

	Image Processing		Description
Learning-based Methods	Depth Map Estimation (DPE) [?]		Estimate relative distance of images
	Normal Surface Estimation (NSE) [?]		Estimate Normal Surface of images
	Albedo Map Estimation (AME) [?]		Estimate Diffuse Albedo of images
	Roughness Map Estimation (RME) [?]		Estimate Roughness of images
	Edge Detection (EGD) [?]		Detect Boundaries of images
	Binarization (BIN) [?]		Make images only black and white
	Illuminance Enhancement (RBU) [?]		Recover images from dim light
	Image Demoiréing (IDM) [?]		Remove moiré pattern
	Image Deblurring (IDR) [?]		Recover images from blurry
	Absolute Depth Estimation (ADE) [?]		Estimate absolute distance of images
Rule-based Methods	Brightness (BE/BR)	Value: [0.1, 1.9]	Increase or Decrease Brightness
	Contrast (CE/CR)	Value: [0.1, 1.9]	Increase or Decrease Contrast
	Saturation (SE/SR)	Value: [0.1, 1.9]	Increase or Decrease Saturation
	Box Filter (BX)	Kernal: [1, 10]	Smooth images via Box Filter
	Gaussian Blur (GB)	Kernal: [1, 10]	Blur images via Gaussian Filter
	Log Transform (LT)	Value: [27, 50]	Enhance Low Gray part of images
	Gamma Correct (GC)	Value: [0.5, 1.5]	Adjust exposure of images
	Gaussian Sharpen (GS)	Value: [0.5, 1.5]	Enhance Edges
	Bilateral Filter (BF)	Sigma: [15, 105]	Enhance edges with Blur images
	Median Filter (DB)	Kernal: [1, 19]	Enhance edges with Shape images
	Wavelet Transformation (WT)	LH: [0, 3] HH: [4, 6] HL: [7, 9]	Analyze signals in time-frequency domains
	Perlin Noise (PN)	Octave level: [0, 9]	Generate smooth, continuous, random-like patterns
	Dilate (DL)	Kernal: [0, 9]	Enlarge bright areas in images
	Erode (ED)	Kernal: [0, 9]	Shrink bright areas in binary images
	Morphology Opening (OP)	Kernal: [0, 9]	Erode, then Dilate
	Morphology Closing (CL)	Kernal: [0, 9]	Dilate, then Erode

Table 1: This table shows the composition of heterogeneous Action Space, including 22 rule-based methods and 10 learning-based methods, and their corresponding abbreviation