



## **1. Introduction**

- The first method for speech-preserving emotion manipulation in videos.
- It automatically changes the emotion of a talking face given only semantic information as input.
- Semantic control of facial performance could be a key tool for movie production, video games, extended reality.

# 2. Method overview

- NED can control facial expressions in videos by conditioning the manipulation either:
  - a) on emotional labels, or
  - b) on the specific style of a reference video.



a)

b)

• We use a mouth-related train loss to preserve lip motion:



# Neural Emotion Director: Speech-preserving semantic control of facial expressions in "in-the-wild" videos

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# **3. Pipeline**



#### 4. 3D-based Emotion Manipulator training

 Multi-domain adversarial training using expression parameters from multiple videos of talking faces.



# 6. Experimental results



# 5. Neural Face Renderer training

 Person-specific "self-reenactment" training: reconstruct the face images from the conditional geometry images.









# 7. Visual comparison with GANmut [2]

More realistic results, with much less artifacts.



## 8. Quantitative comparisons on MEAD [1]

	Ours		GANmut [2]		DSM [3]		ICface [4]	
	FAPD	FID	FAPD	FID	FAPD	FID	FAPD	FID
neutral	14.9	2.1	16.8	2.9	22.1	5.5	40.0	45.8
nappy	17.8	3.4	15.0	2.6	27.0	10.3	43.7	50.5
ear	18.4	3.0	20.5	4.3	28.0	8.5	43.0	46.6
ad	19.0	3.0	18.1	4.3	24.5	8.8	38.6	47.4
urprised	18.9	2.9	19.1	7.2	27.3	11.8	46.1	45.0
ingry	18.4	3.0	22.4	4.2	-	-	51.7	53.5
lisgusted	18.1	3.1	15.1	4.5	-	-	39.7	54.6
vg. (7)	17.9	2.9	18.1	4.3	_	_	43.3	49.0
vg. (5)	17.8	2.9	17.9	4.3	25.8	9.0	42.3	47.1

nd Truth

GANmu

DSM

ICface



### 9. Failure cases

Input videos with big changes in illumination conditions or subject's appearance.



Frame from the



#### References

[1] Wang et al. MEAD. ECCV 2020
[3] Solanki & Roussos. DSM. arXiv, 2021.
[2] d'Apolito et al. GANmut. CVPR 2021.
[4] Tripathy et al. ICface. WACV, 2020.