

# DeepFormableTag: End-to-end Generation and Recognition of Deformable Fiducial Markers

## Supplemental Document

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## 1 MARKER GENERATOR NETWORK DETAILS

Table 1 provides details of parameters of our marker generator networks.

Table 1. Marker generator architecture details. For the convolutions, stride and padding is set to (1, 1) with zero padding.

Operator	Activation	Input	Output shape
Message	-	-	36
FC1	-	Message	256
Pixel-norm	LReLU	FC1	256
FC2	LReLU	Pixel-norm	256
Reshape	-	FC1	$4 \times 4 \times 16$
Upsample1	-	Reshape	$8 \times 8 \times 16$
Conv1 (3 × 3)	LReLU	Upsample1	$8 \times 8 \times 8$
AdaIn1	-	Conv1, FC2	$8 \times 8 \times 8$
Upsample2	-	AdaIn1	$16 \times 16 \times 8$
Conv2 (3 × 3)	LReLU	Upsample2	$16 \times 16 \times 6$
AdaIn2	-	Conv2, FC2	$16 \times 16 \times 6$
Upsample3	-	AdaIn2	$32 \times 32 \times 6$
Conv3 (3 × 3)	LReLU	Upsample3	$32 \times 32 \times 6$
AdaIn3	-	Conv3, FC2	$32 \times 32 \times 6$
ConvLast toRGB (1 × 1)	Sigmoid	AdaIn3	$32 \times 32 \times 3$

## 2 CORNER AND DECODER HEAD NETWORK DETAILS

Table 2 provides details of parameters of our corner and decoder head networks.

Table 2. Corner head and decoder head architecture details.

Operator	Activation	Input	Output shape
RoI Align	-	-	$12 \times 12 \times 128$
FC-common	ReLU	RoI Align	$256 \times 1$
FC-resample1	ReLU	FC-common	$128 \times 1$
FC-resample2	-	FC-resample1	$8 \times 8 \times 2$
Decoding sampler	-	RoI Align, FC-resample2	$8 \times 8 \times 128$
FC3	ReLU	Decoding sampler	512
FC4	ReLU	FC3	256
FC-decoder	-	FC4	36
FC-objectness	-	FC4	1
FC-corner1	ReLU	FC-common	$128 \times 1$
FC-corner2	-	FC-corner1	$4 \times 6$
CornerSampler	-	Stem, FC-corner2	$4 \times 8 \times 8 \times 64$
Conv3 (3 × 3, zero-padding)	ReLU	CornerSampler	$4 \times 6 \times 6 \times 32$
FC5	ReLU	Conv3	$4 \times 128$
FC6	ReLU	FC5	$4 \times 64$
FC-corner predictor	-	FC6	$4 \times 2$

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