Table R1: Results of transferability and effect of T of the proposed AdvAD. $*$ means white-box ASR.

Model	Attack Method	Res-50	Mob-V2	Inc-V3	VGG-19	$l_2\downarrow$	PSNR ↑	SSIM ↑	FID ↓	LPIPS ↓
Res-50	SSAH	**99.7***	15.5	20.4	12.7	2.65	43.73	0.9911	4.48	0.0021
	AdvAD (T=1000)	**99.7***	**18.3**	**22.6**	**15.1**	**1.06**	**51.84**	**0.9980**	**2.42**	**0.0005**
	AdvAD (T=500)	**100.0***	18.4	23.0	15.8	**1.17**	**50.85**	**0.9974**	**2.86**	**0.0006**
	AdvAD (T=250)	**100.0***	19.7	23.4	16.5	1.38	49.25	0.9961	3.83	0.0010
	AdvAD (T=200)	**100.0***	**20.3**	**23.8**	**17.0**	1.47	48.76	0.9954	4.23	0.0012
	AdvDrop	96.8*	17.3	23.1	15.8	3.17	41.91	0.9872	**5.57**	0.0061
	PerC-AL	98.8*	22.4	23.8	17.4	2.05	**46.35**	0.9894	8.62	0.0029
	AdvAD (T=100)	**100.0***	**23.5**	**24.9**	**19.9**	**1.97**	46.04	**0.9912**	7.15	**0.0026**
	AdvAD (T=50)	**100.0***	27.1	28.1	23.8	**2.79**	**43.04**	**0.9818**	**11.32**	**0.0067**
	AdvAD (T=25)	**100.0***	**34.0**	**31.5**	**32.5**	4.34	39.05	0.9589	18.96	0.0183
	PGD	98.6*	41.4	36.7	36.0	8.17	33.53	0.8830	35.25	**0.0517**
	AdvAD (T=10)	**100.0***	**44.3**	**37.6**	**42.9**	**7.21**	**34.63**	**0.9015**	**30.84**	0.0547
Mob-V2	SSAH	7.7	97.8*	19.8	11.6	2.18	45.24	0.9930	2.95	0.0016
	AdvAD (T=1000)	**9.7**	**99.7***	**21.3**	**14.8**	**0.94**	**53.08**	**0.9982**	**1.46**	**0.0004**
	AdvAD (T=500)	10.0	99.8*	21.4	14.7	**1.05**	**51.92**	**0.9977**	**1.76**	**0.0005**
	AdvAD (T=250)	10.9	**100.0***	22.0	16.1	1.27	50.06	0.9964	2.50	0.0008
	AdvAD (T=200)	**11.1**	**100.0***	**22.2**	**15.7**	1.34	49.65	0.9958	2.77	0.0009
	AdvDrop	9.7	97.7*	22.7	15.0	3.16	41.94	0.9873	4.88	0.0064
	PerC-AL	**12.7**	99.8*	23.3	17.8	2.16	45.67	0.9879	8.77	0.0032
	AdvAD (T=100)	12.2	**100.0***	**23.4**	**17.9**	**1.83**	**46.68**	**0.9919**	**4.73**	**0.0020**
	AdvAD (T=50)	14.4	100.0*	24.8	21.5	**2.59**	**43.74**	**0.9831**	**8.22**	**0.0052**
	AdvAD (T=25)	**21.2**	**100.0***	**29.2**	**29.3**	4.27	39.18	0.9596	15.63	0.0151
	PGD	29.9	99.9*	**35.3**	37.9	8.29	33.41	0.8803	34.57	0.0500
	AdvAD (T=10)	**30.6**	**100.0***	**35.3**	**38.5**	**7.23**	**34.60**	**0.9006**	**27.25**	**0.0480**

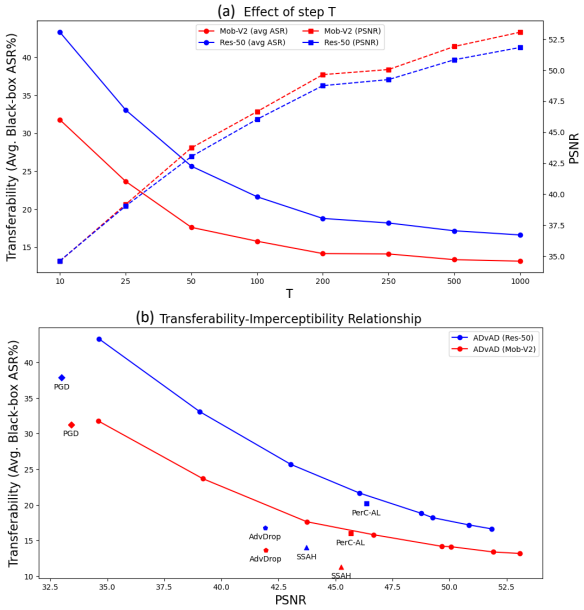

Figure R1: (a) Effect of step T and the trade-off between imperceptibility and transferability. (b) imperceptibility-transferability relationship and more comparisons.

Algorithm 1 AdvAD and **AdvAD-X**

Input: Attacked model $f(\cdot)$, image $\boldsymbol{x}_{ori}$ with label y_{gt}, budget ξ, step T, diffusion coefficients $\alpha_{0:T} \in (0,1]^{T+1}$;
Output: Adversarial example $\boldsymbol{x}_{adv}$

Initialize $\boldsymbol{\epsilon}_0 \sim \mathcal{N}(\mathbf{0}, \boldsymbol{I})$;
Calculate $\bar{\boldsymbol{x}}_T$ via Eq. (4);
Set $\hat{\boldsymbol{x}}_T := \bar{\boldsymbol{x}}_T$, $\hat{\boldsymbol{\epsilon}}_{T+1} := \boldsymbol{\epsilon}_0$;
if AdvAD-X then
  Calculate mask $\boldsymbol{m}$ of $\boldsymbol{x}_{ori}$ using GradCAM;
for $t = T$ to 1 **do**
  Calculate $\hat{\boldsymbol{x}}_t^0$ via Eq. (7);
  if AdvAD then
    Calculate $\hat{\boldsymbol{\epsilon}}_t'$ with AMG via Eq. (8);
    Calculate $\hat{\boldsymbol{\epsilon}}_t$ with PC via Eq. (10);
  else if AdvAD-X then
    if $f(\hat{\boldsymbol{x}}_t^0) == y_{gt}$ (DGI Strategy) **then**
      Calculate $\hat{\boldsymbol{\epsilon}}_t'$ with AMG and $\boldsymbol{m}$ (CA Strategy);
      Calculate $\hat{\boldsymbol{\epsilon}}_t$ with PC via Eq. (10);
    else
      Set $\hat{\boldsymbol{\epsilon}}_t = \boldsymbol{\epsilon}_0$;
  Calculate $\hat{\boldsymbol{x}}_{t-1}$ via Eq. (11);
if AdvAD then
  return $\boldsymbol{x}_{adv} = \text{int8}(\text{round}(\hat{\boldsymbol{x}}_0))$;
else if AdvAD-X **then**
  return $\boldsymbol{x}_{adv} = \hat{\boldsymbol{x}}_0$ (Ideal Senario);

Table R2: Comparison between PGD equipped with decaying step size strategy and the proposed AdvAD.

Model	Attack Method	Steps	Time	ASR	l_∞	l_2	PSNR ↑	SSIM ↑
ResNet-50	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00005$)	T=1000	2272	**99.9**	0.016	1.80	46.75	0.9947
	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00003$)		2228	99.0	0.008	1.17	50.41	0.9974
	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00001$)		2306	7.1	-	-	-	-
	AdvAD (ours)		2201	99.7	0.010	**1.06**	**51.84**	**0.998**
Swin-Base	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00005$)	T=1000	8725	98.0	0.008	1.28	49.88	0.9975
	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00003$)		8728	89.1	**0.004**	**0.94**	**52.47**	**0.9985**
	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00001$)		8715	3.9	-	-	-	-
	AdvAD (ours)		9729	**100**	0.013	1.19	50.57	0.9978
VisionMamba-Small	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00005$)	T=1000	6350	89.2	0.008	1.63	47.76	0.9959
	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00003$)		6393	78.3	**0.004**	**1.10**	**51.05**	**0.9979**
	PGD + Step size decay (λ_t in Eq. 12, $\eta = 0.00001$)		6348	2.5	-	-	-	-
	AdvAD (ours)		6154	**99.7**	0.016	1.62	47.94	0.9960