

Deep Learning Tools for Eating Disorder Recovery

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Introduction

- People with eating disorders (ED) have created **pro-eating disorder** communities online [1] where they encourage each other to act on ED symptoms and post inspirational photos (Fig. 1) of their ideal body type
- Seeing this content can be particularly harmful for patients in recovery
- For ED clinicians, it is hard to stay up-to-date with pro-ED communities and monitor patients
- For patients, it is hard to use social media without seeing triggering images

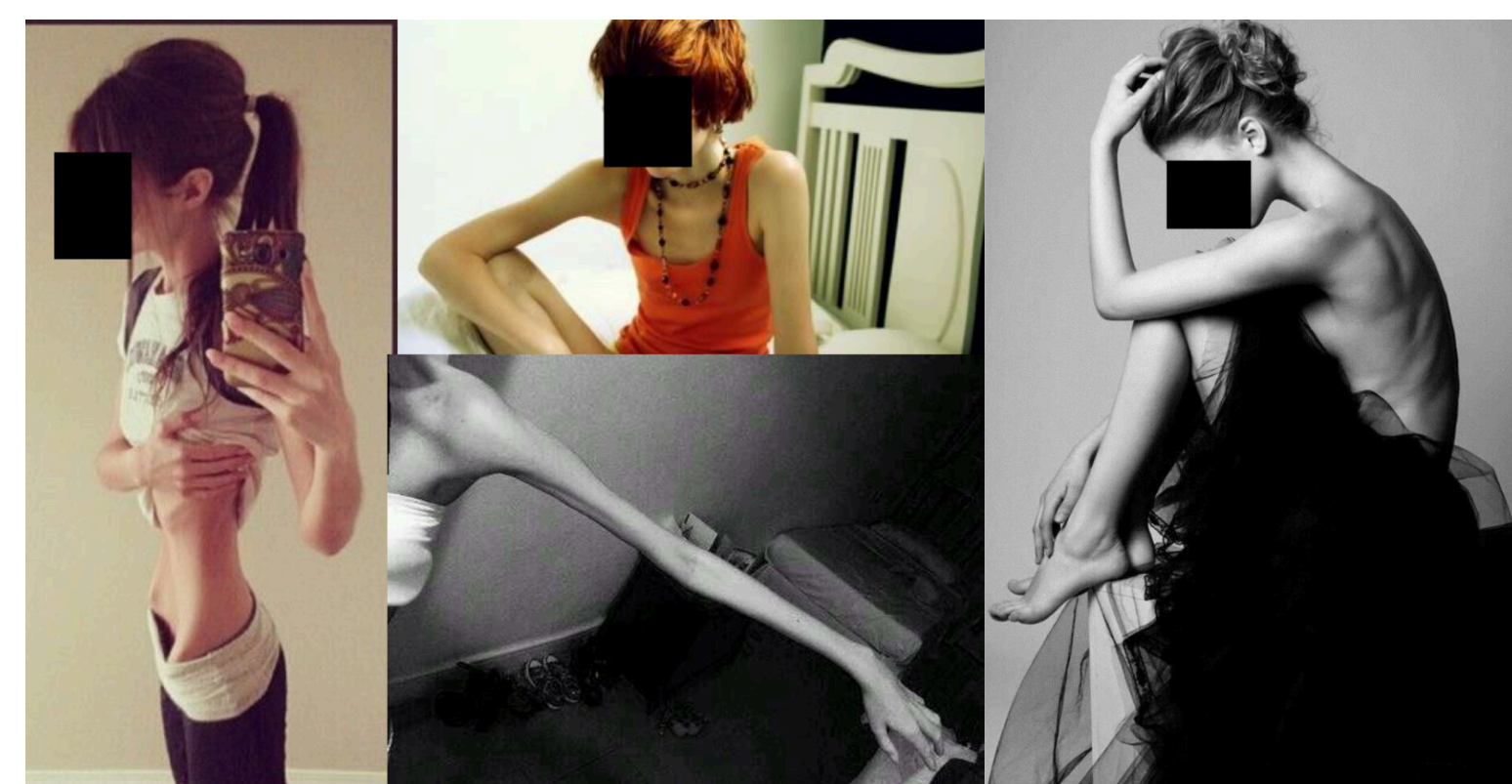


Figure 1. sample of pro-ED training data

Tumblr Blog Test

- As a proof of concept, we identified ten Tumblr users (Fig. 2) and classified images from their blogs:

Blog type	Topic	%pro-ED
pro-ED		73%
pro-ED		88%
pro-ED		89%
pro-ED		83%
fitspo	vegan food & pilates	53%
not pro-ED	landscapes and books	21%
not pro-ED	mathematics memes	4%
not pro-ED	black & white art	10%
not pro-ED	cars	9%
not pro-ED	musicians and bands	7%

Figure 2. Tumblr blog image test

Overview

a **deep learning classifier** that detects pro-eating disorder images, used to create software tools that aim to **improve health outcomes for ED patients**

Dataset Curation

- Used hashtags for training data and gathered images from Tumblr, Twitter, and Flickr
- Images from hashtags represent the pro-ED community as defined by its members
- Created not-pro-ED training data from hashtags that yielded content similar in demographics and photographic style (Fig. 3) to pro-ED images

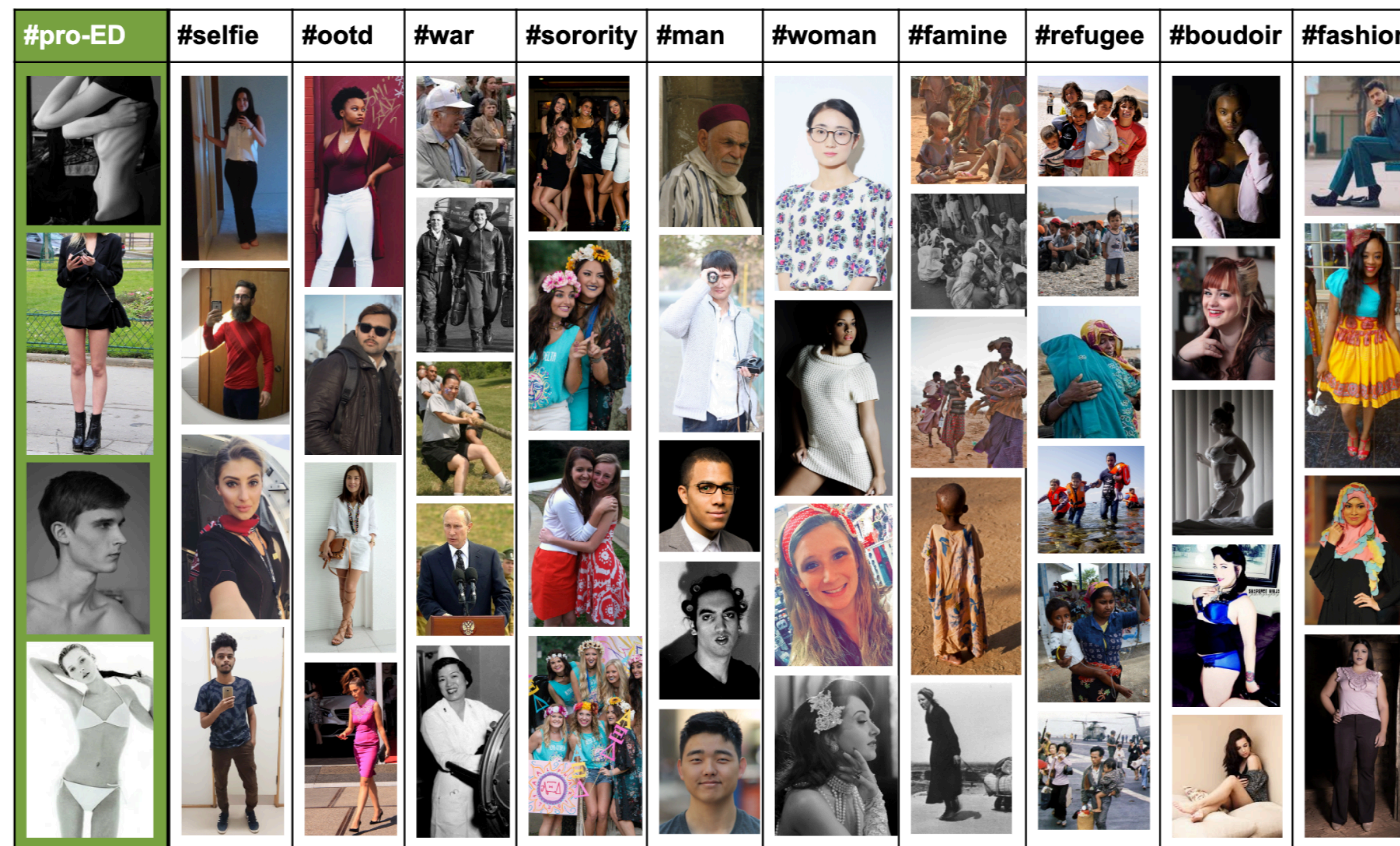


Figure 3. sample images from the pro-ED and not-pro-ED classes

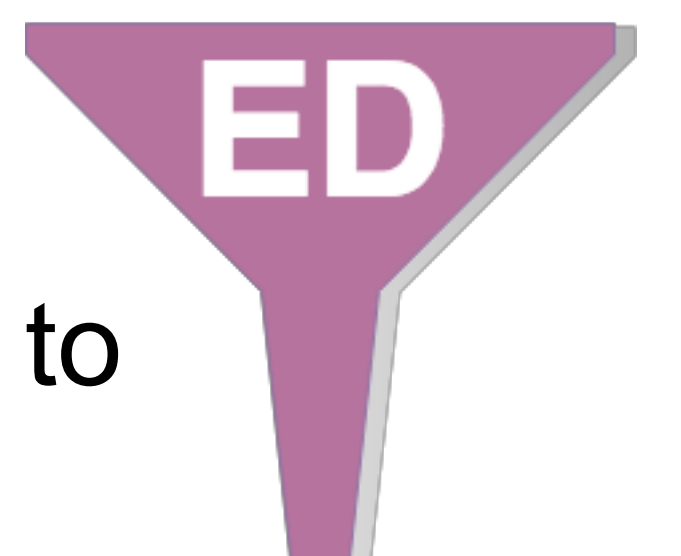
Classifier Design

- Used a standard Convolutional Neural network, ResNet [2], as baseline for classifier
- Binary classifier with 51,000 images in each category, trained with a 80/20 data split
- Resulting classifier detects pro-ED images with **80% accuracy**

Software

filterED: patient tool

Google Chrome browser extension that uses classifier to identify then block triggering images



explainED: clinician tool

Webapp that helps clinicians assess and understand pro-ED users and content online



Future Work

- Adding software features to both tools and adapting them to users' needs and desires
- Improving the classifier's training data by gathering more images
- Conducting user studies and deploying software in the world

* based on work done in collaboration with Robert Pless and Justine-Louise Manning

References

- [1] A. Oksane and , D. Garcia, P. Räsänen, "Proanorexia communities on social media", Pediatrics, 2016.
- [2] K. He, X. Zhang, S. Ren, J. Sun, "Deep residual learning for image recognition", IEEE Conference on Computer Vision and Pattern Recognition, 2016.