0 TITLES:

NAMES:

I’m Lying Down

iLieDown

Automatic Face Rotation (Auto-Face)

iRotate 2.0

1 INTRODUCTION

because the screen is oriented relative to gravity instead of the user

Handheld devices such as smartphones and tablets can be used in four different orientations: *portrait*, *upsidedown*, *landscapeLeft*, and *landscapeRight*. The device’s screen automatically changes to match which orientation the device is being held in. Current solutions commonly use the Earth’s gravity to calculate the rotation of the device. Specifically, modern devices use an accelerometer to measure the acceleration (and/or force) acting on the device due to gravity in the , , and directions. These observations are then used to confidently orient the display relative to gravity.

Let’s say for example that a user is sitting upright and holding a smartphone vertically, so the phone’s display is oriented to *portrait*. This orientation is correct since the user is also vertical. When the user lies down to the right, the device rotates from *portrait* to *landscapeRight* because that is the correct orientation relative to gravity. However, this configuration is wrong since the user has not actually rotated the device; they are still holding it vertically relative to themselves. The screen should remain *portrait*, but the accelerometer/gravity solution fails to detect this. In the remaining sections, we loosely refer to the current solution as “gravity” because it uses gravity to orient the device’s display.

Noticeable lag - do this first

1. Have the user test both gravity rotation and iLieDown rotating in all three directions
2. Ask them if one appeared faster or slower than the other

|  |  |  |  |
| --- | --- | --- | --- |
|  | Gravity is faster | Auto-Face is faster | Same |
| iPhone 6 | 7 | 0 | 13 |
| iPhone XS | 3 | 2 | 15 |

Total number of successful rotations –

80

51

Would you use the application despite the lag?

|  |  |  |
| --- | --- | --- |
|  | Yes | No |
| iPhone 6 | 20 |  |
| iPhone XS | 20 |  |

Would you still use it despite the privacy concerns of images being taken?

Yes 11111111

Only if the company is reputable

No

Use ‘anonymous’ images for training?

Go for it 1111

Only if the company is reputable 1

Only if the users could approve the photos before sending them 1

No 111

How often do you use your device upsidedown?

Weekly – 1

Never – 13

Something else – when facetiming and charging, taking pictures

TOTAL PEOPLE TESTED: 8 guys, 4 girls

**Final Check.** When rotating, only two orientations are possible – relative to gravity and the previous orientation. This is depicted in Figure 2 in step 1 when Auto-Face knows that either a *landscapeLeft* or *portrait* orientation is possible.

Our goal is to correctly orient a device screen relative to the user using the front-facing camera while remaining extremely battery and CPU efficient. Another goal is to be fast enough so that user cannot notice any additional lag compared to gravity. Our algorithm builds on top of the ideas of fully convolutional neural networks and deeply-supervised nets.