Mooney Faces from Photos

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VSS 2017
Faces are everywhere

[Miller, etc., 2007]
Source Photos are usually not available
[Ng, and Winkler, ICIP2014]
[Ng, and Winkler, ICIP2014]
Generate Large Scale Mooney Face Dataset

[Ng, and Winkler, ICIP2014]
Generate Large Scale Mooney Face Dataset

Predict Source Photos from Mooney Faces

[Ng, and Winkler, ICIP2014]
Generate Large Scale Mooney Face Dataset

Predict Source Photos from Mooney Faces

[Ng, and Winkler, ICIP2014]
Train a Mooney Face Classifier
Train a Mooney Face Classifier

Mooney face classifier
Train a Mooney Face Classifier
Generate Mooney Candidates
Generate Mooney Candidates

two-tone candidates
Generate Large Scale Mooney Dataset

two-tone candidates ➔ Mooney face classifier
two-tone candidates → Mooney face classifier
Mooney Face Classifier: Architecture

[Krizhevsky, Sutskever, and Hinton, NIPS 2012]

[Szegedy, etc., CVPR 2015]
Mooney Face Classifier: Negative Samples

original (✓)
Mooney Face Classifier: Negative Samples

original (✓) dilated (✓)
Mooney Face Classifier: Negative Samples

original (✓) dilated (✓) eroded (✓)
Mooney Face Classifier: Negative Samples

original (✓) dilated (✓) eroded (✓)

inverted (✗)
Mooney Face Classifier: Negative Samples

original (✓) dilated (✓) eroded (✓)

inverted (✗) negative (✗)
Mooney Face Classifier: Negative Samples

original (✓) dilated (✓) eroded (✓)

inverted (✗) negative (✗) neg.+inv. (✗)
Mooney Face Classifier: Negative ImageNet Samples
two-tone candidates -> Mooney face classifier
Mooney Candidates
Mooney Candidates
Mooney Candidates
Mooney Candidates
Mooney Candidates
Generate Large Scale Mooney Dataset

two-tone candidates

Mooney face classifier

[Diagram showing the process of generating a large scale Mooney dataset, including two-tone candidates and a Mooney face classifier.]
Images of Most Mooneyness
[Ng, and Winkler, ICIP2014]

Machine Learning

Generate Large Scale Mooney Face Dataset

([✓])

Predict Source Photos from Mooney Faces
We have a Large-Scale Mooney Face Dataset
Can We Predict GrayScale Face from Mooney Images?
Generative Adversarial Network (GAN)

x sampled from data

[Goodfellow, etc., NIPS2016]
Generative Adversarial Network (GAN)

D(x) tries to be 1

differentiable function D

x sampled from data

x

[Goodfellow, etc., NIPS2016]
Generative Adversarial Network (GAN)

D(x) tries to be 1

Differentiable function D

x sampled from data

input noise z

[Goodfellow, etc., NIPS2016]
Generative Adversarial Network (GAN)

- $D(x)$ tries to be 1
- Differentiable function $D$
- $x$ sampled from data
- Input noise $z$

[Goodfellow, etc., NIPS2016]
Generative Adversarial Network (GAN)

D(x) tries to be 1

differentiable function D

x sampled from data

G(z) sampled from model

differentiable function G

input noise z

[Goodfellow, etc., NIPS2016]
Generative Adversarial Network (GAN)

[Goodfellow, etc., NIPS2016]

\[ D(x) \] tries to be 1

\[ D \] tries to make \( D(G(z)) \) near 0; 
\[ G \] tries to make \( D(G(z)) \) near 1

\[ x \] sampled from data

\[ G(z) \] sampled from model

\[ G(z) \] are playing games:
\[ G \] tries to generate fake images that fool \[ D \]
\[ D \] tries to identify the fakes

\[ x \]

\[ G(z) \]
Generative Adversarial Network (GAN)

[Goodfellow, etc., NIPS2016]

- $D(x)$ tries to be 1
- Differentiable function $D$
- $x$ sampled from data

- $G(z)$ sampled from model
- Differentiable function $G$
- Input noise $z$

$D$ tries to make $D(G(z))$ near 0; $G$ tries to make $D(G(z))$ near 1

$G$ and $D$ are playing games:
- $G$ tries to generate fake images that fool $D$
- $D$ tries to identify the fakes
Predict GrayScale Face by GAN

**Positive Examples**

Real or fake pair?

**Negative Examples**

Real or fake pair?

Split dataset into training and testing set by identity
Faces in testing are never seen to G and D

[Isola, etc., CVPR2017]
Prediction Results
Prediction Results

<table>
<thead>
<tr>
<th>input</th>
<th>CCA-1600</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Image 1" /></td>
<td><img src="image2" alt="Image 2" /></td>
</tr>
<tr>
<td><img src="image3" alt="Image 3" /></td>
<td><img src="image4" alt="Image 4" /></td>
</tr>
<tr>
<td><img src="image5" alt="Image 5" /></td>
<td><img src="image6" alt="Image 6" /></td>
</tr>
</tbody>
</table>
Prediction Results

input  CCA-1600  CGAN
Prediction Results

![Image of prediction results with input, CCA-1600, CGAN, and Source columns]
<table>
<thead>
<tr>
<th>input</th>
<th>CGAN</th>
<th>input</th>
<th>CGAN</th>
<th>input</th>
<th>CGAN</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
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Prediction Results
Generate Large Scale Mooney Face Dataset

Predict Source Photos from Mooney Faces

[Ng, and Winkler, ICIP2014]
Now We can predict source photos
Use our code and download dataset from

https://mooney.icsi.berkeley.edu