

# Neural separation of observed and unobserved distributions

T. Halperin, A. Ephrat, Y. Hoshen

Illustrative task: Separate tiger and environmental sounds



# Standard Setting: Supervised Source Separation

Requires clean audio samples of tiger, and of environmental sounds

Hard to obtain clean tiger samples



# Our Setting: Semi-Supervised Source Separation

Only requires clean audio samples of tiger-free environments

Much easier to obtain!



# Semi-Supervised Separation with Neural Egg Separation

Novel method: Neural Egg Separation (NES)

Iterative method

Key: obtain increasingly better estimates of the unobserved distribution



# Neural Egg Separation

NES works on mixtures of: images, music and vocals, speech and noise

Example: mixture of bag and shoes images

We never observe shoes alone, only mixed with bags.

Bags:  
Observed



Shoes:  
**Unobserved**



+



=



## Neural Egg Separation: Initialize

- Make a rough estimate of shoe images



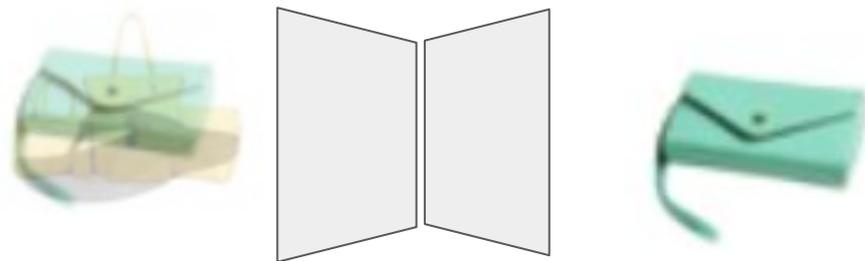
# Neural Egg Separation: Synthetic Mixtures

- Mix estimated shoes with real bags



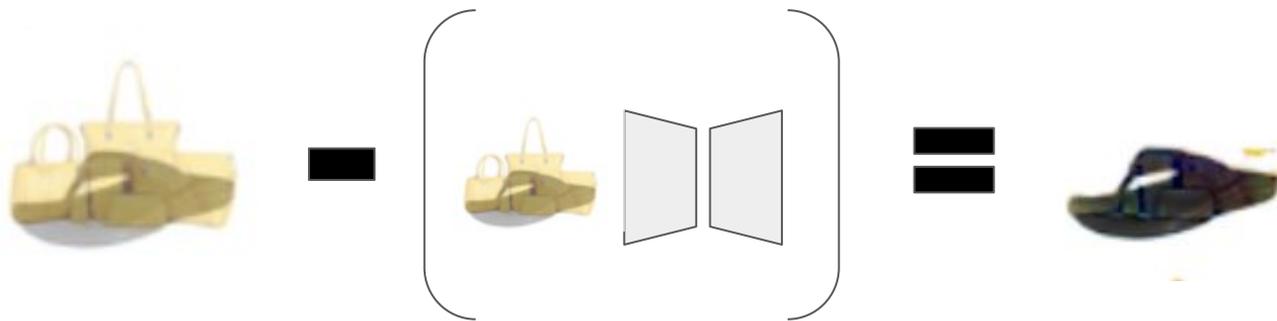
# Neural Egg Separation: Separation Network Training

- Train a separation function to separate mixtures into clean sources



# Neural Egg Separation: Refining Unobserved Estimates

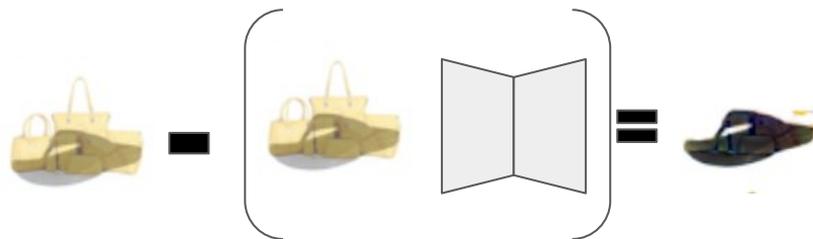
- Use separation function to create cleaner estimates



# Neural Egg Separation: Iterate

Works on audio and images  
Poster #223

Refine estimated samples:



Create synthetic mixtures:



Train better separation function:

