Discussion: Instagram photos reveal predictive markers of depression

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24/04/2020
1. Instagram posts made by individuals diagnosed with depression can be reliably distinguished from posts made by healthy controls, using only measures extracted computationally from posted photos and associated metadata. This applies to the photographs that are taken even before the first clinical diagnosis of depression.

2. The models outperformed general practitioners’ average unassisted diagnostic success rate for depression.

3. On average, depressed users post photos in bluer, grayer, darker colors. Depressed users post more photos with faces. Depressed users post photos with fewer faces. The use of filters between healthy users and depressed users is different.
Topics of Discussion.

01. Depression
   What exactly is depression and how society perceives it?

02. Interpretations
   How can we interpret the results?

03. Implications
   What does (or does not) this study imply?
Depression
What is depression?

Depression is a mood disorder that involves a persistent feeling of sadness and loss of interest.

Depression is nearly twice as common among women as men, according to the Centers for Disease Control and Prevention (CDC).

- a depressed mood
- reduced interest in activities once enjoyed
- a loss of sexual desire
- changes in appetite
- unintentional weight loss or gain
- sleeping too much or too little

https://www.medicalnewstoday.com/articles/8933#symptoms
Depression may be represented differently in various cultures.

In this paper, the author implicitly, but strongly assumed that depressed people will upload photos that reveal depression on their Instagram.

*Is that assumption reasonable?*

*How is depression represented (or not tabooed) in your country?*

Please share your experience and knowledge on depression!
Interpretation
How did they collect and analyzed data?

Data Collection
- Mechanical Turk workers.
- Depression level measured through CES-D questionnaire.
- 100+ previous tasks, high approval rating, American IP address.

Feature Extraction
- Computational features and Instagram metadata
- Sentiments of the collected photos

Statistical Framework
- Bayesian Logistic Regression & Supervised ML
Which Statistical Measure to Choose?

Table 1  Comparison of accuracy metrics for All-data and Pre-diagnosis model predictions

<table>
<thead>
<tr>
<th></th>
<th>Mitchell et al. $\mu$</th>
<th>All-data $\mu(\sigma)$</th>
<th>Pre-diagnosis $\mu(\sigma)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall</td>
<td>0.510</td>
<td>0.697 (0.008)</td>
<td>0.318 (0.012)</td>
</tr>
<tr>
<td>Specificity</td>
<td>0.813</td>
<td>0.478 (0.012)</td>
<td>0.833 (0.010)</td>
</tr>
<tr>
<td>Precision</td>
<td>0.42</td>
<td>0.604 (0.009)</td>
<td>0.541 (0.009)</td>
</tr>
<tr>
<td>Negative Predictive Value</td>
<td>0.858</td>
<td>0.579 (0.008)</td>
<td>0.665 (0.006)</td>
</tr>
<tr>
<td>F1</td>
<td>0.461</td>
<td>0.647 (0.003)</td>
<td>0.401 (0.008)</td>
</tr>
</tbody>
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Precision = $\frac{TP}{(TP+FP)}$

*How many of those who we labeled as depressed are actually depressed?*

Recall = $\frac{TP}{(TP+FN)}$

*Of all the people who are depressed, how many of those they correctly predict?*

Specificity = $\frac{TN}{(TN+FP)}$

*Of all the people who are healthy, how many of those did we correctly predict?*
The study suggests that depressed people do not use filters much, or choose filters that convert images in black-and-white.
What can we say about filter characteristics?
03.

Implications
Other Possible Indicators of Depression?

Several features were selected as possible indicators of depression: user activity, community reaction, user social activity, pixel-level HSV, filters.

Can you think of other possible indicators of depression in Instagram photos?

Will they be computational features or semantic features?

Can they be extracted from a single post, or should they be extracted and inferred from a sequence of posts?
This research surveyed Mturk workers from United States only.

However, throughout the paper, the authors never mentioned that this is a research about depression in United States.

*Can we say that the result of this work can account for depression in general, in the world of Social Media?*
Assume that there is a system that can detect a smallest hint of depression in your Instagram photos, with 100% accuracy.

_Do you want your Social Media service provider to detect your depression? (even before you notice that you are depressed?)_ Why, or Why not?
Thanks!

Do you have any questions?