Gallery D.C.: Design Search and Knowledge Discovery through Auto-created GUI Component Gallery

Chunyang Chen, Sidong Feng, Zhenchang Xing, Linda Liu, Shengdong Zhao, Jinshui Wang
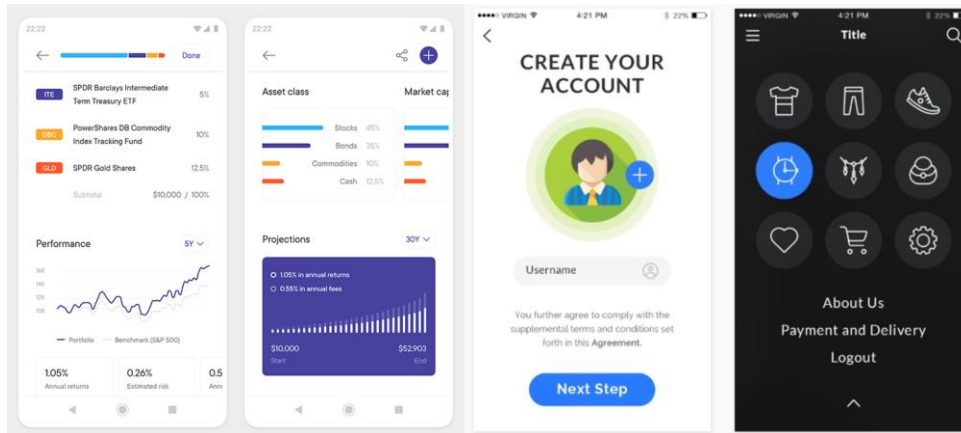
What is **Design Sharing**?

Design sharing is a routine activity through which design knowledge and creativity is exchanged among designers.

What is **Invisible Crowdsourcing**?

Invisible crowdsourcing is one of the emerging Web 2.0 based phenomena and enables a broader collaboration indirectly with thousands of designers who craft the design of the world-wide popular mobile apps.
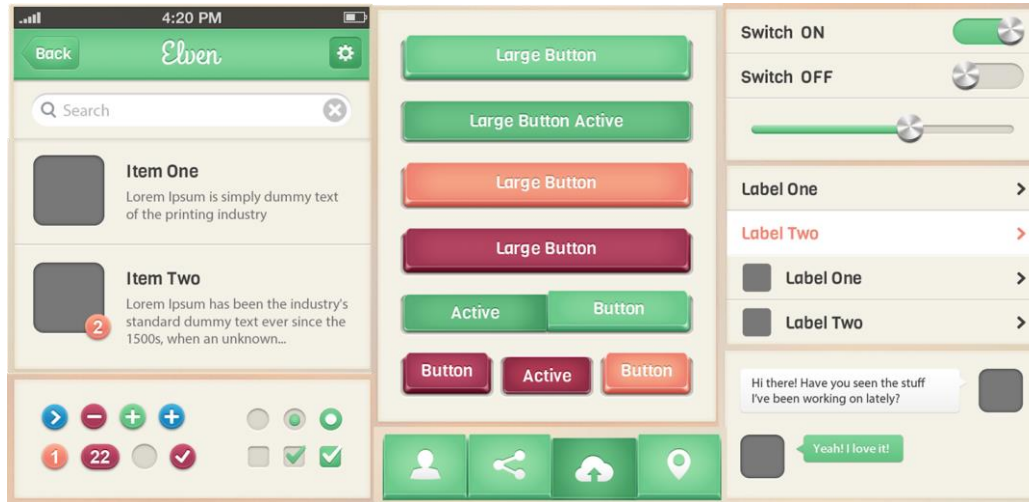
Motivation: Design Practicality

Designers need to see the **practical use** of certain GUI designs in real applications, rather than just **artworks.**

Artwork   Google Map   HERE WeGo   Baidu Map   Tencent Map
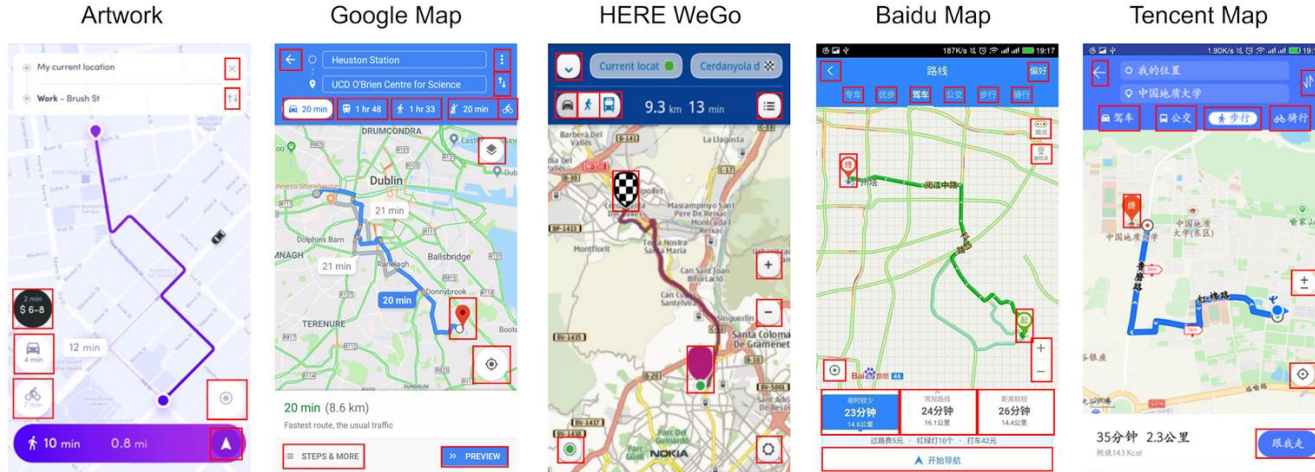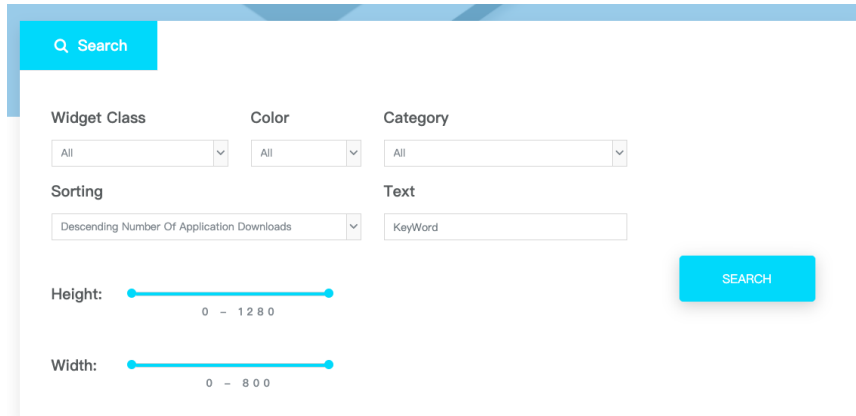
Motivation: Design Granularity

Designers want to see not only the **overall** designs but also the detailed design of the GUI **components**.
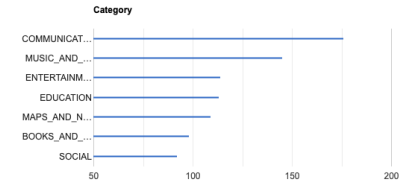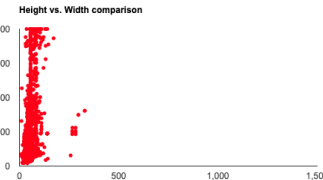
Motivation: Design Knowledge Discovery

Designers need **advanced** GUI design **search abilities** and **knowledge discovery support**.
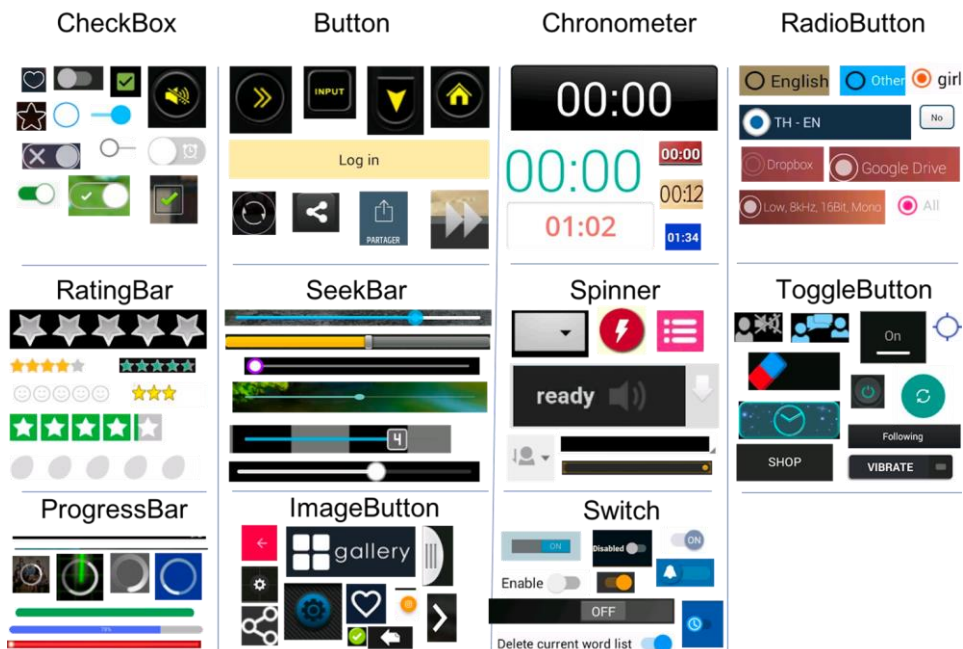
Gallery D.C.: http://mui-collection.herokuapp.com/

TALK OUTLINE

1. Problem Definition

2. Data Collection

3. Component Wirification

4. Gallery D.C.

5. Informal Feedbacks from Designers

A large-scale gallery of 11 types of GUI components for Android GUI design

CheckBox | Button | Chronometer | RadioButton | RatingBar | SeekBar | Spinner | ToggleButton | ProgressBar | ImageButton | Switch
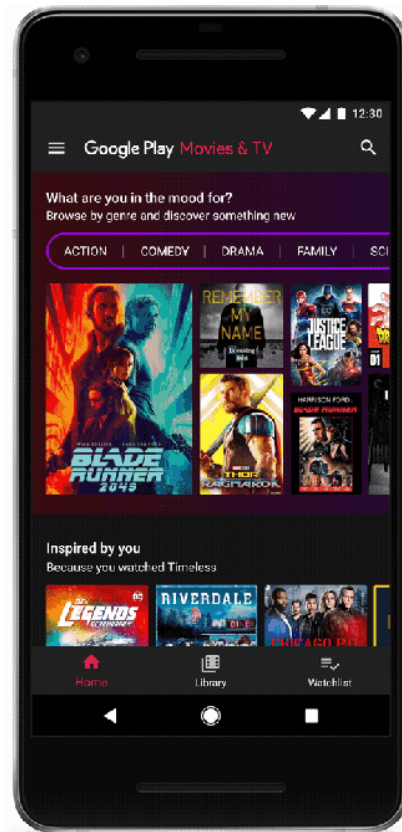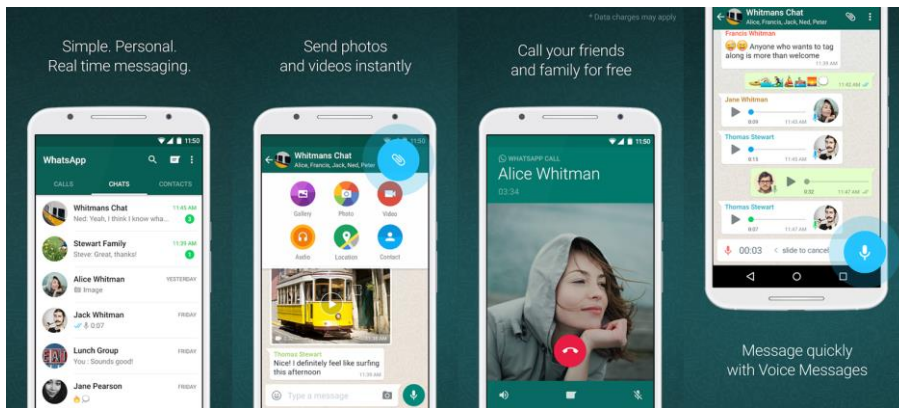
- Chen, Chunyang, Ting Su, Guozhu Meng, Zhenchang Xing, and Yang Liu. "From ui design image to gui skeleton: a neural machine translator to bootstrap mobile gui implementation." In *Proceedings of the 40th International Conference on Software Engineering*, pp. 665-676. ACM, 2018.
- Chen, Sen, Lingling Fan, Chunyang Chen, Ting Su, Wenhe Li, Yang Liu, and Lihua Xu. "Storydroid: Automated generation of storyboard for Android apps." In *Proceedings of the 41st International Conference on Software Engineering*, pp. 596-607. IEEE Press, 2019.

8

Application introduction screenshots in market usually illustrates the most important features and the best-designed GUIs of an application
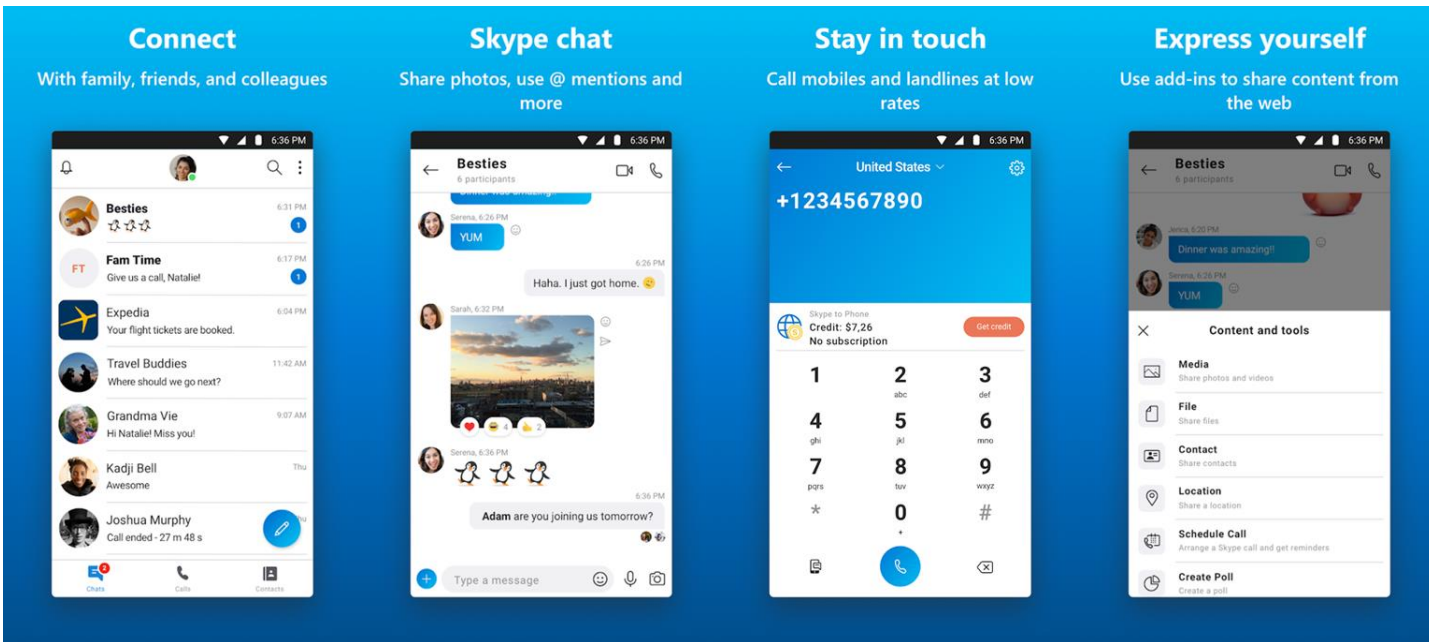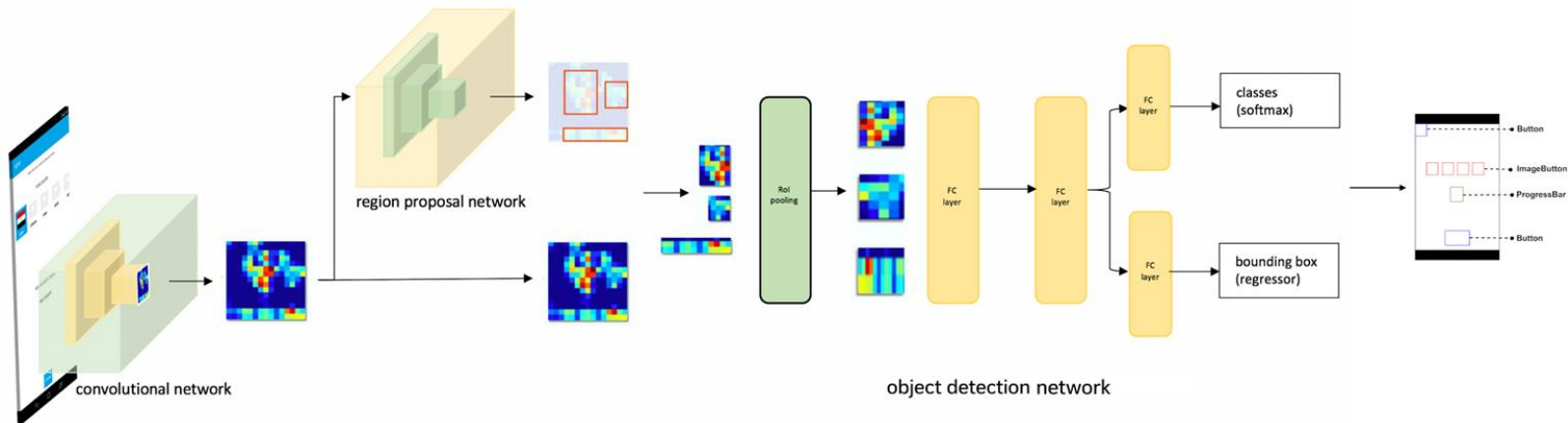
	Method	Data Size
Real-app screenshots	Automated GUI Exploration	68,702
App Introduction screenshots	Crawling	469,177

We use the real-app screenshots to train a component detection model using Faster RCNN.
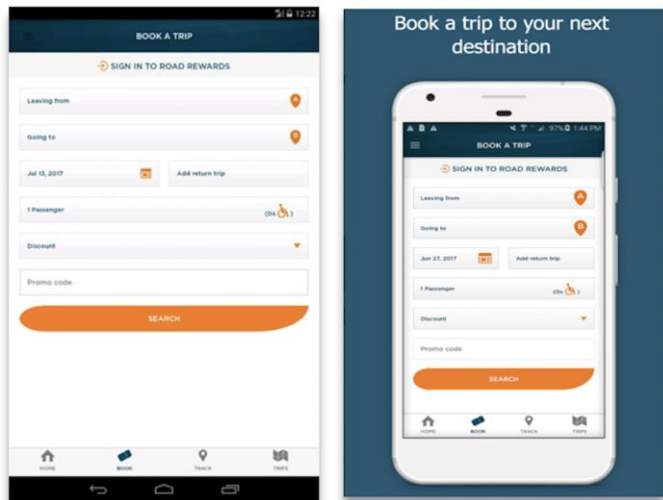
The trained model is then used to wirifiy (i.e., decompose) components from the app introduction screenshots.
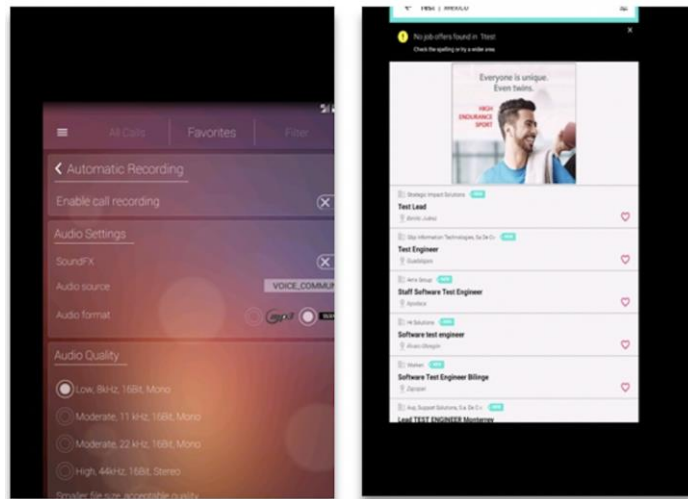
We develop a GUI-specific image augmentation method to transform the real application screenshots into similar style of introduction screenshots.
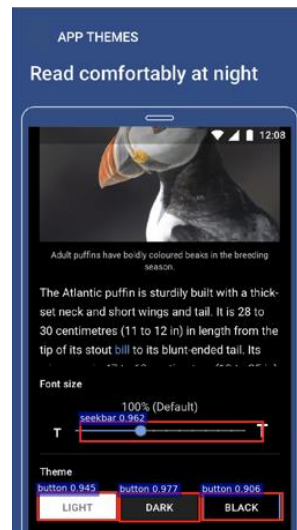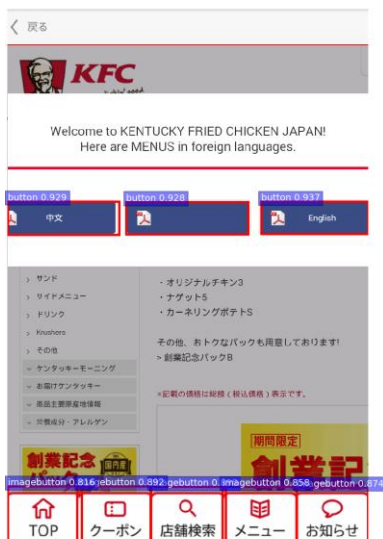
Problem

Solution

IoU	Recall	Precision	mAP
0.6	0.65	0.73	0.69
0.7	0.60	0.79	0.66
0.8	0.53	0.84	0.62
0.9	0.36	0.90	0.44

Performance of model:

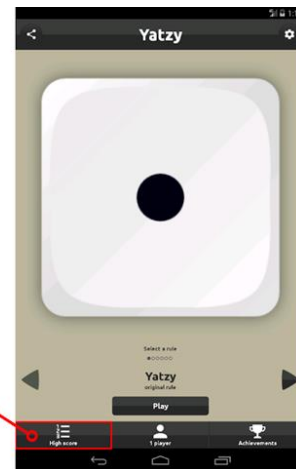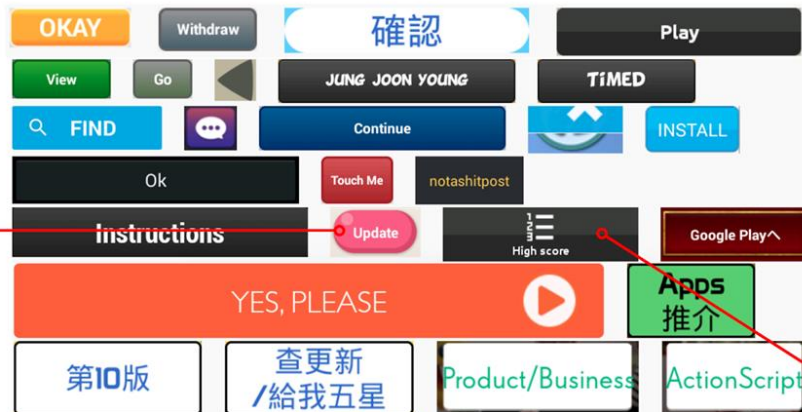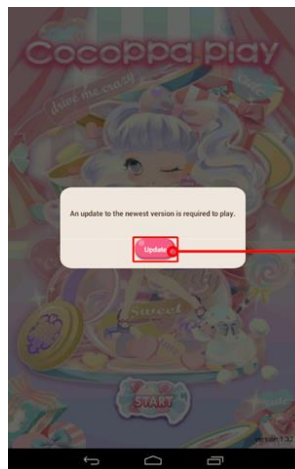- **Recall**: *0.62*, **Precision**: *0.76*, **mAP**: *0.51*

Give designers direct access to GUI components and at the same time allow them to view actual use of the components in the whole designs.
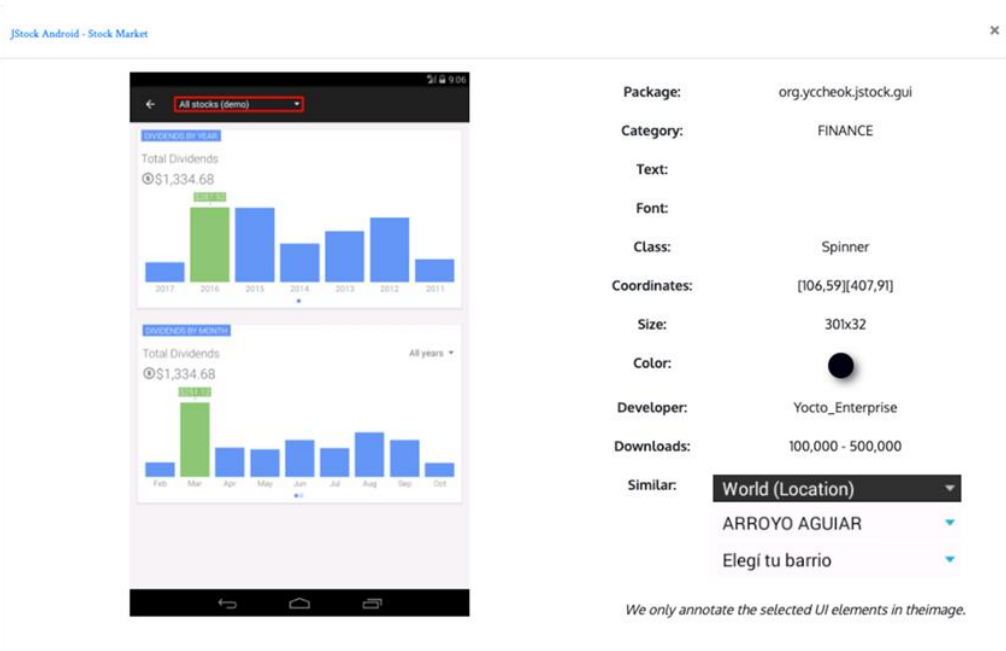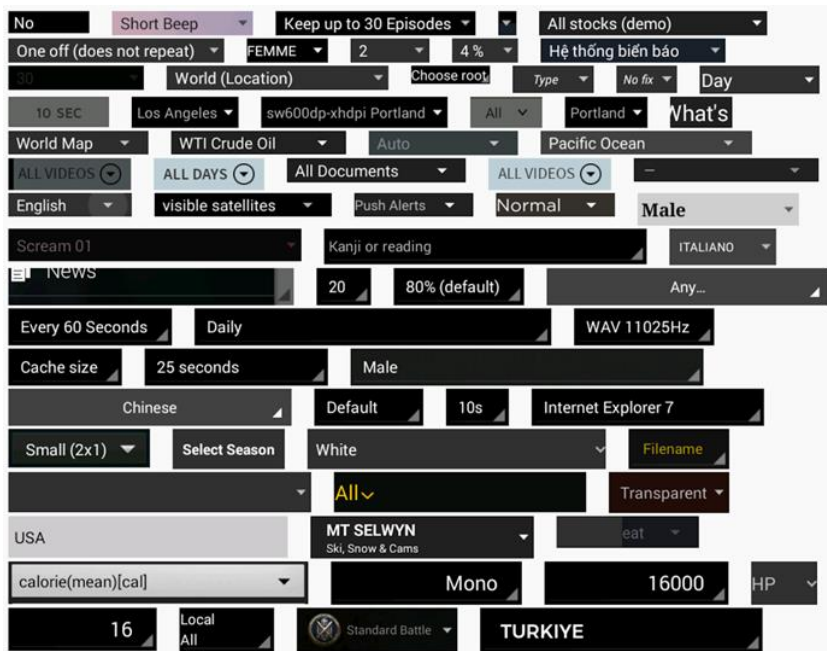
Inspirational Search

Game application scenario

- **Pink** reflective **bubble** ➡ attract **young girls**
- **ranking-list** icon ➡ **ranking** mechanism

Design Demographics
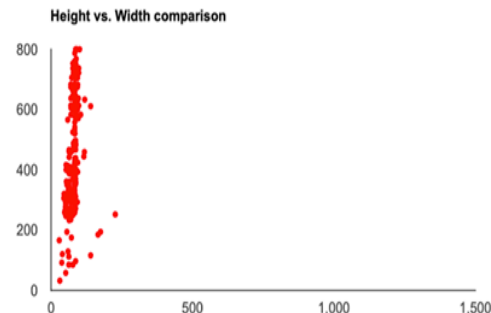
Social media application scenario

- **flat** and **wide** ➡ catch **attention**
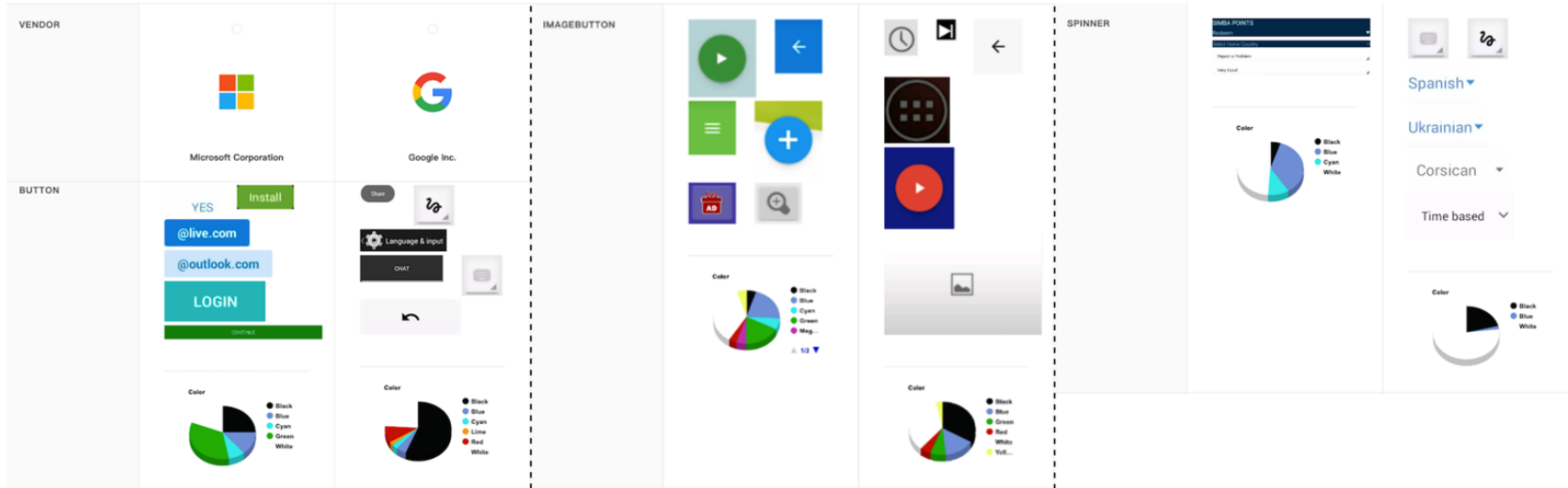
Comparison Shopping

Distinguished design system scenario

- **Microsoft** ➡ **right angle** rectangle
- **Google** ➡ **white, black, gray, shadowing** effects

Summary of contributions

1) Invisible crowdsourcing GUI design resources in the application market

2) Complement existing design sharing platforms
- Design Practicality
- Design Granularity
- Design Knowledge Discovery

1) Qualitative study showing the usefulness of Gallery D.C.
- http://mui-collection.herokuapp.com/

- Video: https://www.youtube.com/watch?v=Co5ydBLH9JA
- Paper: https://chunyang-chen.github.io/publication/designGallery_CSCW19.pdf

Chunyang Chen, Sidong Feng, Zhenchang Xing, Linda Liu, Shengdong Zhao, Jinshui Wang. 2019. Gallery D.C.: Design Search and Knowledge Discovery through Auto-created GUI Component Gallery. Proc. ACM Hum.-Comput. Interact. 3, CSCW, Article 180 (November 2019), 22 pages.

SCAN ME