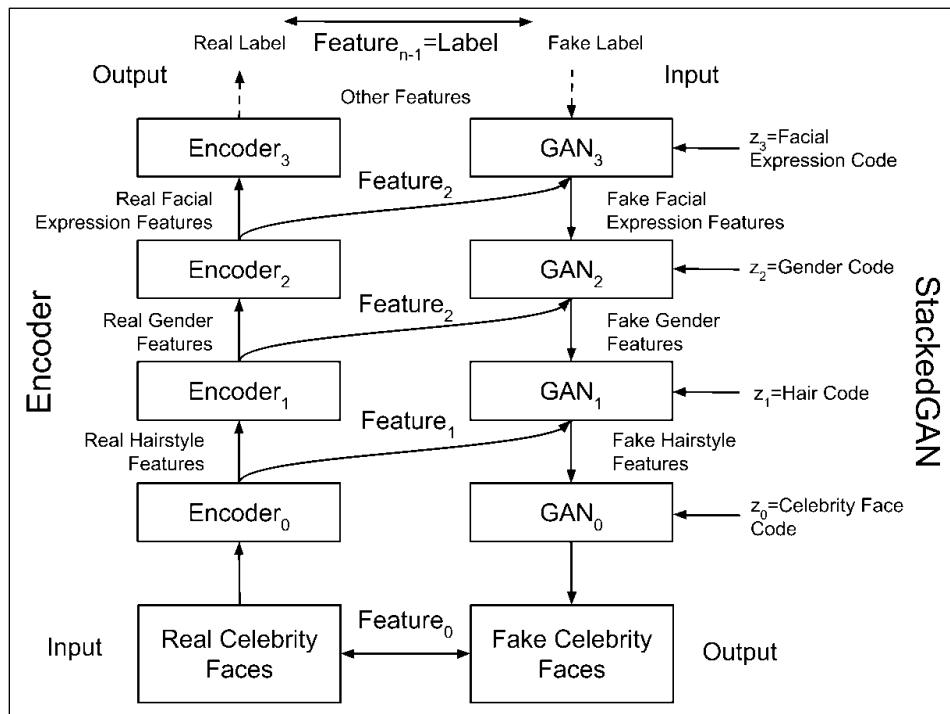
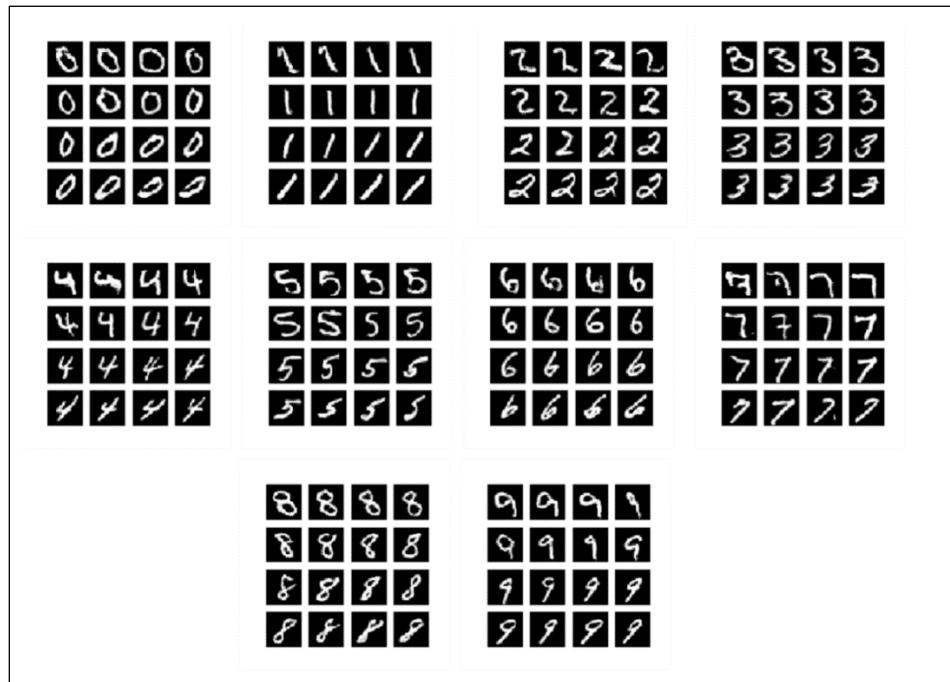
## Chapter 6: Disentangled Representation GANs

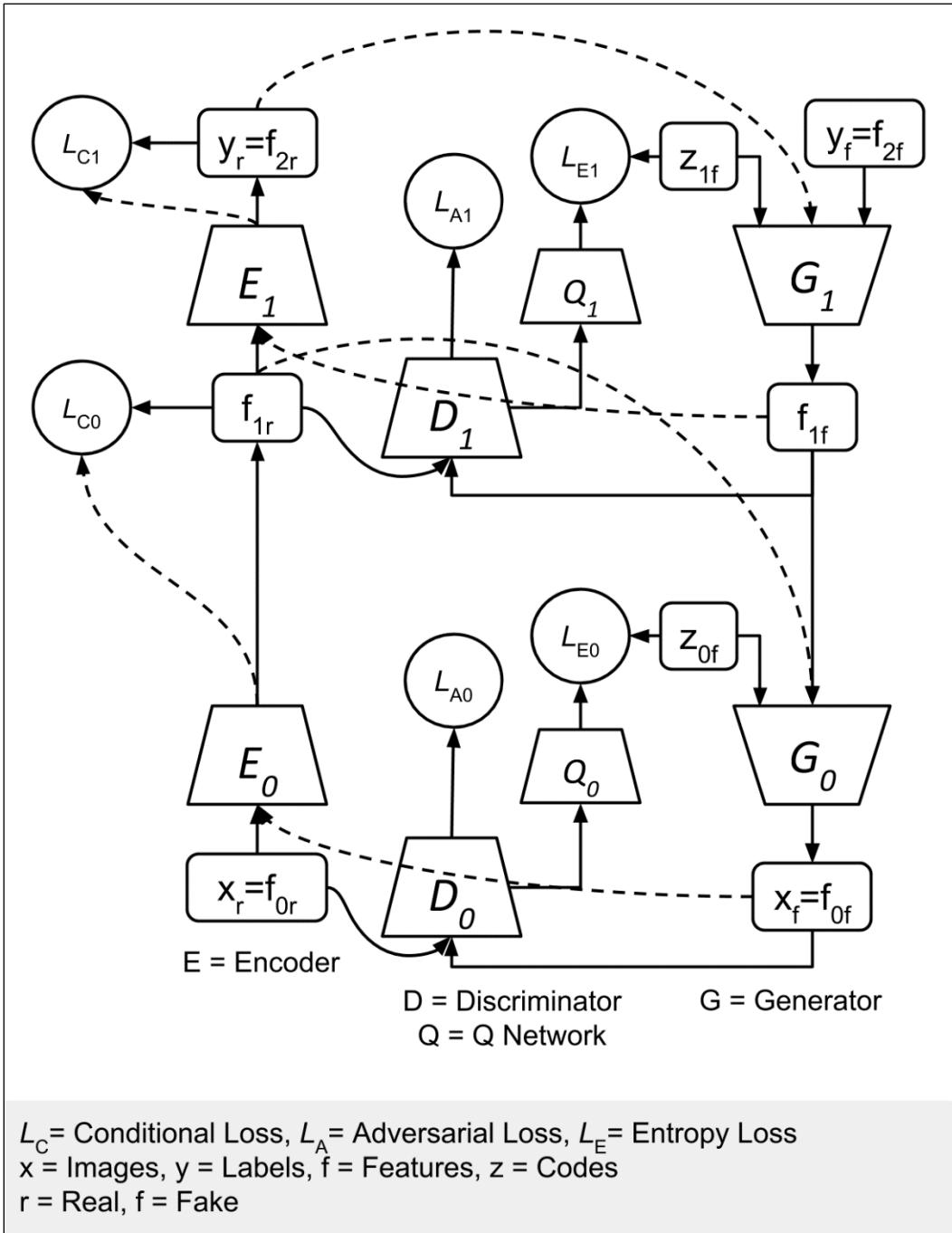


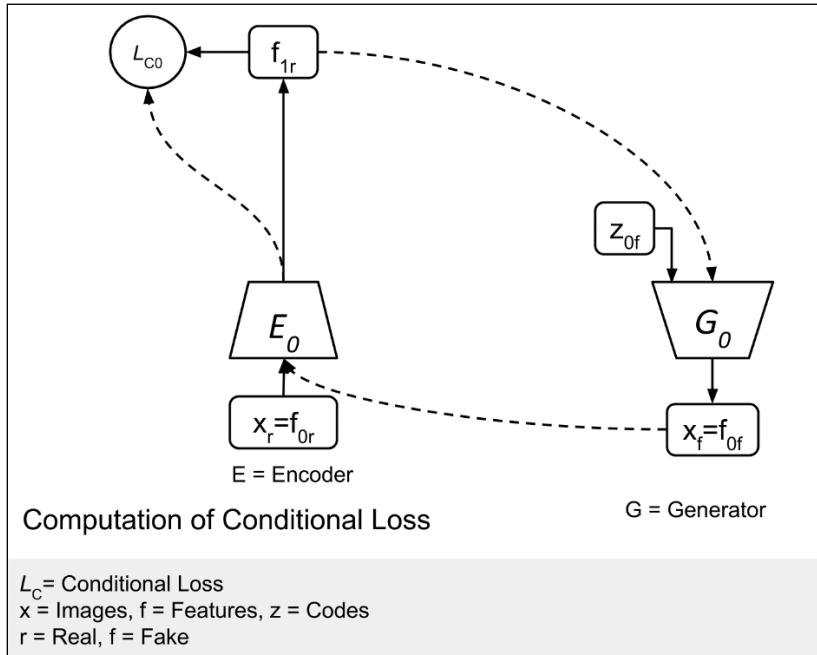
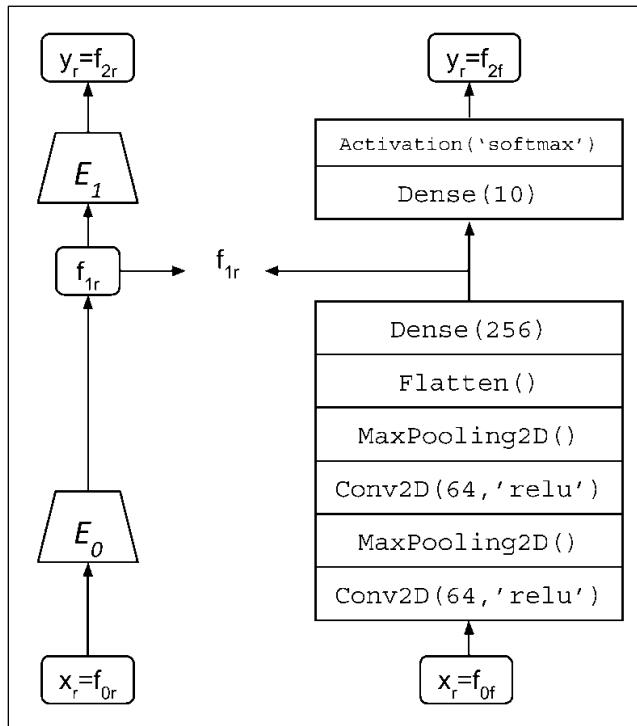


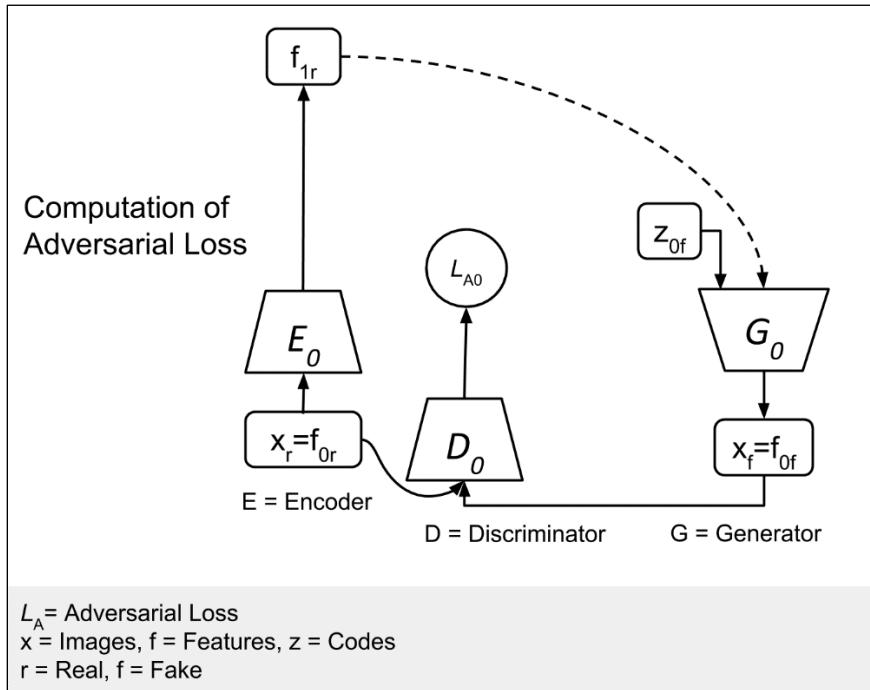
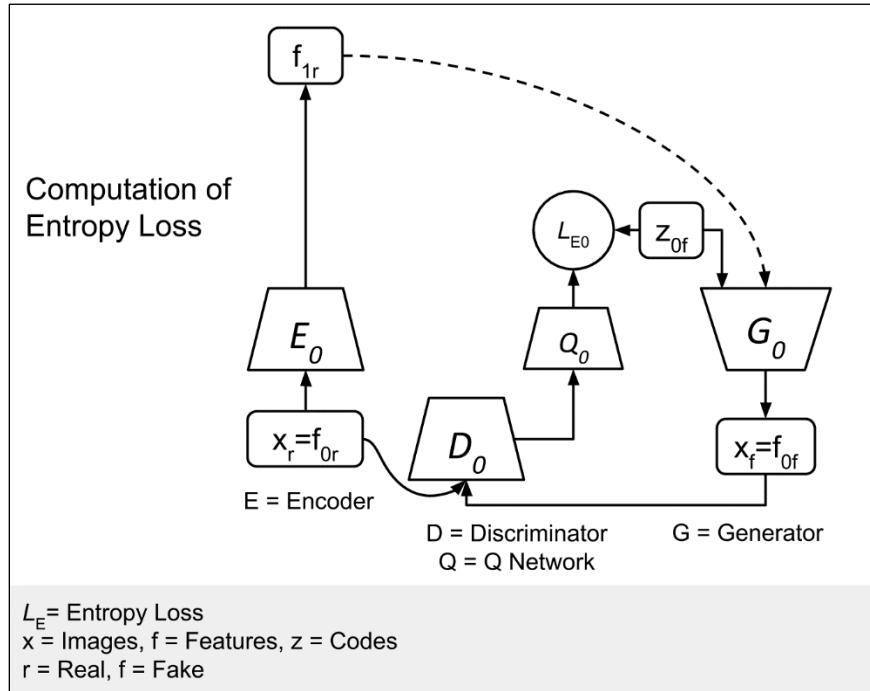
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4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
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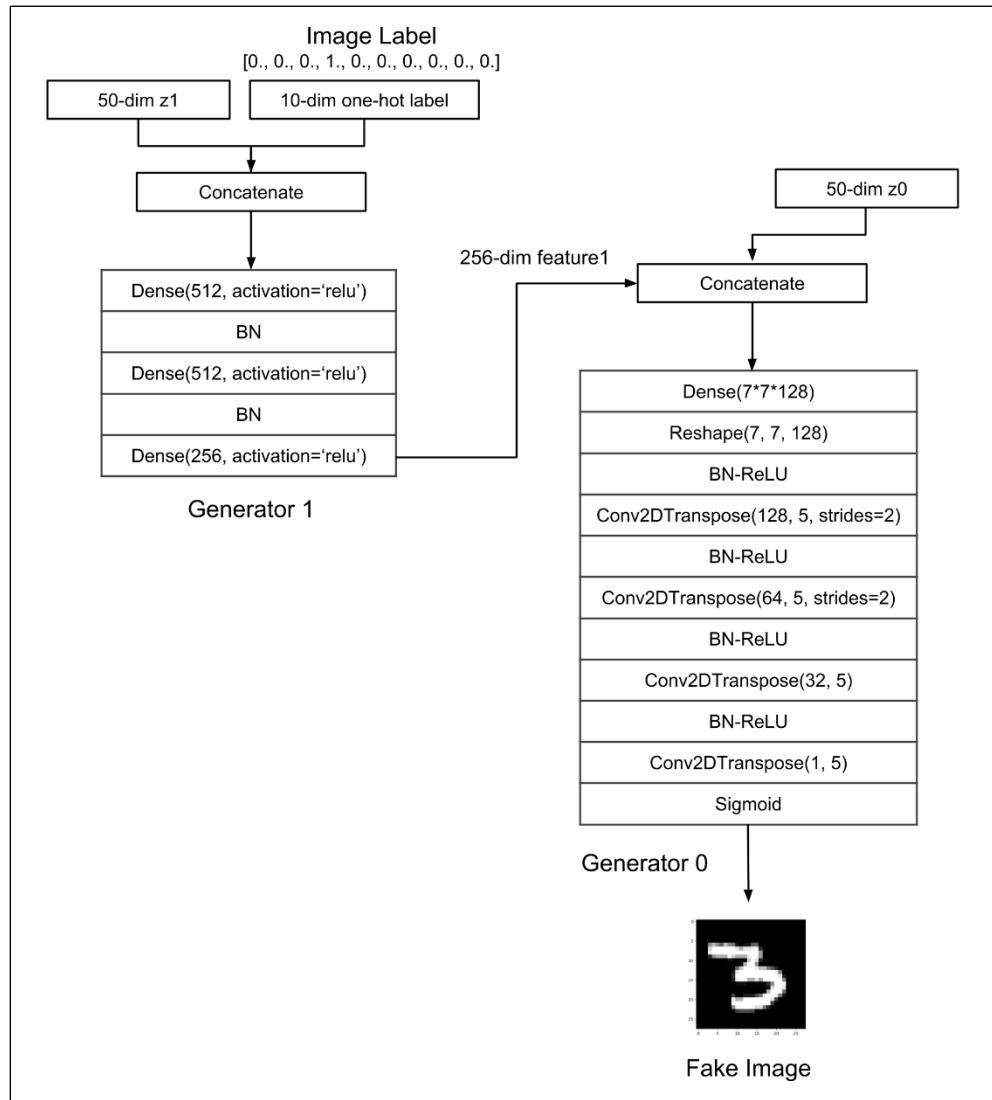
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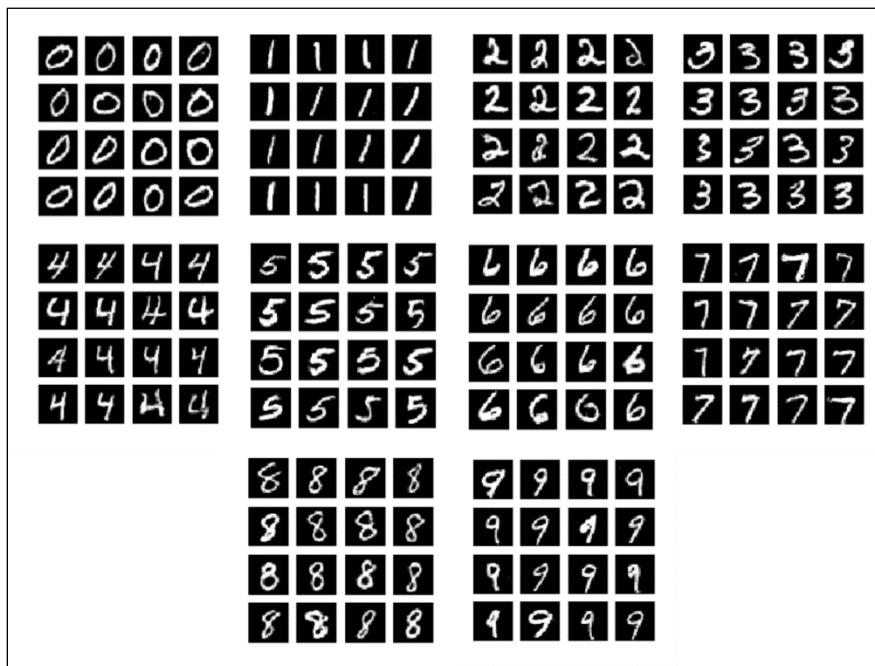
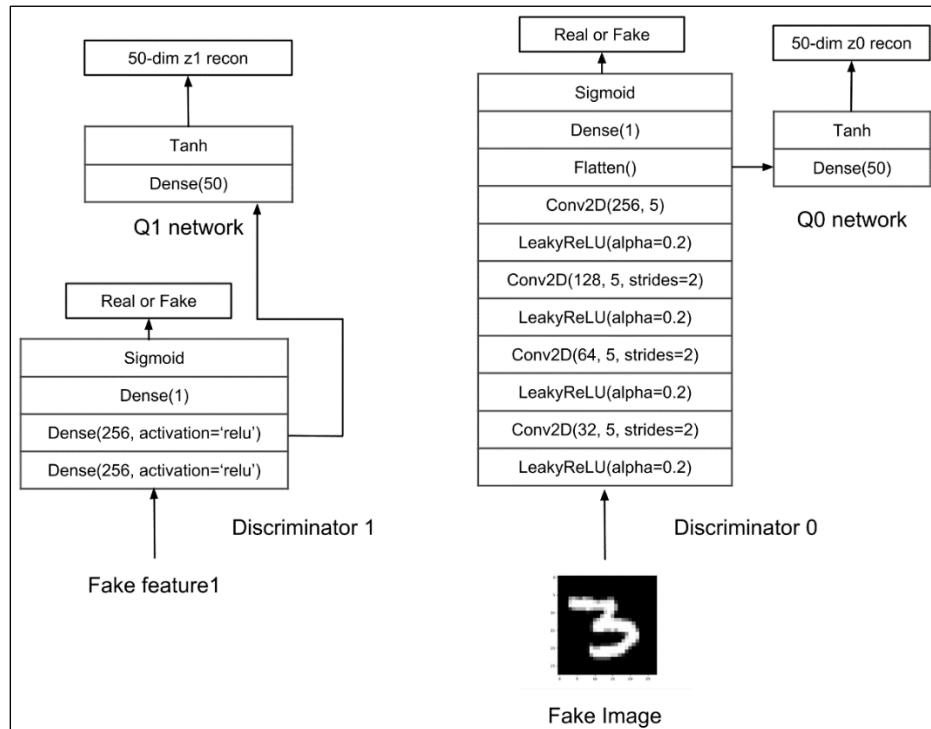






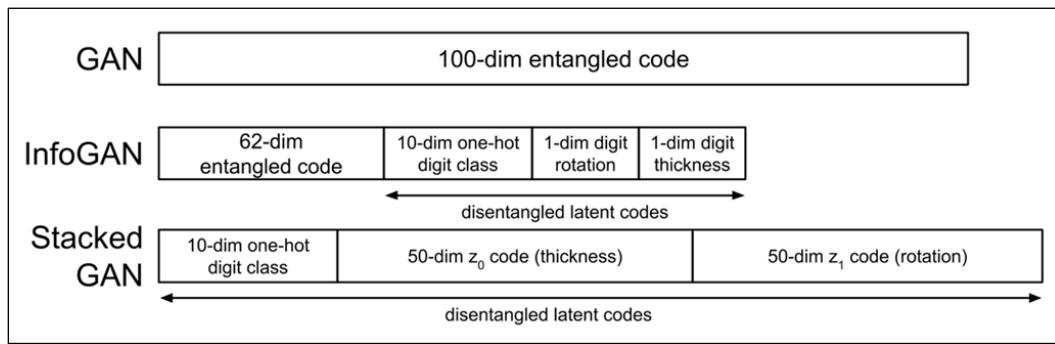






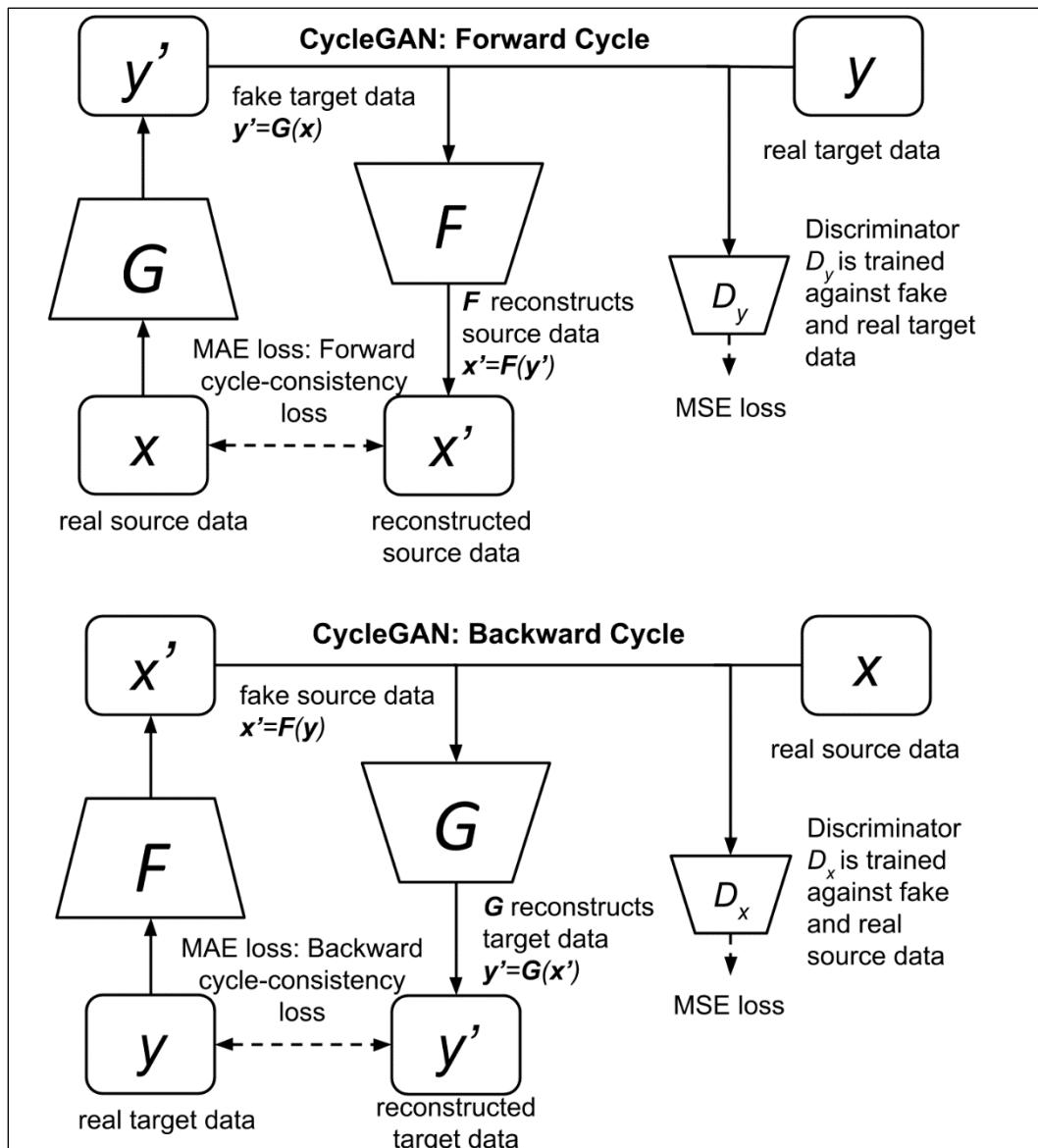
0 0 0 0	1 1 1 1	2 2 2 2	3 3 3 3
0 0 0 0	1 1 1 1	2 2 2 2	3 3 3 3
0 0 0 0	1 1 1 1	2 2 2 2	3 3 3 3
0 0 0 0	1 1 1 1	2 2 2 2	3 3 3 3
4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
8 8 8 8	9 9 9 9		
8 8 8 8	9 9 9 9		
8 8 8 8	9 9 9 9		
8 8 8 8	9 9 9 9		

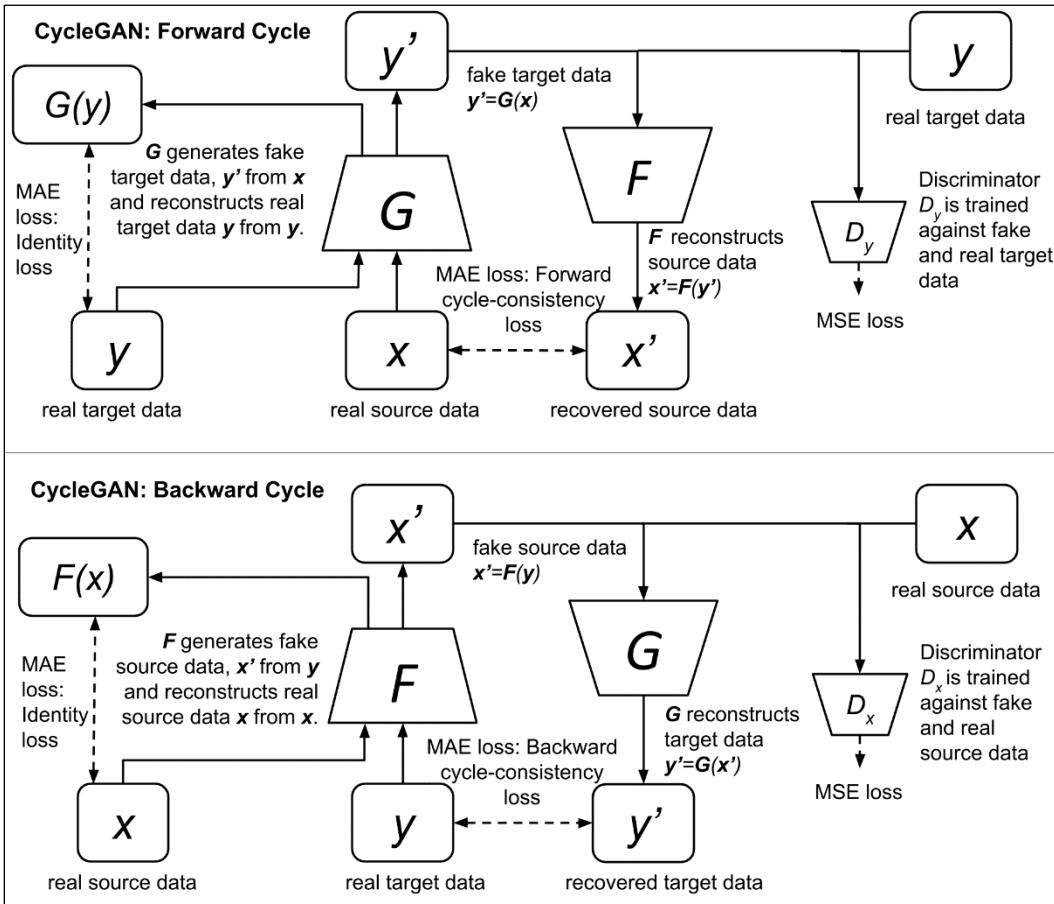
0 0 0 0	1 1 1 1	2 2 2 2	3 3 3 3
0 0 0 0	1 1 1 1	2 2 2 2	3 3 3 3
0 0 0 0	1 1 1 1	2 2 2 2	3 3 3 3
0 0 0 0	1 1 1 1	2 2 2 2	3 3 3 3
4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
4 4 4 4	5 5 5 5	6 6 6 6	7 7 7 7
8 8 8 8	9 9 9 9		
8 8 8 8	9 9 9 9		
8 8 8 8	9 9 9 9		
8 8 8 8	9 9 9 9		

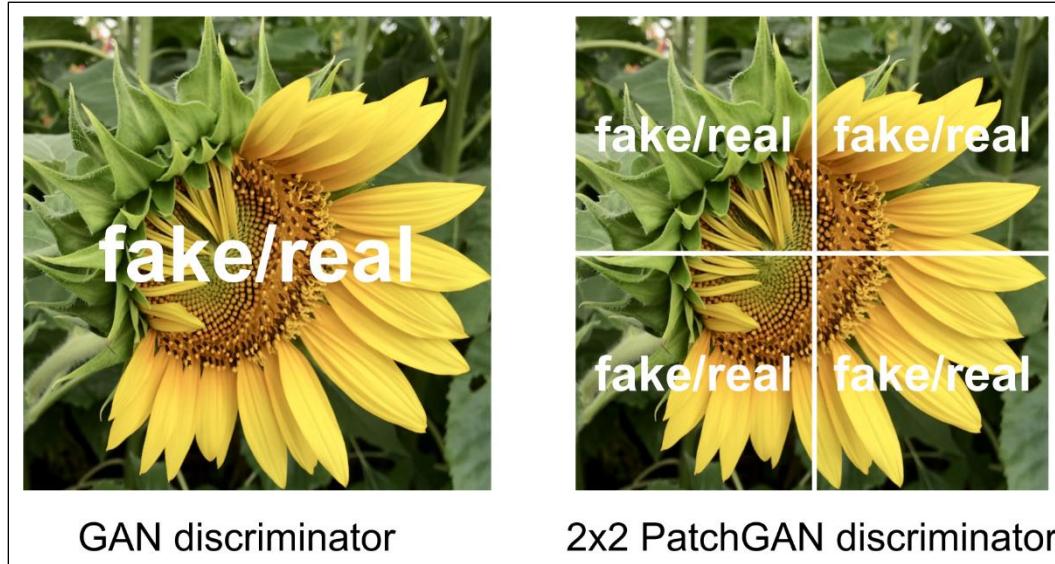
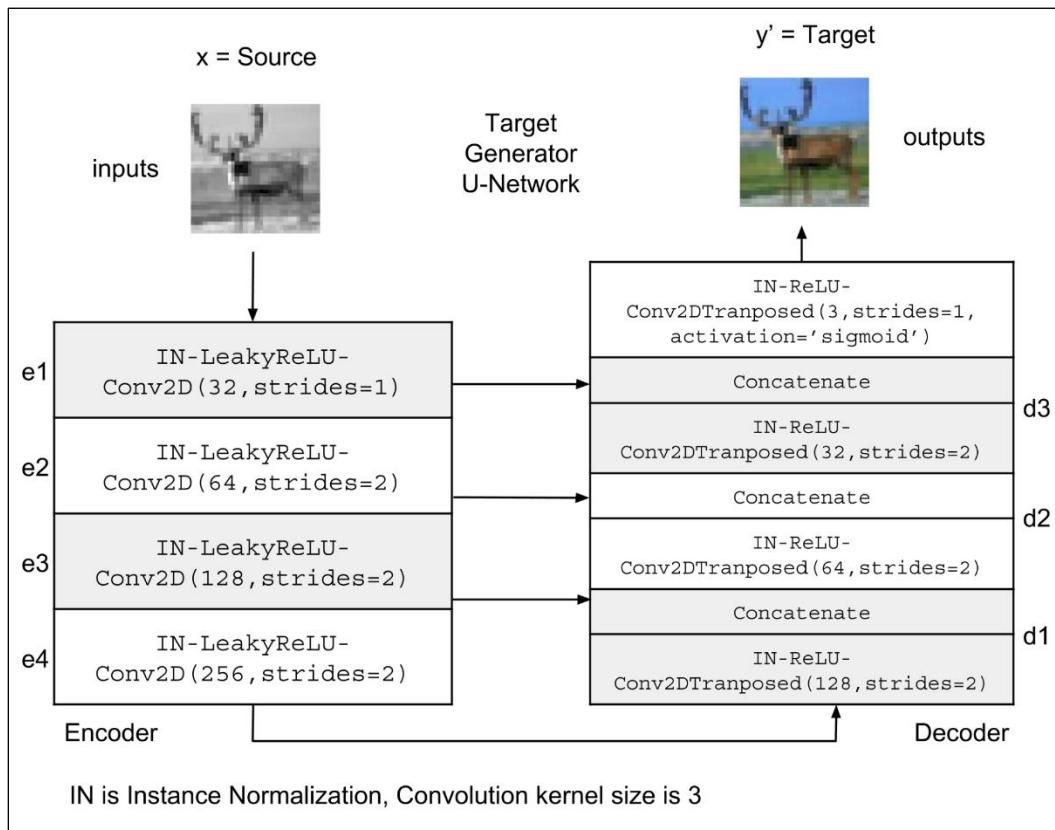


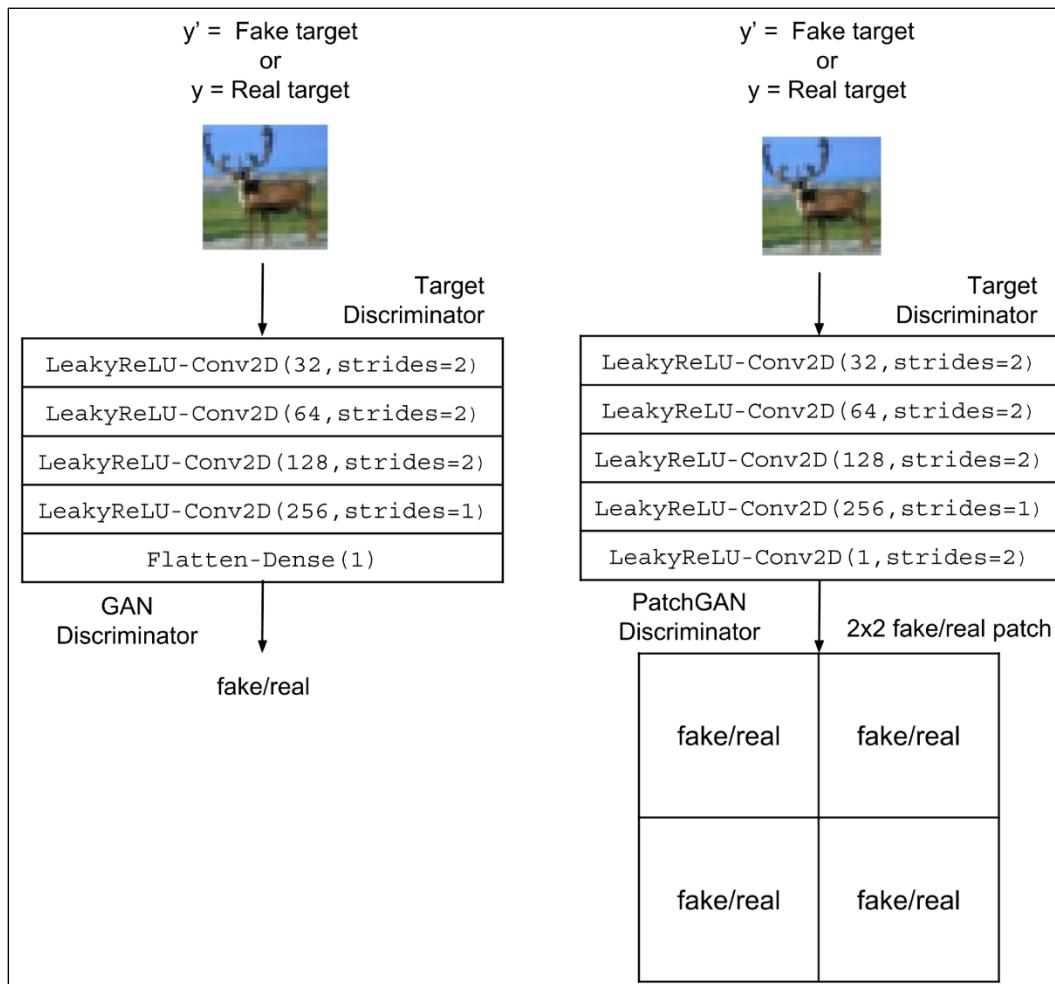
## Chapter 7: Cross-Domain GANs



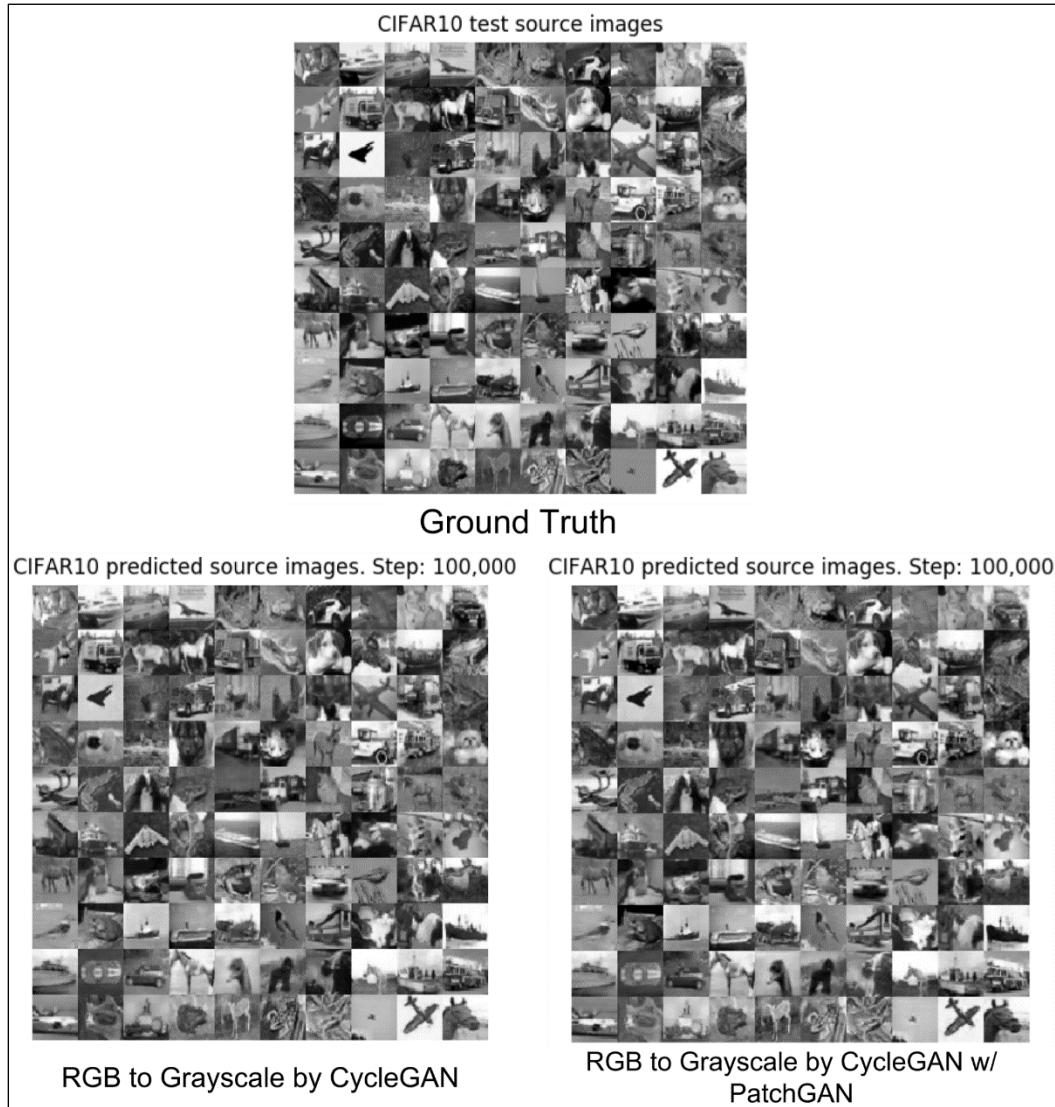


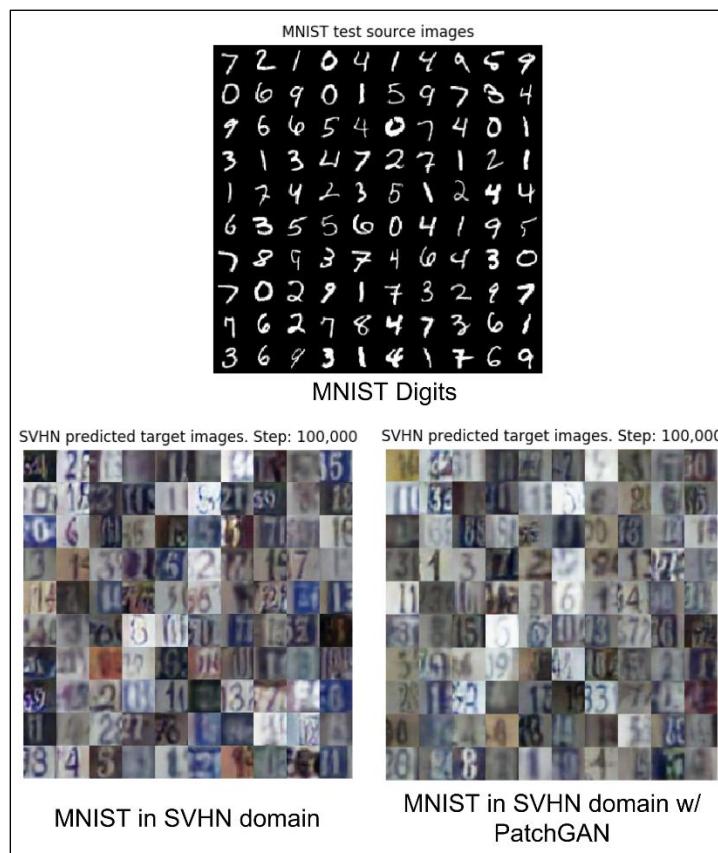
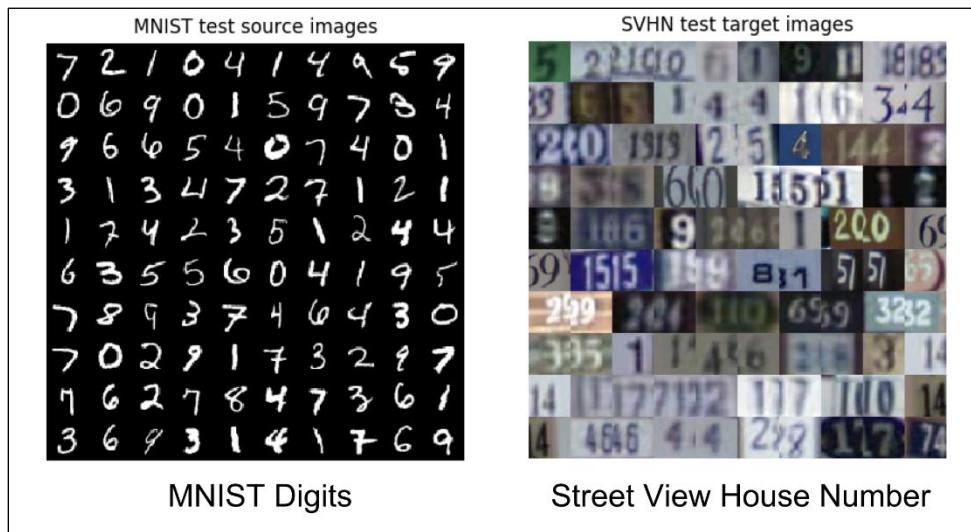












SVHN test target images



SVHN

MNIST predicted source images. Step: 100,000 MNIST predicted source images. Step: 100,000



SVHN in MNIST domain

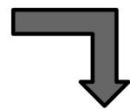


SVHN in MNIST domain w/  
PatchGAN

Test mnist source images

7	2	1	0	4	1	4	9	5	9
0	6	9	0	1	5	9	7	3	4
9	6	4	5	4	0	7	4	0	1
3	1	3	4	7	2	7	1	2	1
1	7	4	2	3	5	1	2	4	4
6	3	5	5	6	0	4	1	9	5
7	8	9	3	7	4	6	4	3	0
7	0	2	9	1	7	3	2	9	7
7	6	2	7	8	4	7	3	6	1
3	6	9	3	1	4	1	7	6	9

MNIST to SVHN Forward Cycle



SVHN predicted target images.



MNIST reconstructed source images.

7	2	1	0	4	1	4	9	5	9
0	6	9	0	1	5	9	7	3	4
9	6	4	5	4	0	7	4	0	1
3	1	3	4	7	2	7	1	2	1
1	7	4	2	3	5	1	2	4	4
6	3	5	5	6	0	4	1	9	5
7	8	9	3	7	4	6	4	3	0
7	0	2	9	1	7	3	2	9	7
7	6	2	7	8	4	7	3	6	1
3	6	9	3	1	4	1	7	6	9



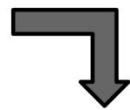
SVHN test target images



SVHN reconstructed target images.



SVHN to MNIST Backward Cycle

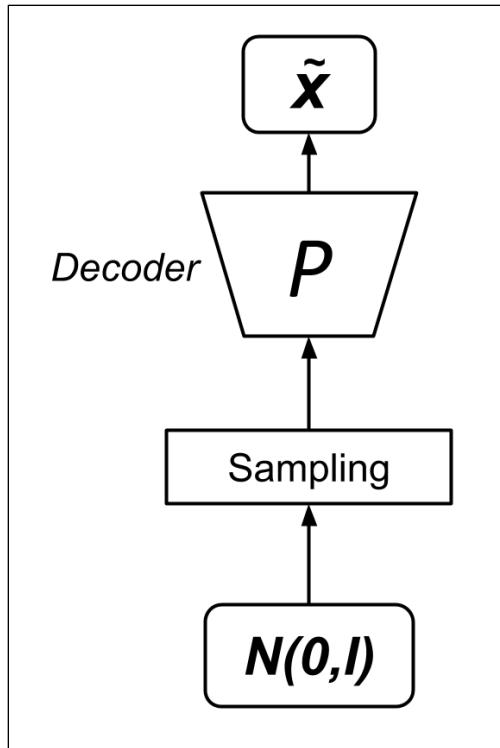
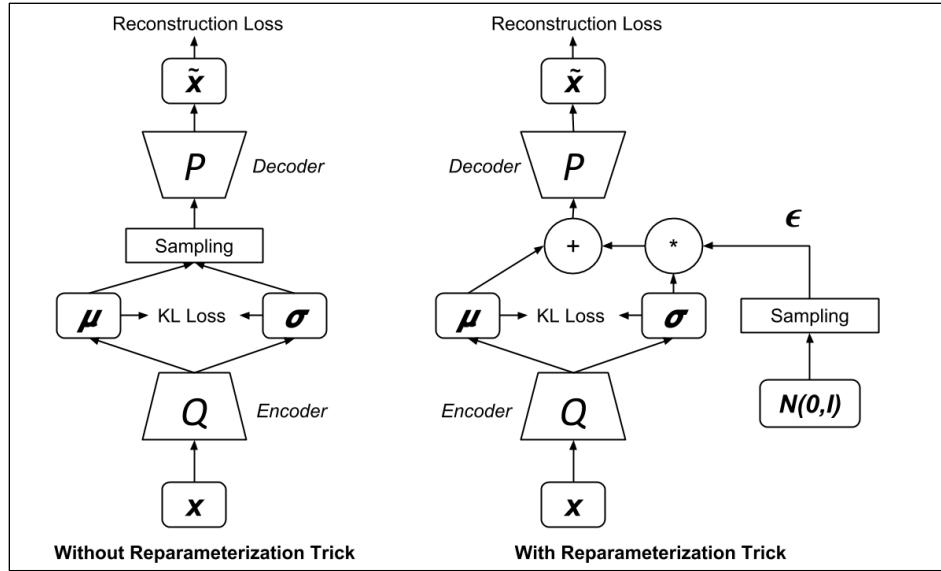


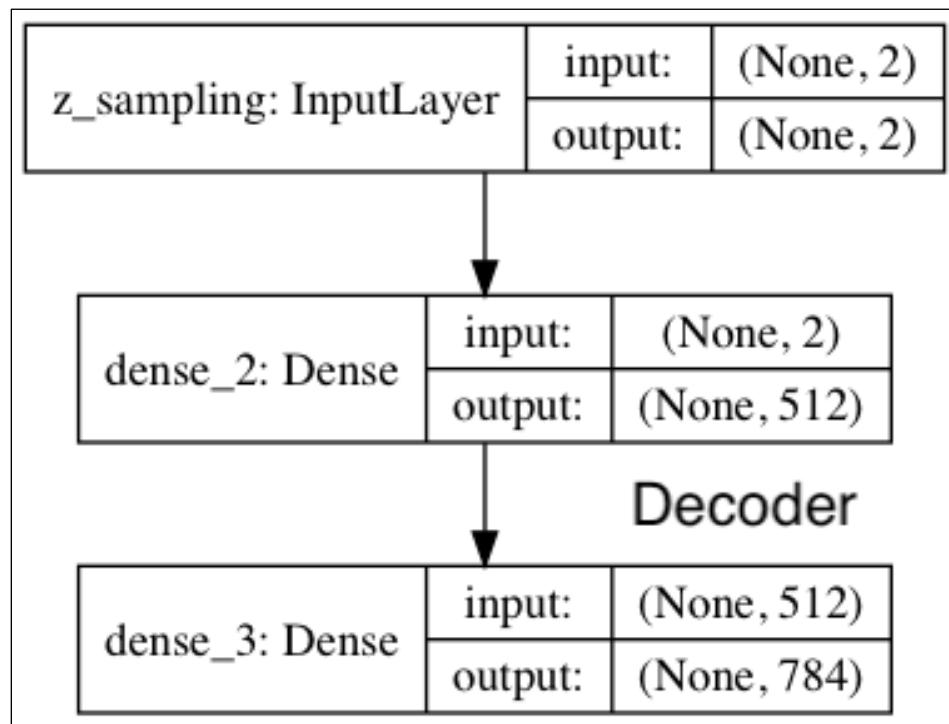
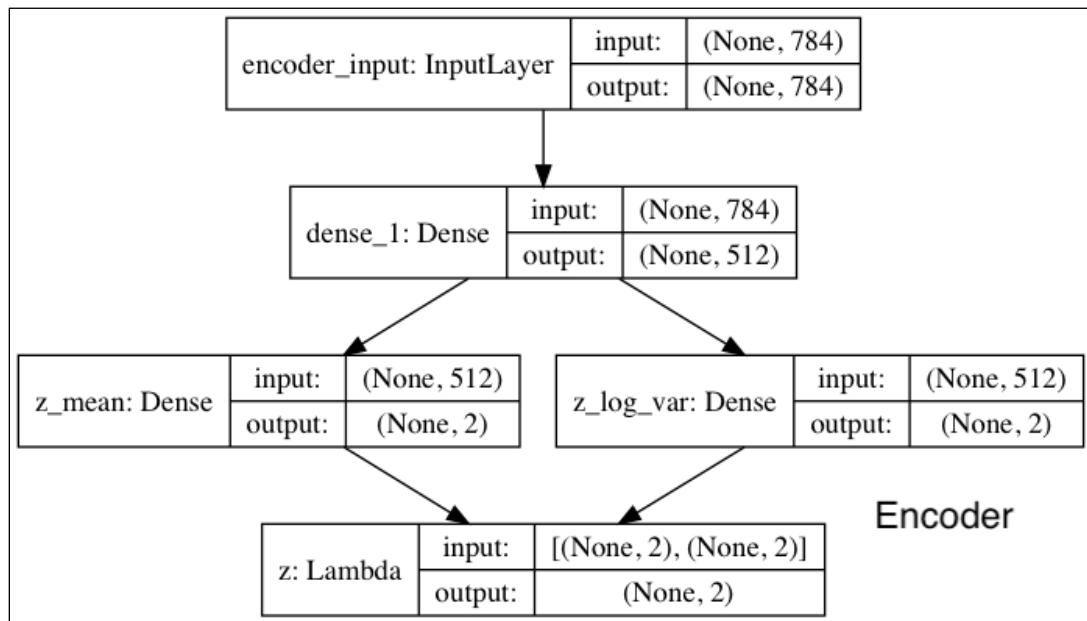
MNIST predicted source images.

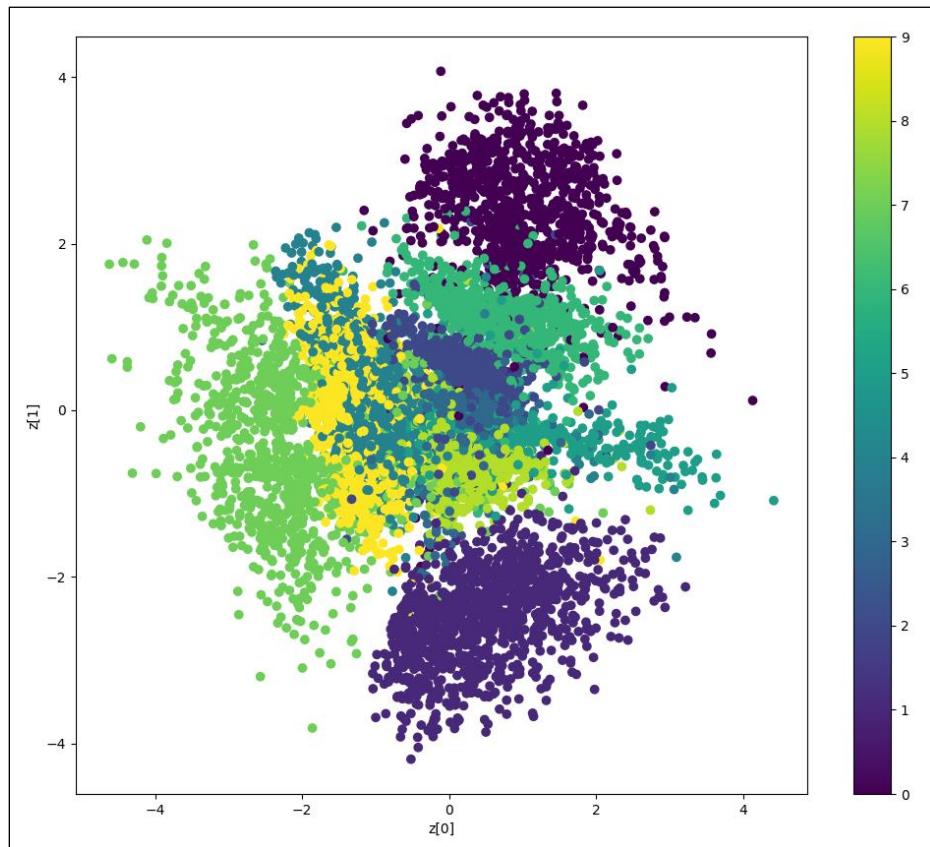
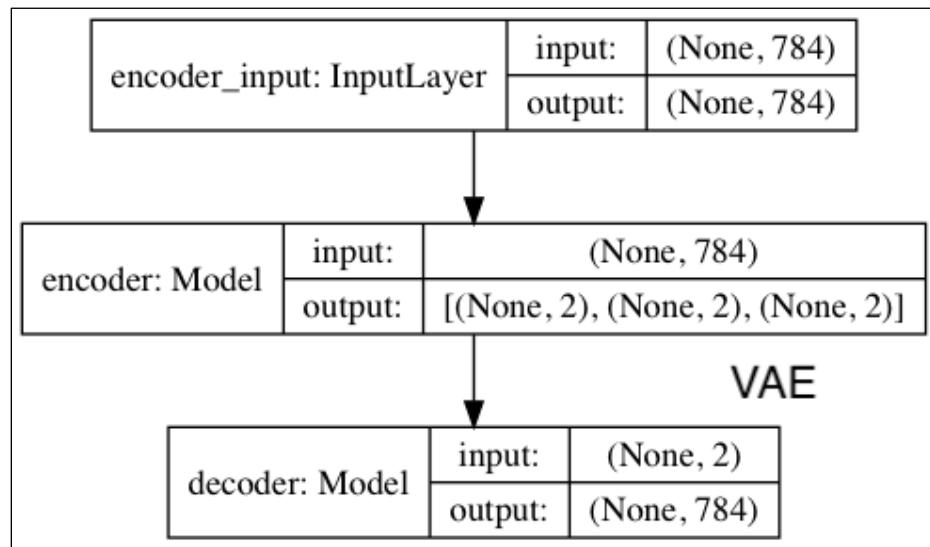
3	3	1	0	9	1	6	0	3	3
1	7	7	2	1	2	1	0	3	2
6	1	1	1	8	5	0	7	7	4
1	3	9	0	3	1	3	1	0	6
1	0	9	4	9	7	1	9	7	6
4	6	0	0	1	2	8	0	0	7
9	7	6	0	9	9	0	2	8	0
9	7	3	1	1	4	8	3	7	3
1	0	0	0	8	1	2	1	8	1
9	1	8	1	8	1	2	0	6	0

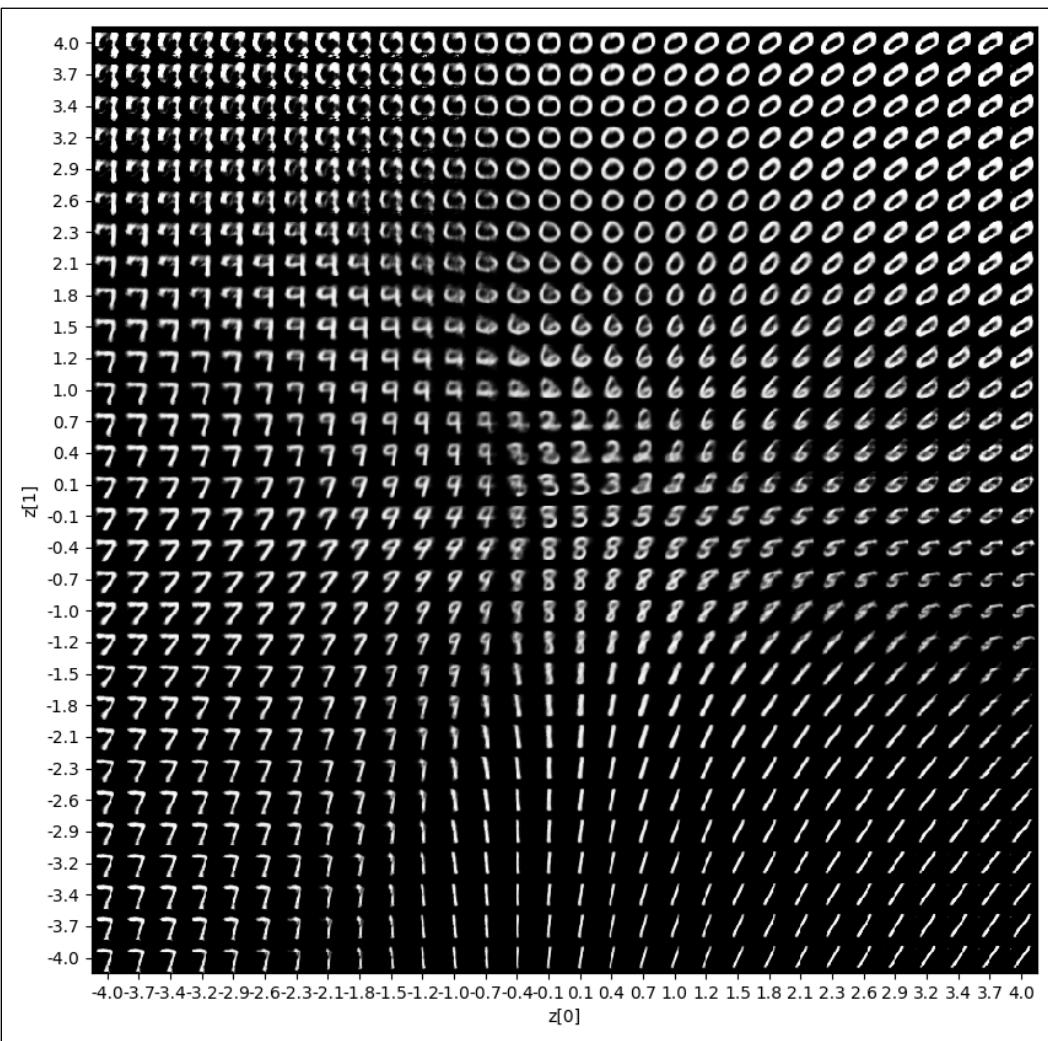


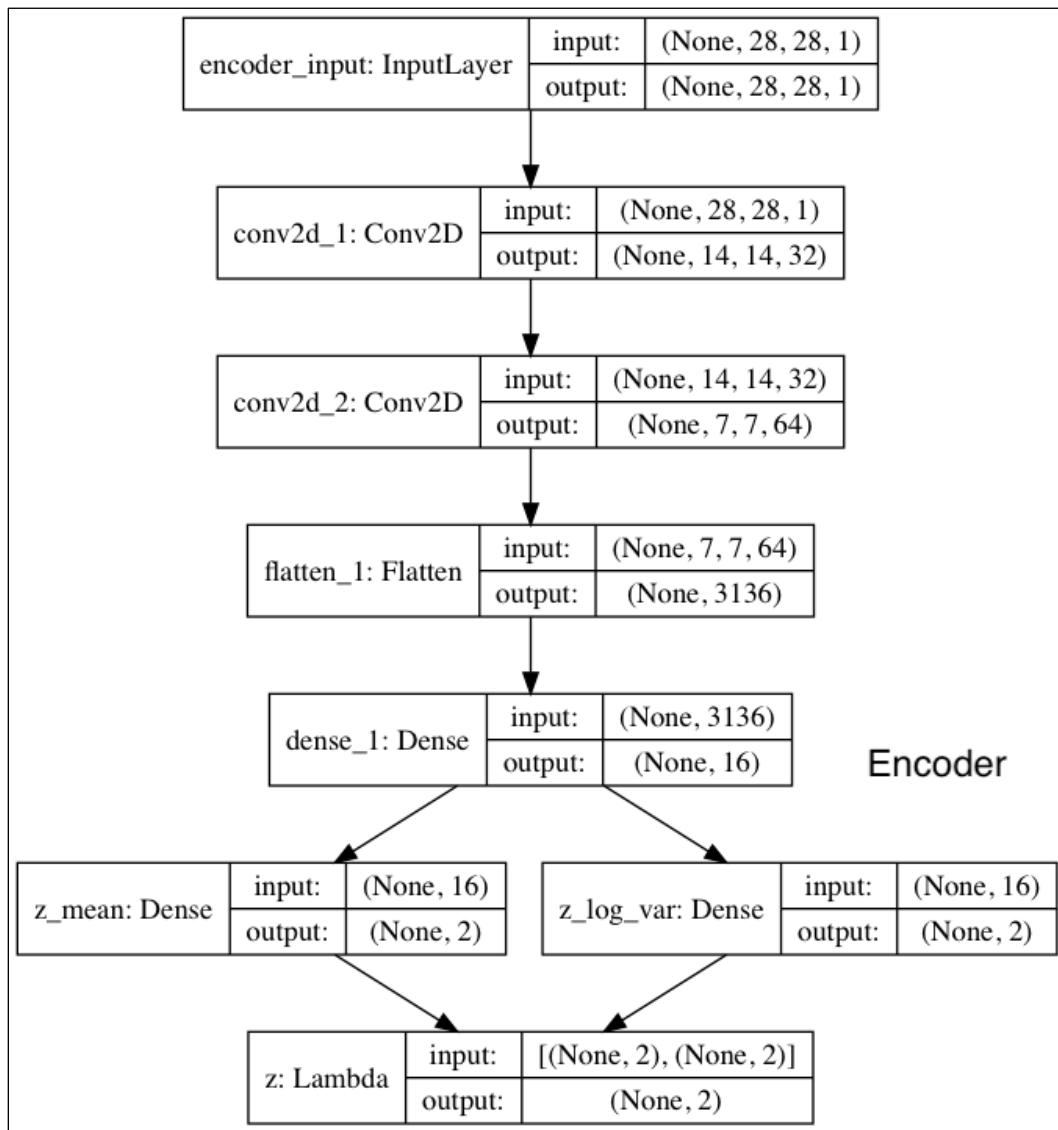
## Chapter 8: Variational Autoencoders (VAEs)

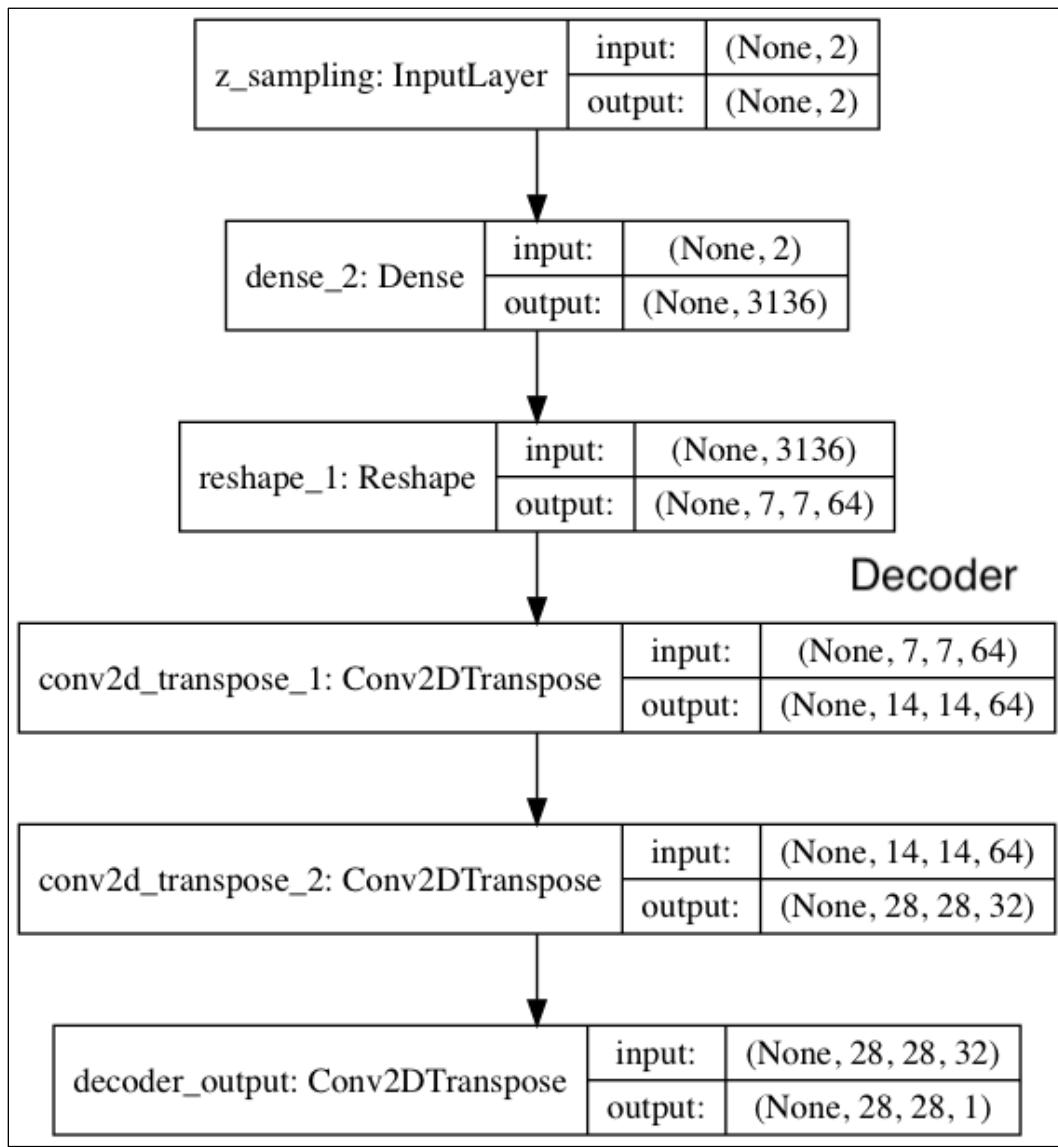


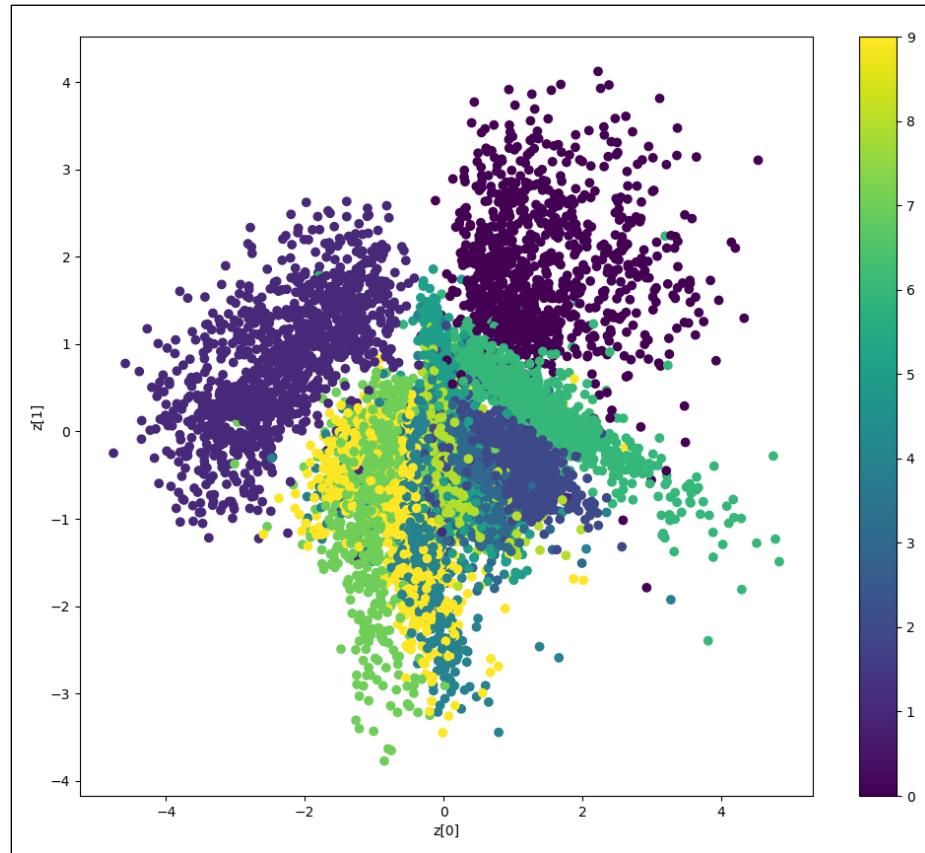
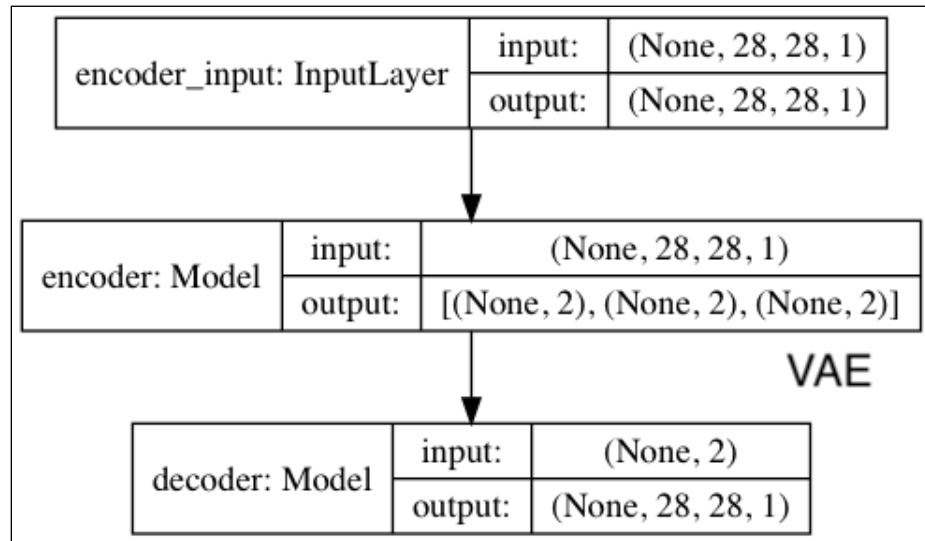


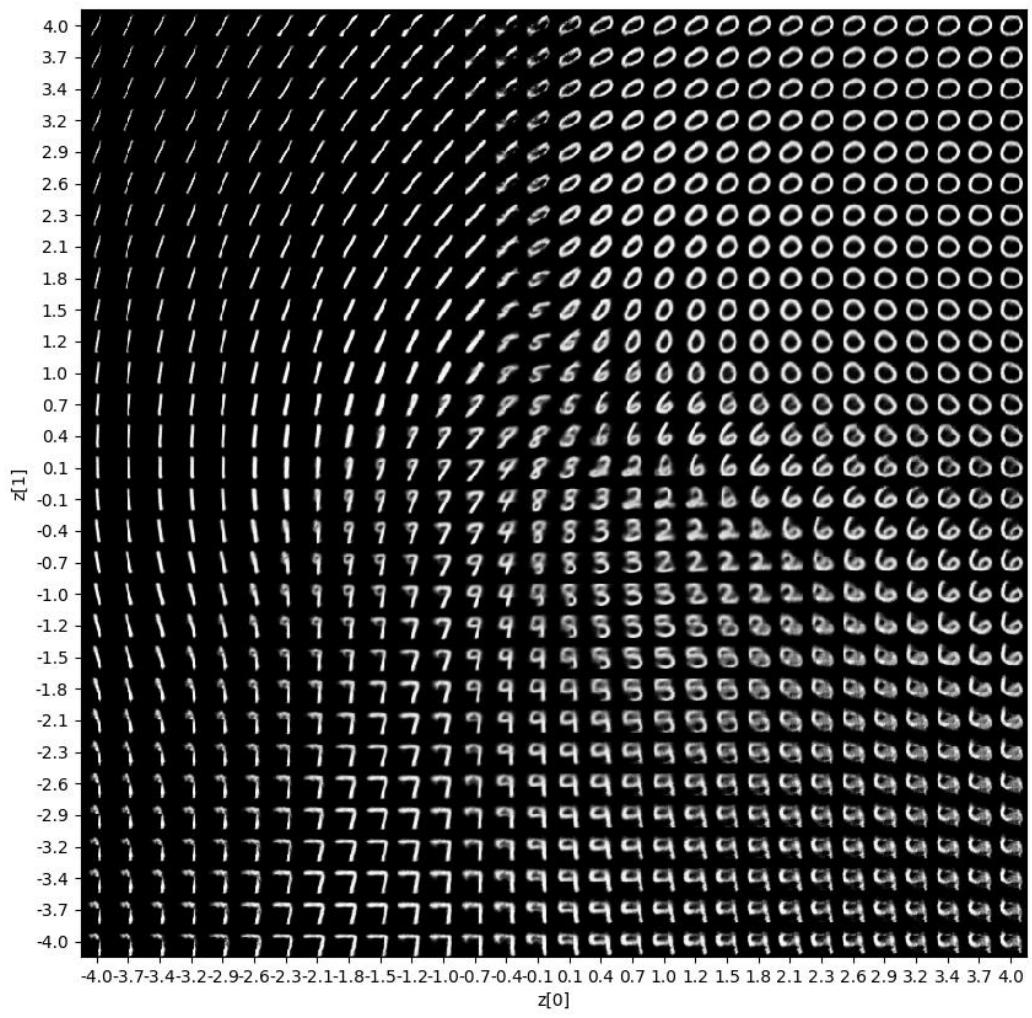


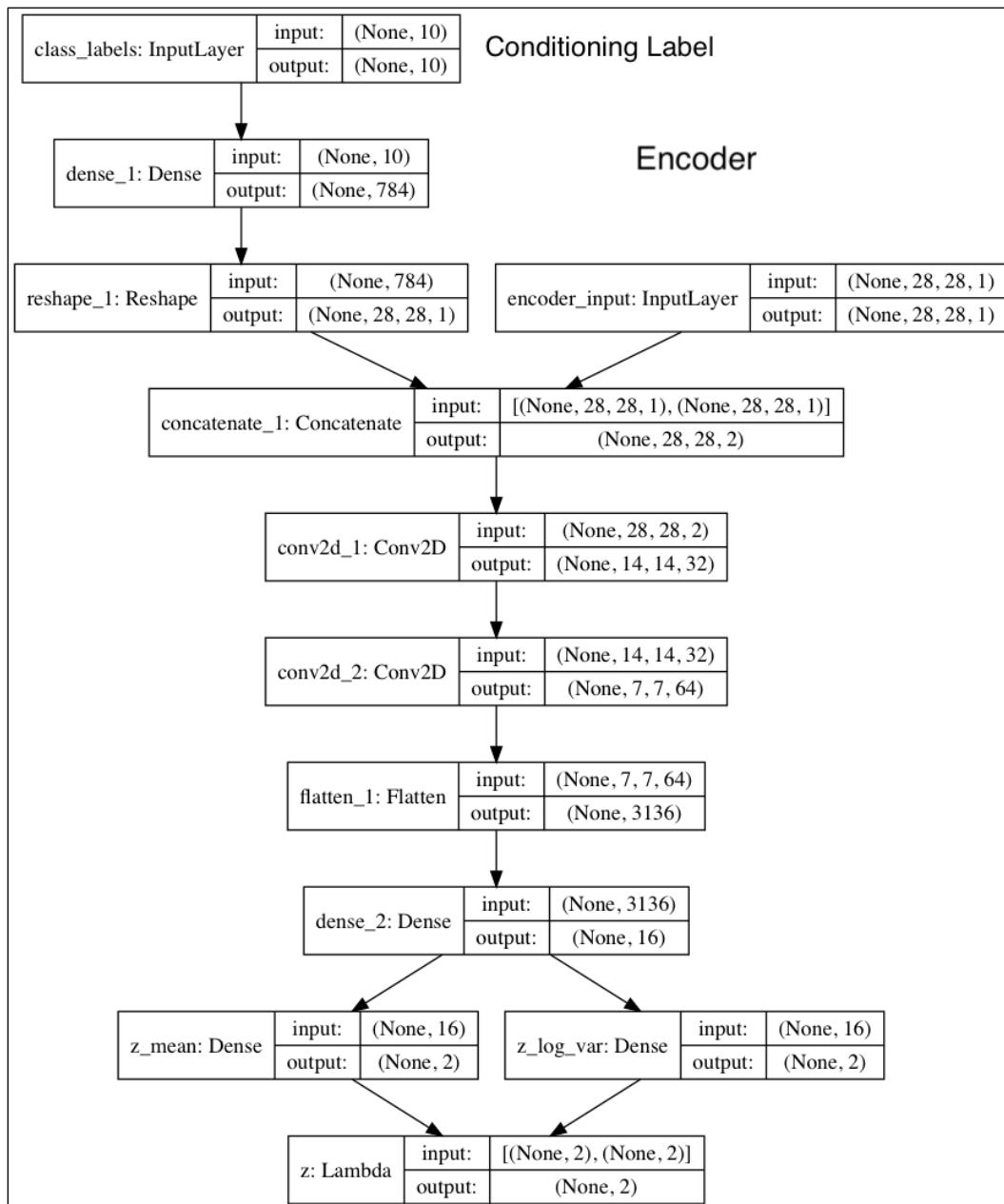


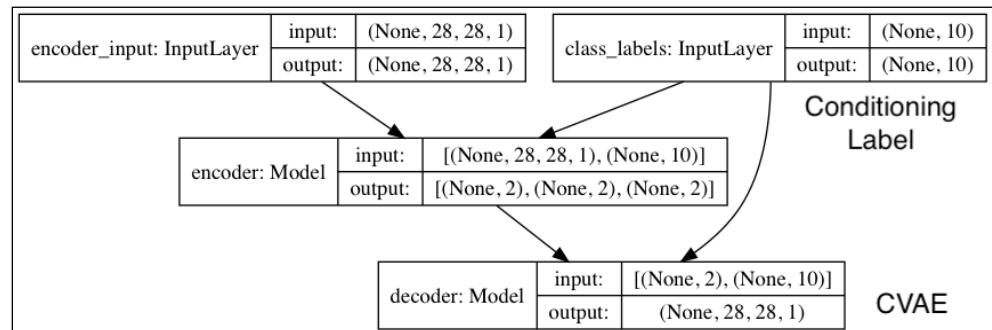
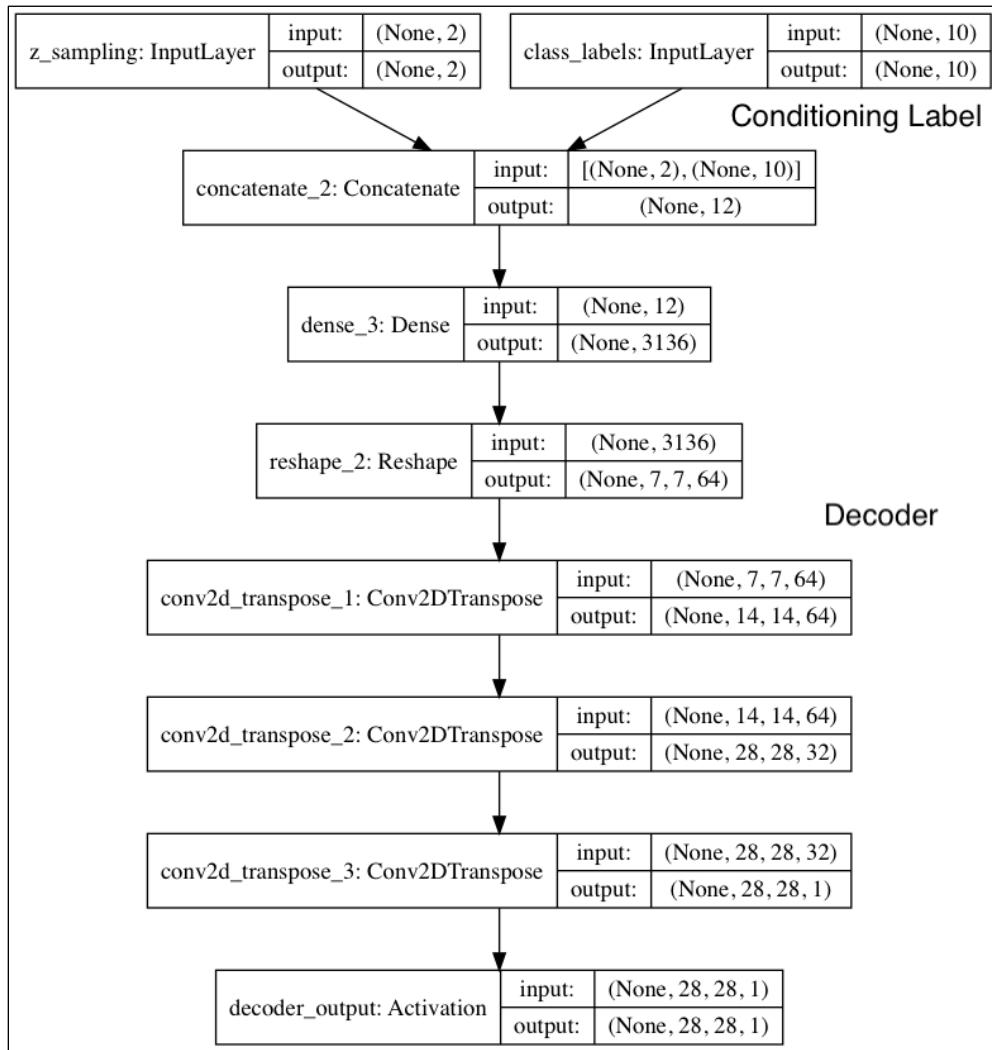


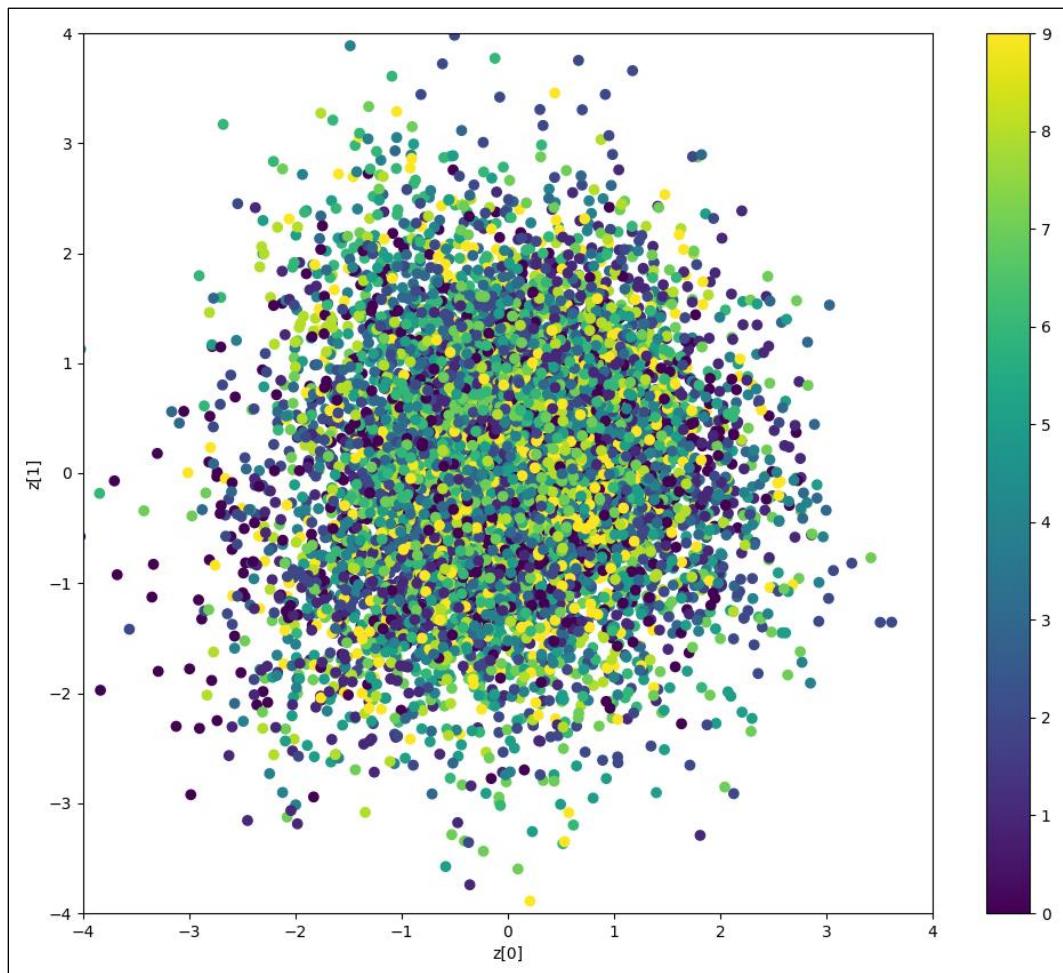


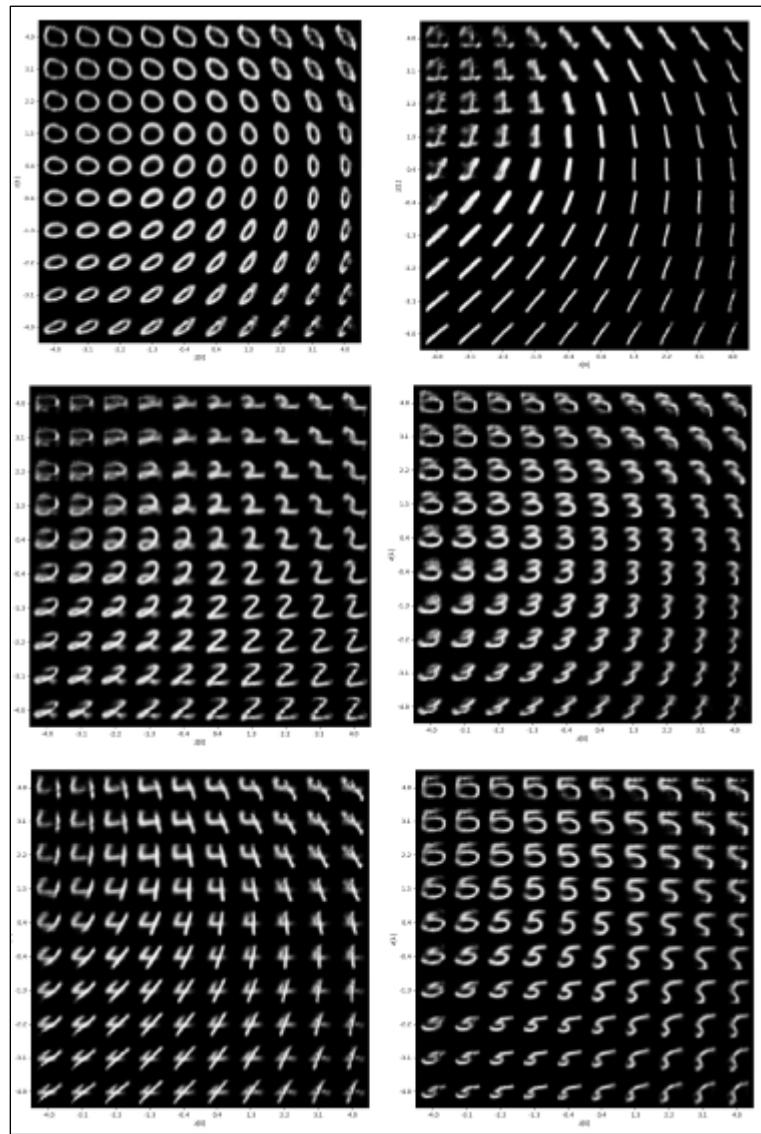


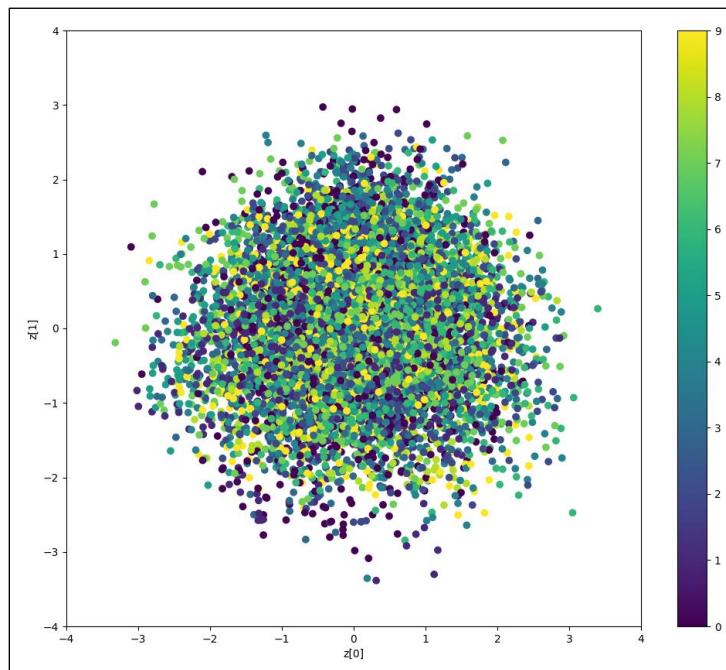
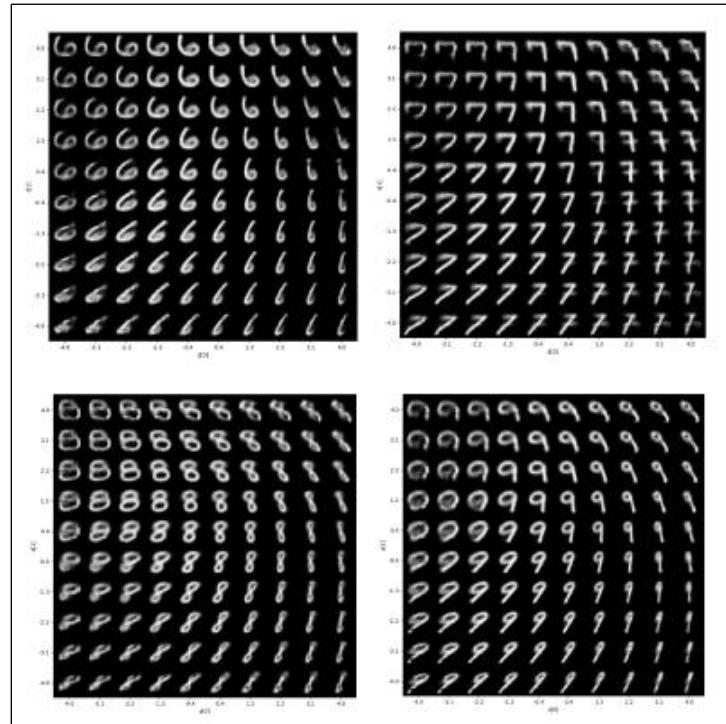


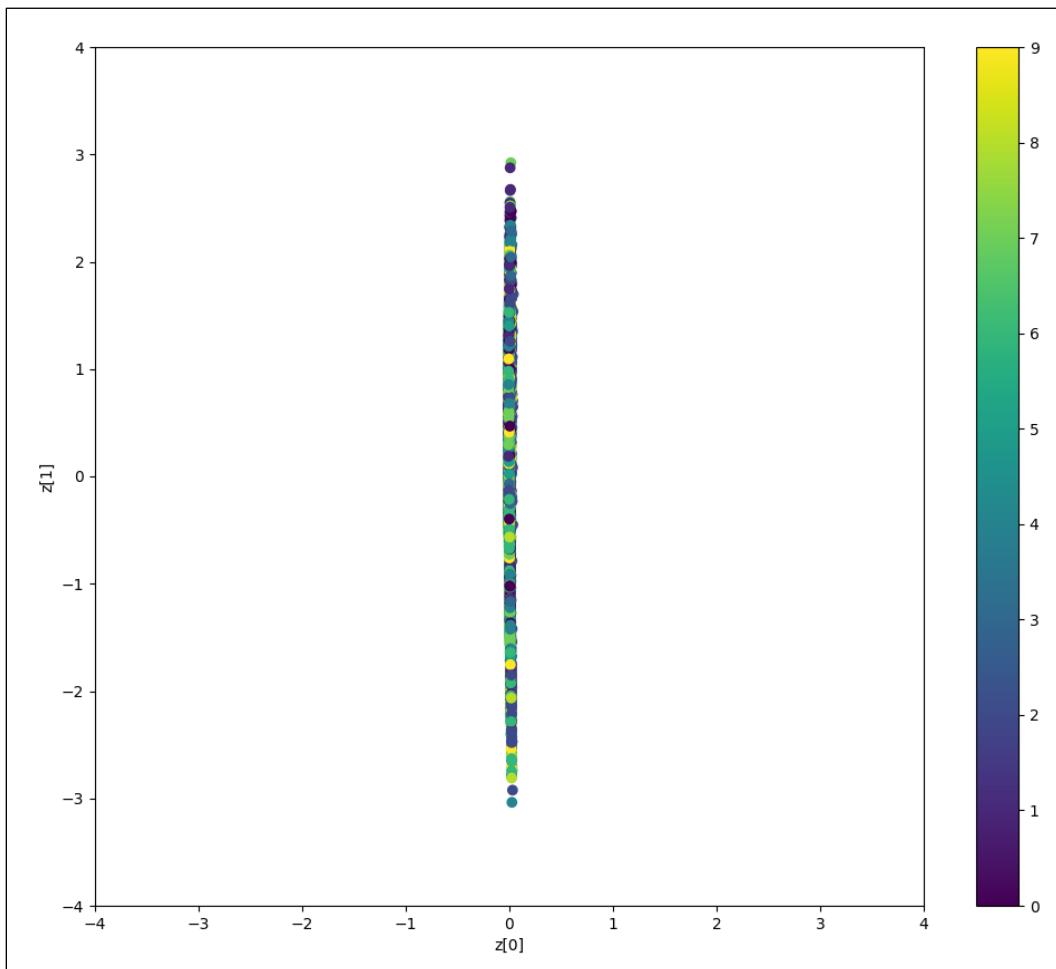


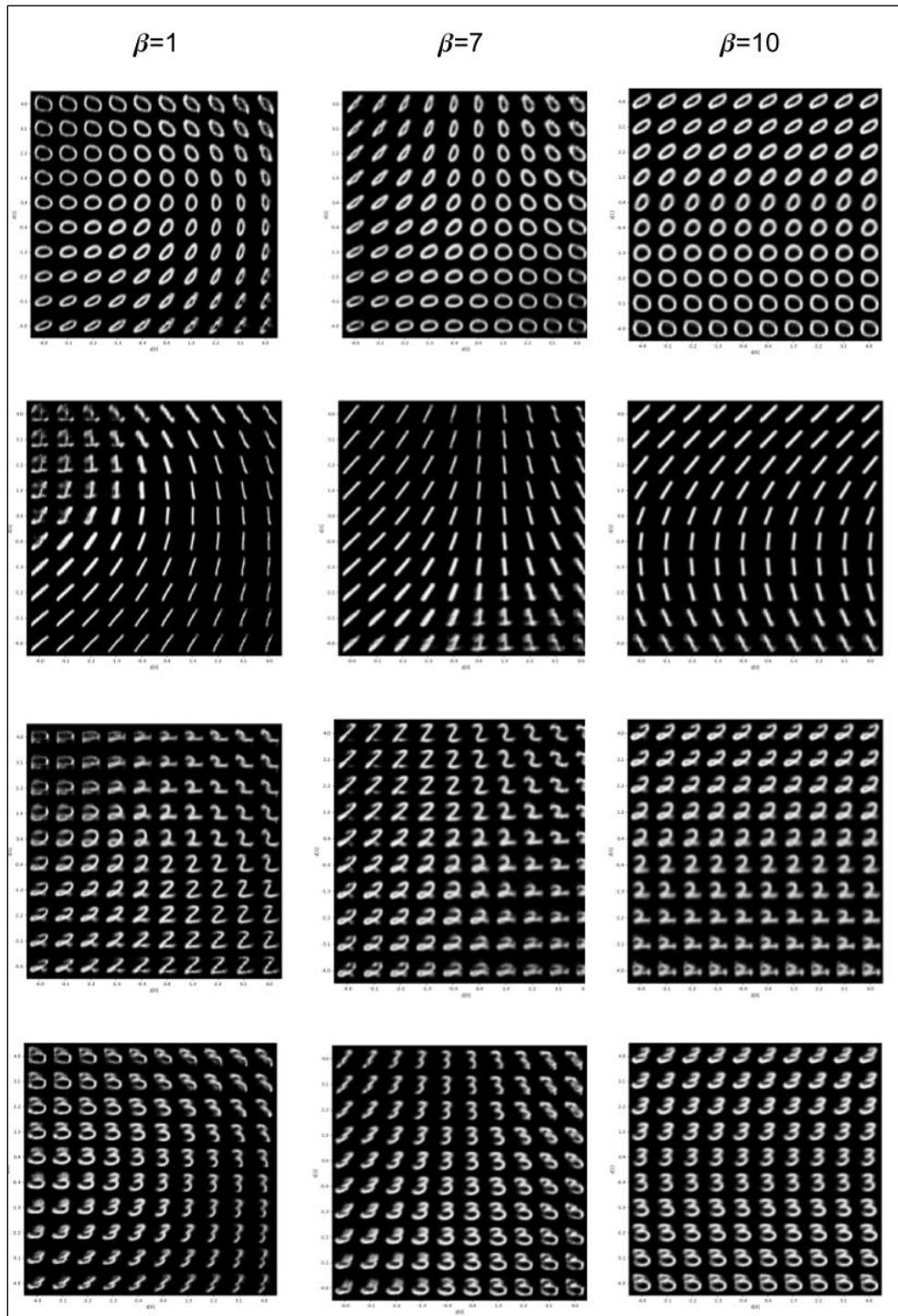




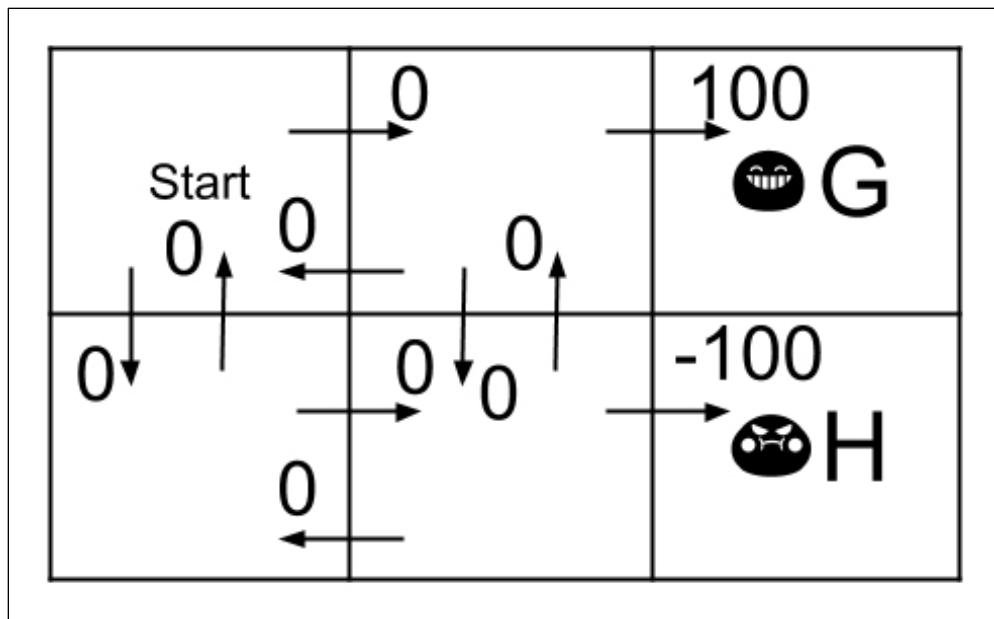
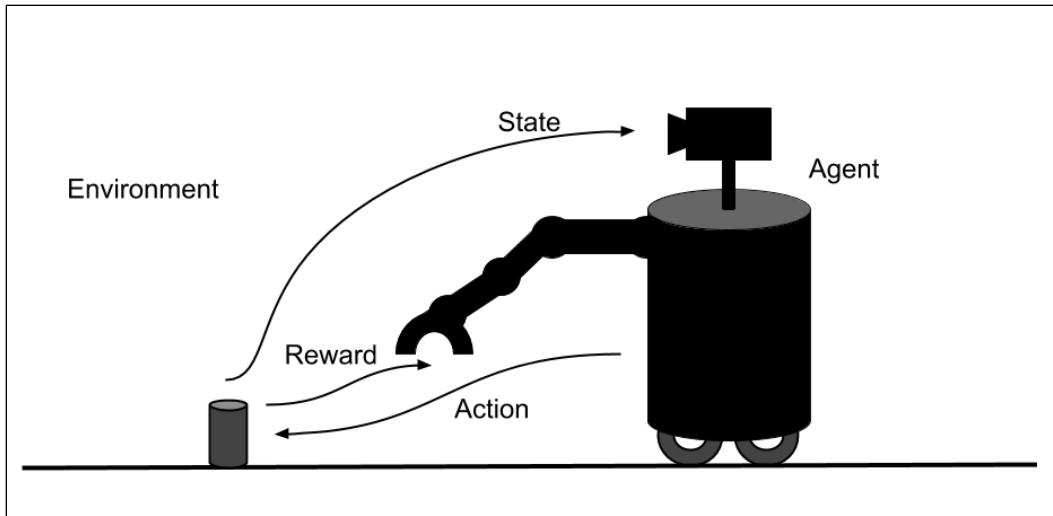








## Chapter 9: Deep Reinforcement Learning



(0,0)	(0,1)	
(1,0)	(1,1)	

Environment

Action \ State	←	↓	→	↑
(0,0)	0	0	0	0
(0,1)	0	0	0	0
(0,2)	0	0	0	0
(1,0)	0	0	0	0
(1,1)	0	0	0	0
(1,2)	0	0	0	0

Q Table

Start	0	
(0, 0)	(0, 1)	(0, 2)
(1, 0)	(1, 1)	(1, 2)

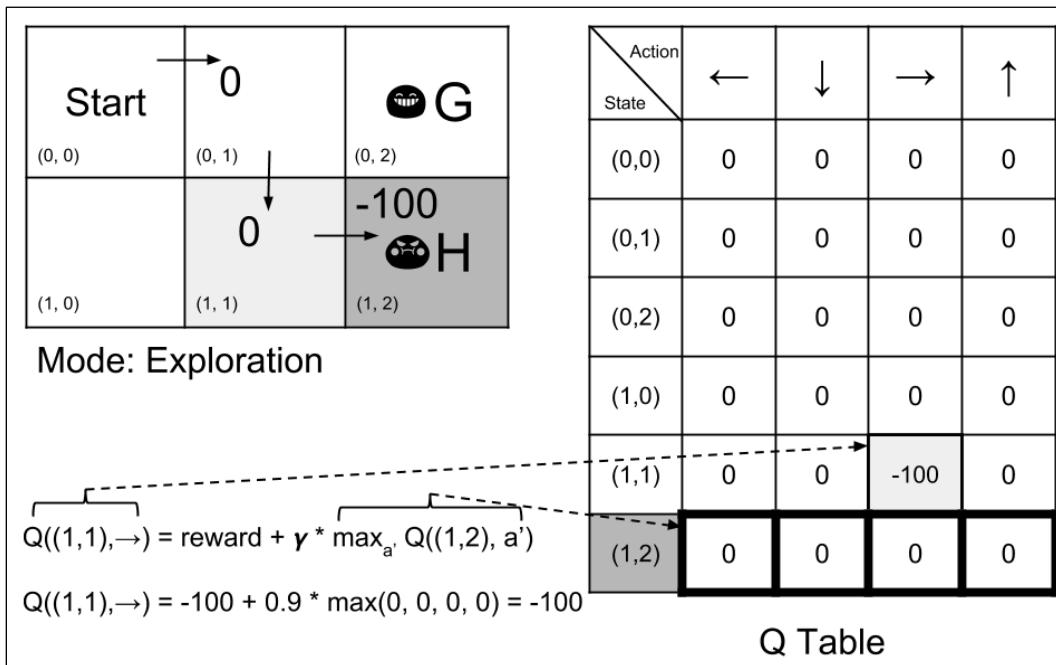
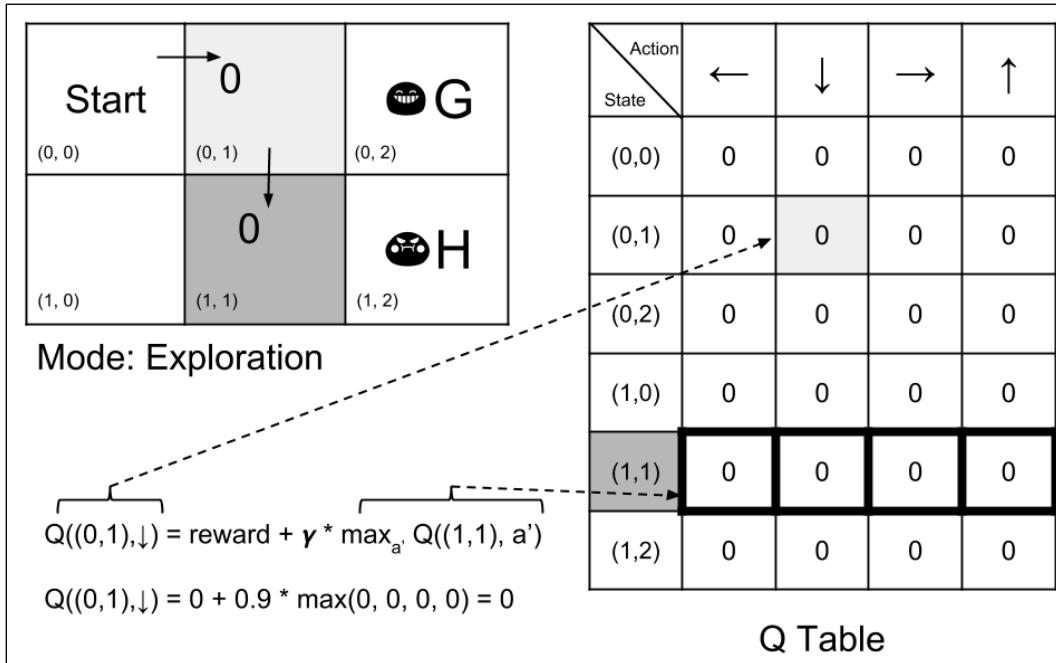
Mode: Exploration

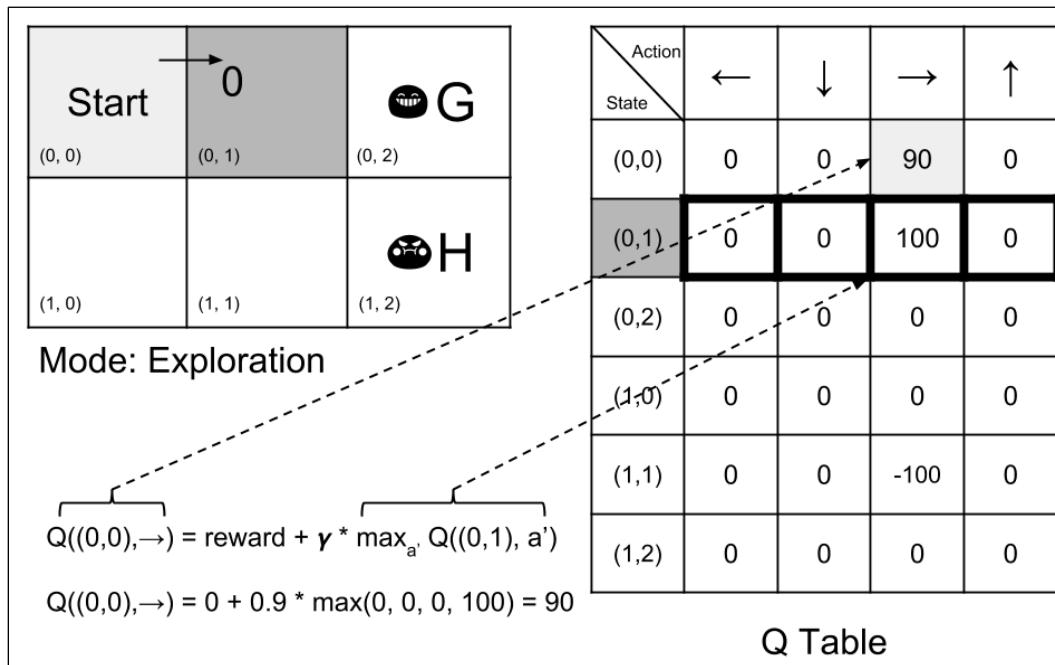
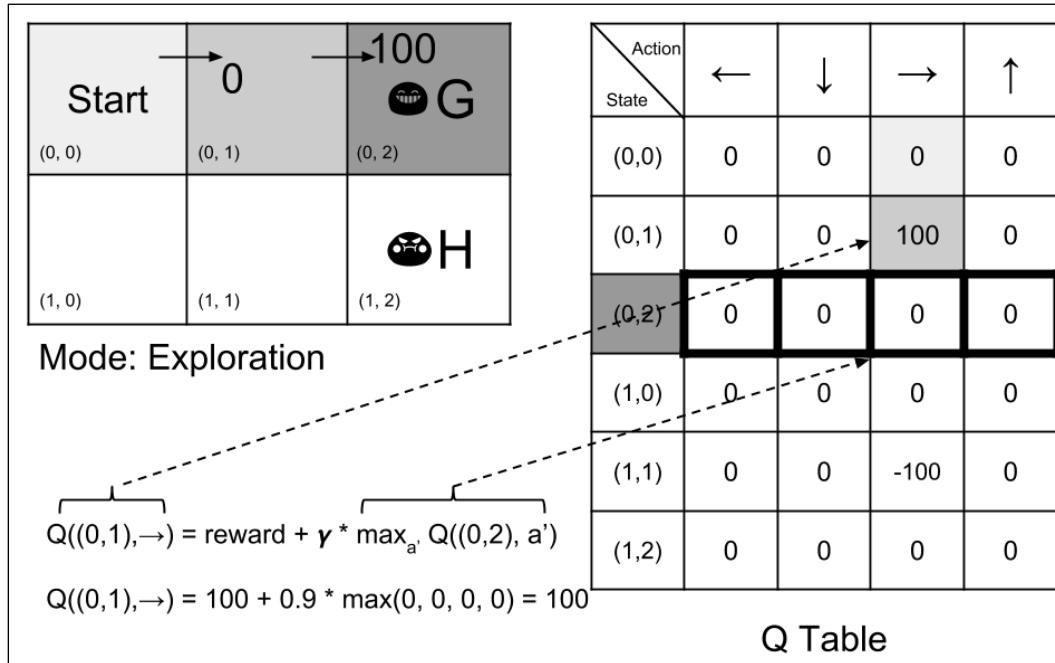
$Q((0,0), \rightarrow) = \text{reward} + \gamma * \max_{a'} Q((0,1), a')$

$Q((0,0), \rightarrow) = 0 + 0.9 * \max(0, 0, 0, 0) = 0$

Action \ State	←	↓	→	↑
(0,0)	0	0	0	0
(0,1)	0	0	0	0
(0,2)	0	0	0	0
(1,0)	0	0	0	0
(1,1)	0	0	0	0
(1,2)	0	0	0	0

Q Table





	Start	0	100 G	
(0, 0)	(0, 1)	(0, 2)		
			H	
(1, 0)	(1, 1)	(1, 2)		

Mode: Exploitation

$\max_{a'} Q((0,0), a') = 90 \rightarrow$  with  $s'=(0,1)$

$\max_{a'} Q((0,1), a') = 100 \rightarrow$  with  $s'=(0,2)$  or Goal

Action \ State	$\leftarrow$	$\downarrow$	$\rightarrow$	$\uparrow$
(0,0)	0	0	90	0
(0,1)	0	0	100	0
(0,2)	0	0	0	0
(1,0)	0	0	0	0
(1,1)	0	0	-100	0
(1,2)	0	0	0	0

Q Table

Step 2 : Exploit (Right)

-----

			<u>G</u>	
--	--	--	----------	--

-----

			H	
--	--	--	---	--

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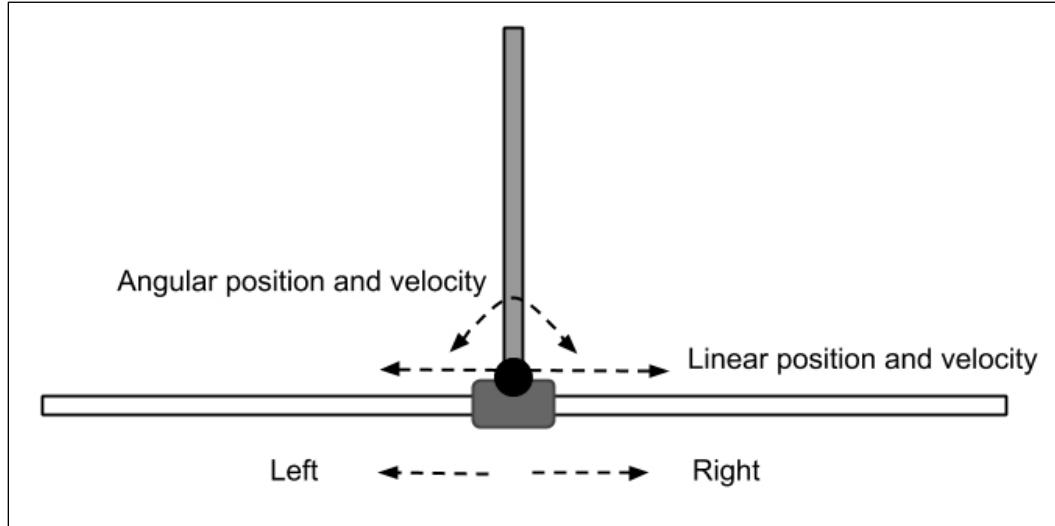
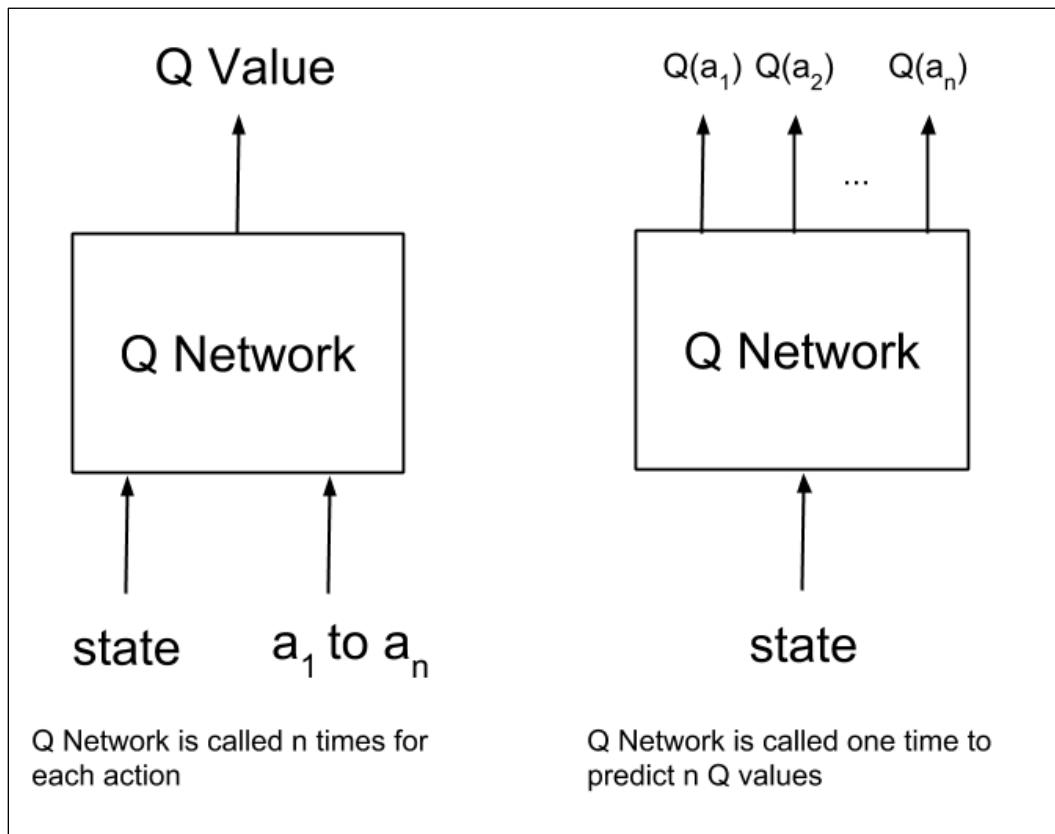
Q-Table (Epsilon: 0.10)

```
[[ 81.    72.9   90.    81. ]
 [ 81.    81.     100.   90. ]
 [ 0.     0.      0.     0. ]
 [ 72.9   72.9   81.    81. ]
 [ 72.9   81.    -100.  90. ]
 [ 0.     0.      0.     0. ]]
```

-----EPISODE DONE-----

Start 90	100	•G 0
81	90	•H 0

(Right)  
SFFF  
FHFH  
FFFH  
HFFG



Start		
(0, 0)      (0, 1)      (0, 2)		
(1, 0)      (1, 1)      (1, 2)		
G H		

**Mode: Exploitation**

$\max_{a'} Q((0,0), a') = 90 \rightarrow$  with  $s'=(0,1)$

$\max_{a'} Q((0,1), a') = 100 \rightarrow$  with  $s'=(0,2)$  or Goal

Action \ State	←	↓	→	↑
(0,0)	0	0	90	0
(0,1)	0	0	100	0
(0,2)	0	0	0	0
(1,0)	0	0	0	0
(1,1)	0	0	-100	0
(1,2)	0	0	0	0

**Q Table**

## Chapter 10: Policy Gradient Methods

