Simple Touch Prediction with Built-In IMUs

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ABSTRACT

Abstracts should be about 150 words. Required. See: https://users.ece.cmu.edu/~koopman/essays/abstract.html

CCS CONCEPTS

• **Human-centered computing** → **User studies**; **Ubiquitous and mobile devices**;

KEYWORDS

Authors' choice; of terms; separated; by semicolons; include commas, within terms only; required.

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1 INTRODUCTION

2 RELATED WORK

Motivate your project by reporting about related work and common goals.

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Device	Release	Display Size (in)	Weight (g)	Screen Diagonal (in)	Height (cm)	Width (cm)	Depth
Samsung Galaxy S3 Mini	2012	4.	113	4.	12.16	6.3	0.99
Samsung Galaxy S4	2013	4.8	130	5.	13.7	7.0	0.79
OnePlus One	2014	5.46	162	5.46	15.29	7.59	0.89
Motorola Nexus 6	2014	5.96	184	6.	15.93	8.3	1.01

Table 1: Data about the smartphones that were used in the study.

3 DATA COLLECTION STUDY

We conducted a data collection study to gather IMU data while performing touches on a smartphone. Our collected dataset consists of 6 smartphone sensors that were sampled while participants performed successive touches on the smartphones front side.

Design

We used a repeated-measures design with one independent variable: PHONE, which was counterbalanced using Latin Balanced squares. To total amount of conditions was: PHONE = 4.

Apparatus

Our dataset was generated using four different sized smartphones on which participants had to perform a certain amount of touches (for further information see Section 3). Our used phone sizes range from 4″ (S3) to 5.96″ (N6). Using phones of these sizes we were able to cover the sizes of everyday smartphones, including some high-end devices and create a generalizable machine-learning model. For more technical details about the used devices see Table 1.

Tasks

For our data collection study participants had to perform a series of touches on the smartphones' touchscreen. We aligned the crosses participants had to touch in a 16×9 grid. In order to achieve a high variance across the whole screen, we randomized the positions of the crosses within all the cells. There were a total of 3 repetitions, resulting in $16 \times 9 \times 3 = 432$ touches on one device.

Between two touches our study participants had to perform a simple *Fitts' Law task*. Here participants had to drag a filled rectangle into a dashed contour of a rectangle. This task was mainly

implemented to reset the participants grip to the bottom half of the device, because a previous shifted grip of the hand to the upper half of the phone influences the recorded sensor data when reaching for targets in the lower half and vice versa.

Procedure

Report about the whole procedure.

Participants

Report about age, gender, and similar demographics.

4 RESULTS

Report about your model. No source code!

Report about the validation dataset / validation study.

5 DISCUSSION

Disuses why it is still not awesome and how this could be improved. Why this is still awesome? Think about: Nobody has done this before.

6 CONCLUSION

Two sentences wrap up what you have done. Than report what you achieved.

REFERENCES

Good Utilization of the Side Bar
Preparation: Do not change the margin dimensions and do not flow the margin text to the next page.
Materials: The margin box must not intrude or overflow into the header or the footer, or the gutter space between the margin paragraph and the main left column.
Images & Figures: Practically anything can be put in the margin if it fits. Use the `\marginparwidth` constant to set the width of the figure, table, minipage, or whatever you are trying to fit in this skinny space.

Sidebar 1: This is the optional caption

Figure 1: In this image, the cats are tessellated within a square frame. Images should also have captions and be within the boundaries of the sidebar on page 3. Photo: ⓒⓄ jofish on Flickr.

Table 2: A simple narrow table in the left margin space.