



Australian
National
University

Image-based 3rd-Party API Recommendation for Implementing UI Design

Oliver Xi

Supervisor: Dr. Zhenchang Xing

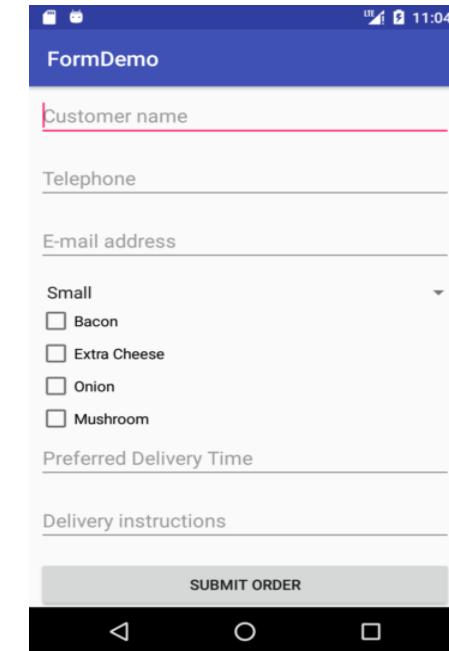
Background

- Build UI = Design + Implement
- Implementing a UI Design requires appropriate APIs.

Background

Documentation

- Layouts
- Notifications Overview
- Add the app bar
- Control the system UI visibility
- Designing effective navigation
- Implementing effective navigation
- Slide between fragments using ViewPager
- Supporting Swipe-to-Refresh
- Toasts overview

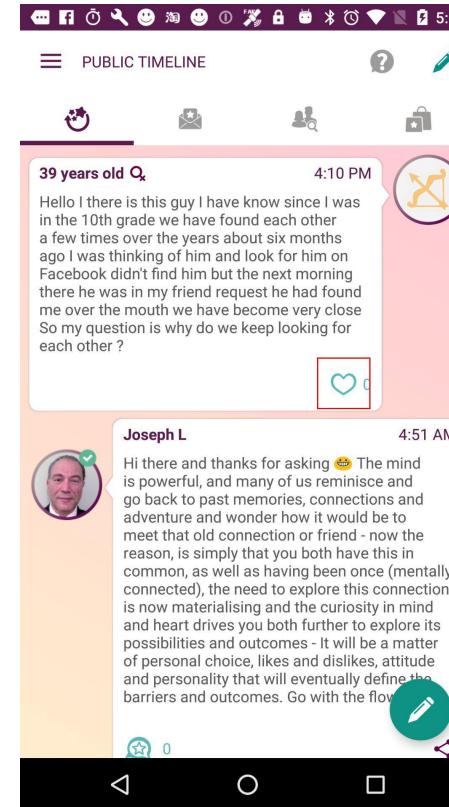
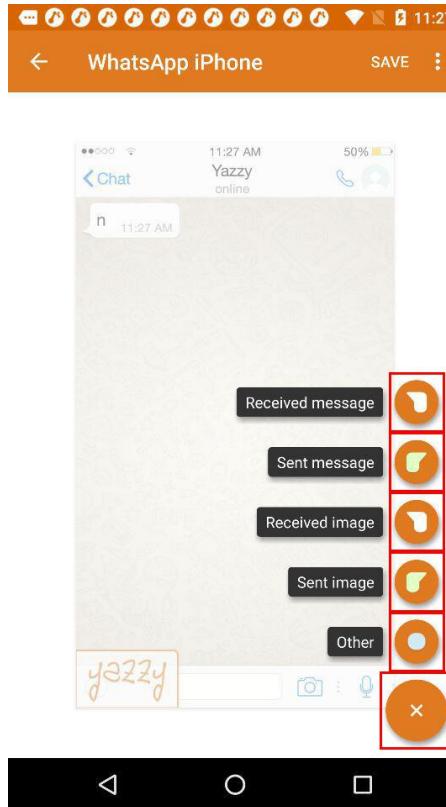


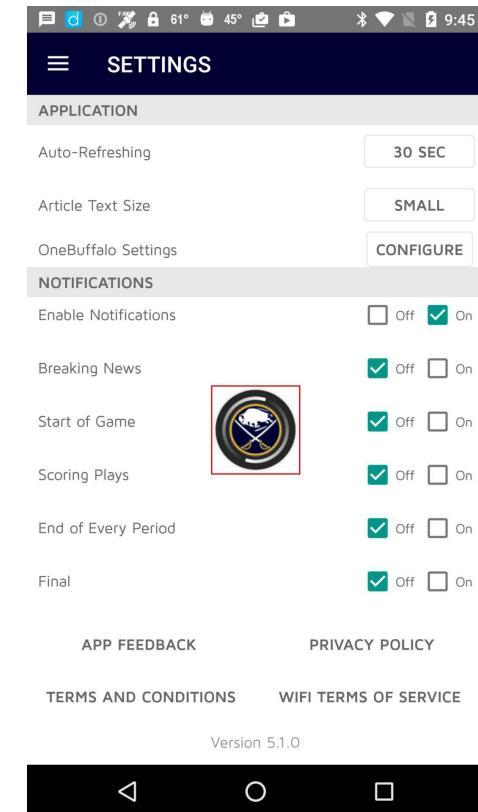
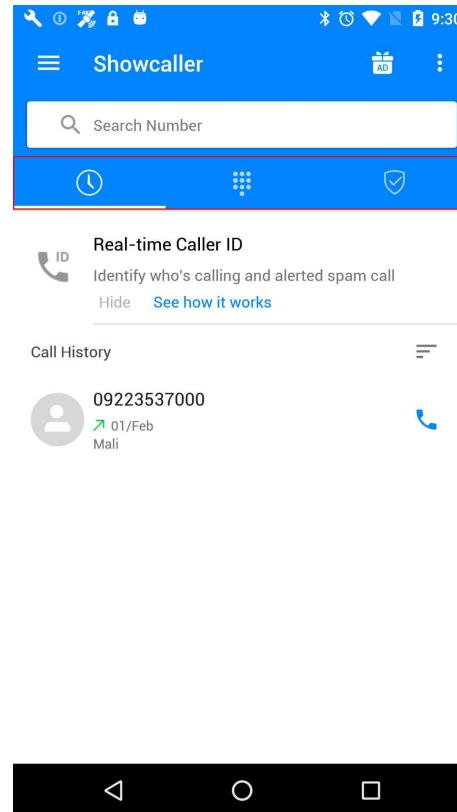
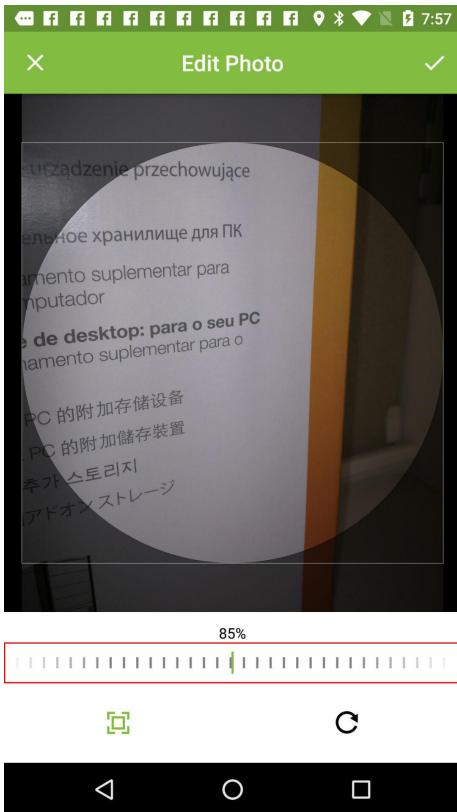
Android UI Framework

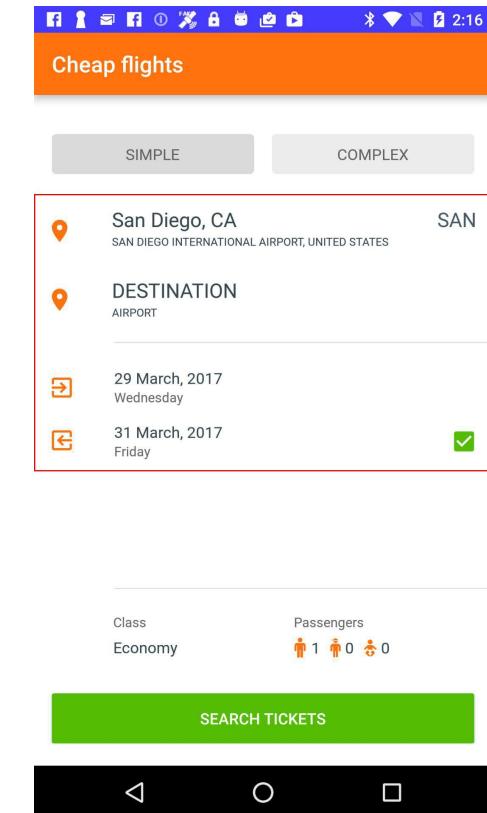
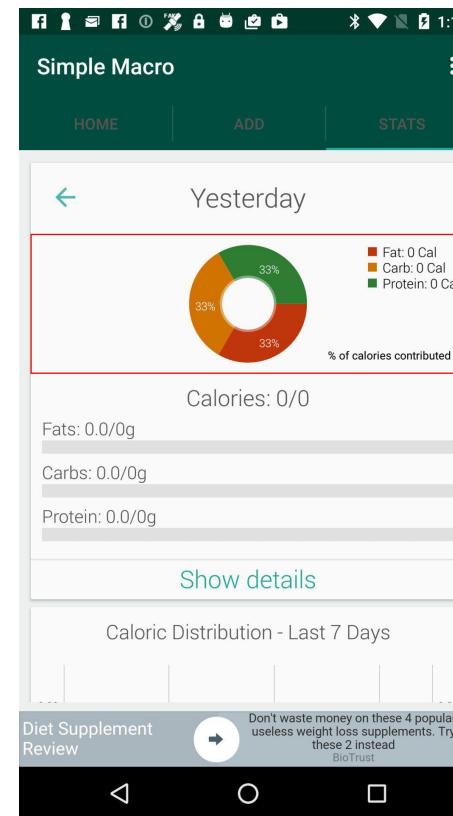
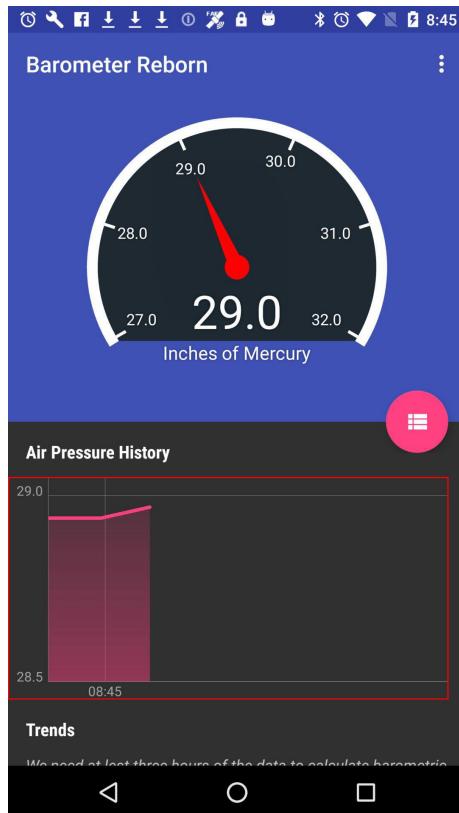
Basic UI Design

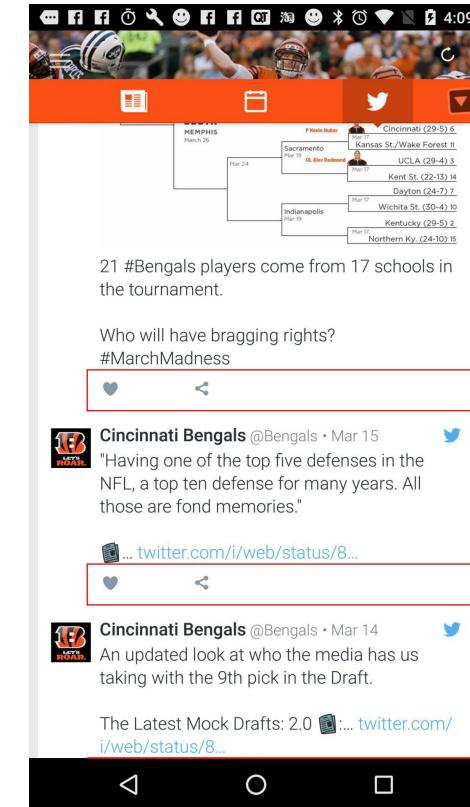
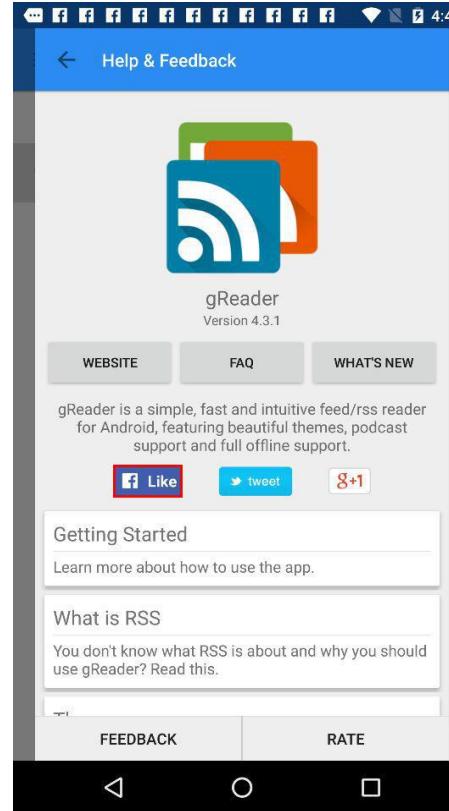
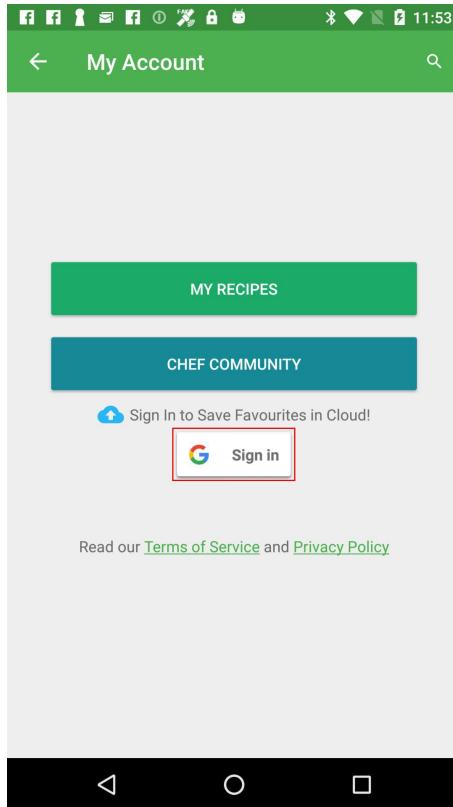
Background

- Extend pre-built components to support :
- Advanced Visual Effects
- User Interaction
- Domain-specific Business Logic
- Service Provider Interaction









Questions

- What parts use pre-build components?
- What parts need extension?
- Are 3rd party components available?

Challenges

- Determining UI parts need extension.
- Describing the concerned UI parts.
- Not all API classes in the libraries are relevant.

Motivation

- A computer-vision based approach.
- Data-driven & End-to-end

Motivation

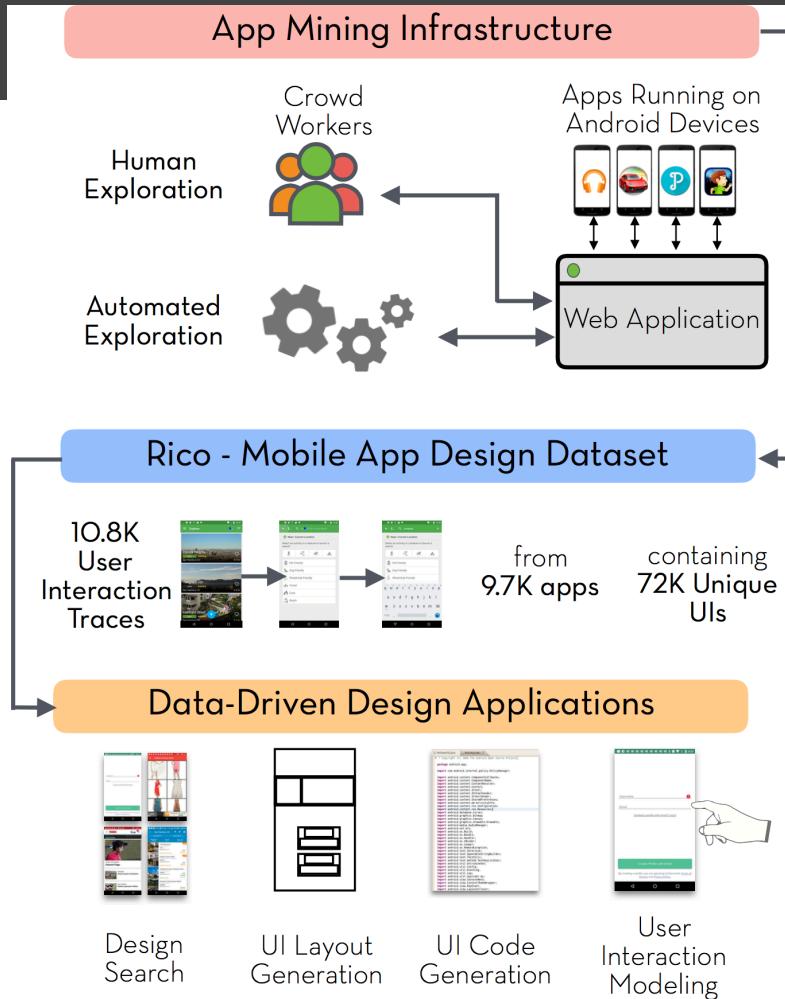
- Benefits:
- No need of describing UI design image.
- Recommendation & Identify parts need extension.
- The most relevant API classes in the library.

Approach

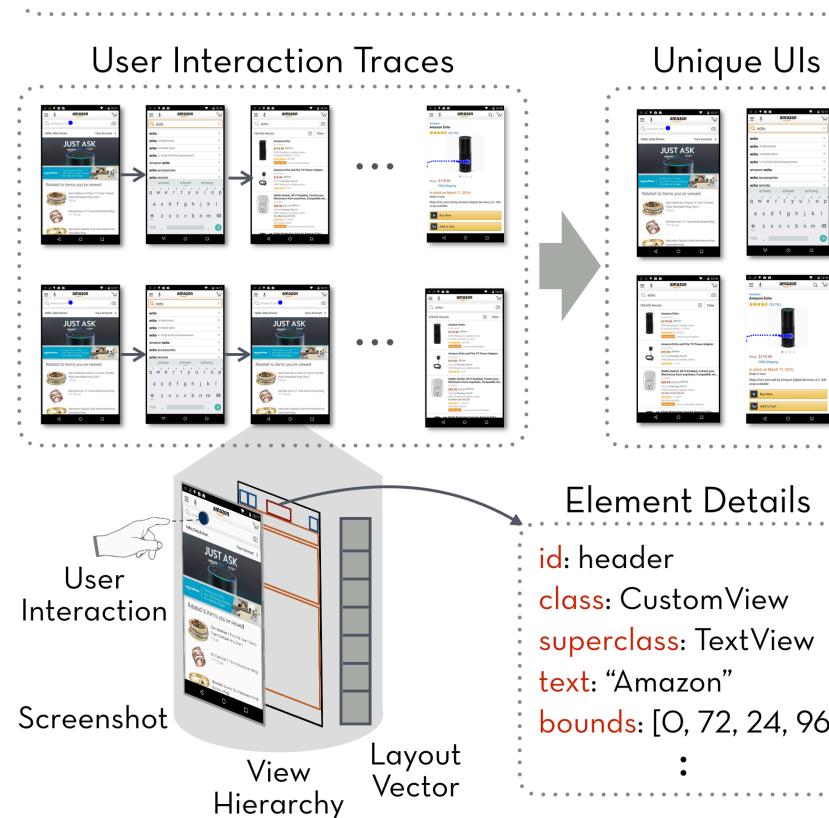
- Data
- Model
- Result
- Future Work

Data

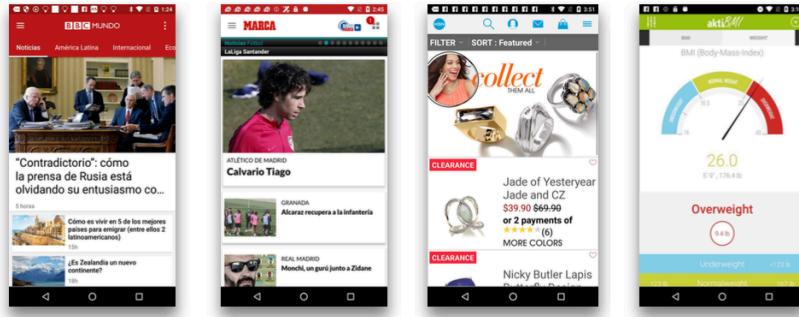
- Rico



Rico



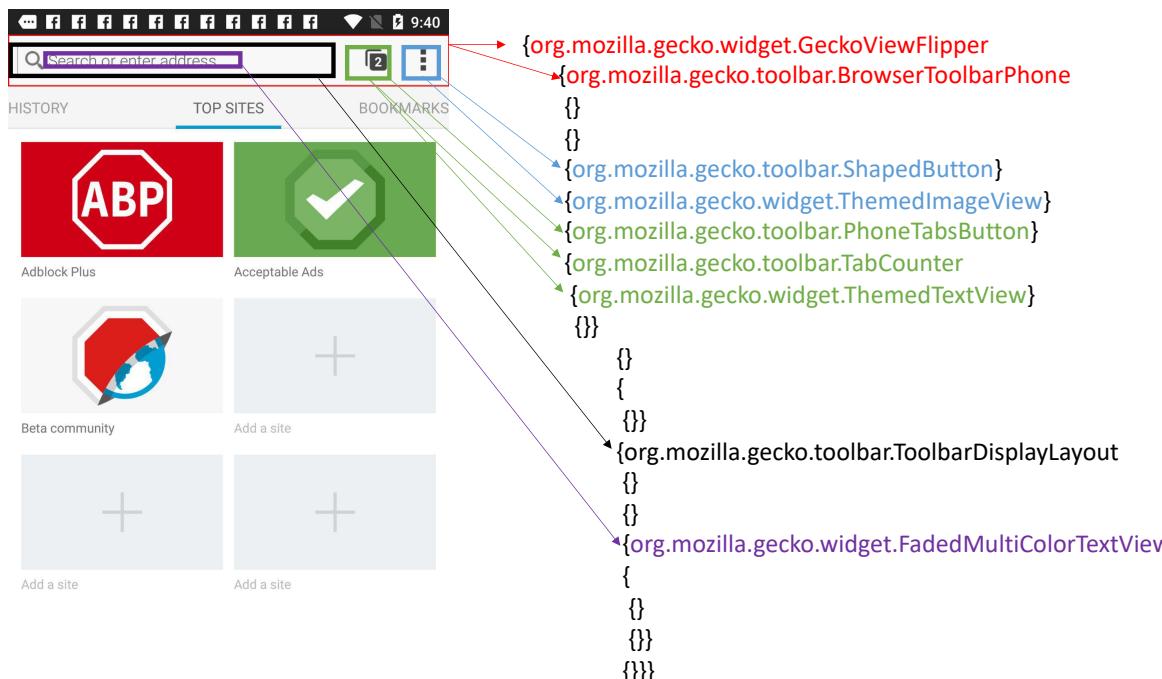
Rico



```
{
  "activity_name": "com.funforfones.android.chicagorta/com.funforfones.android.chicagorta",
  "activity": {
    "root": {
      "scrollable-horizontal": false,
      "draw": true,
      "ancestors": [
        "android.widget.FrameLayout",
        "android.view.ViewGroup",
        "android.view.View",
        "java.lang.Object"
      ],
      "clickable": false,
      "pressed": "not_pressed",
      "focusable": false,
      "long-clickable": false,
      "enabled": true,
      "bounds": [
        36,
        84,
        1404,
        2392
      ],
      "visibility": "visible",
      "content-desc": [
        null
      ],
      "rel-bounds": [
        0,
        0,
        1368,
        2308
      ],
      "focused": false,
      "selected": false,
      "scrollable-vertical": false,
      "children": [
        ...
      ],
      "adapter-view": false,
      "abs-pos": true,
      "pointer": "2e18ce7",
      "class": "com.android.internal.policy.PhoneWindow$DecorView",
      "visible-to-user": true
    },
    "added_fragments": [],
    "active_fragments": []
  },
  "is_keyboard_deployed": true,
  "request_id": "1350"
}
```

Data Preprocessing

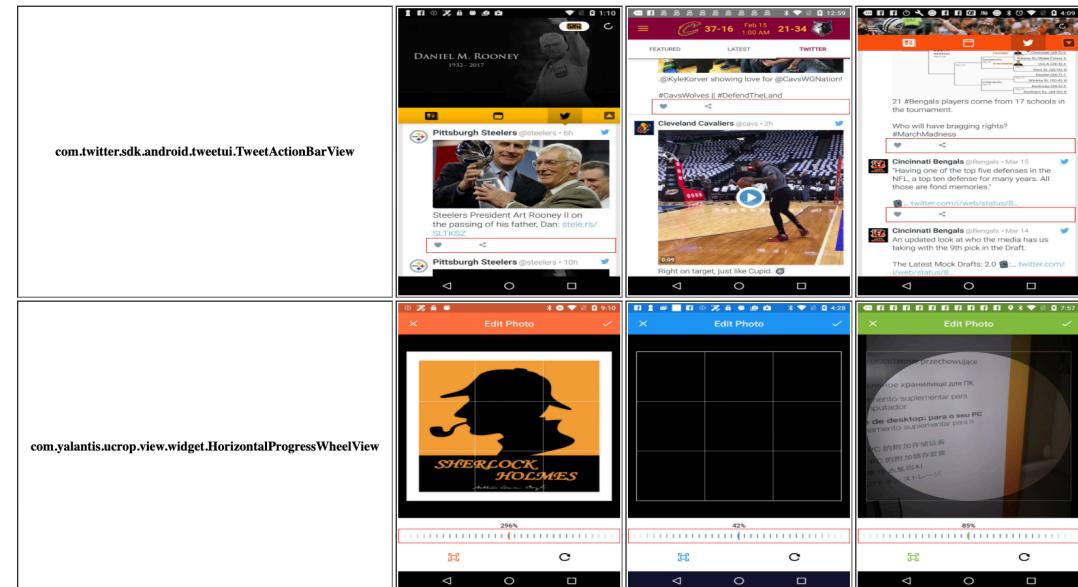
- Mark Third-Party extended components intuitively.
- Noise of component visibility
- Clustering & Classification



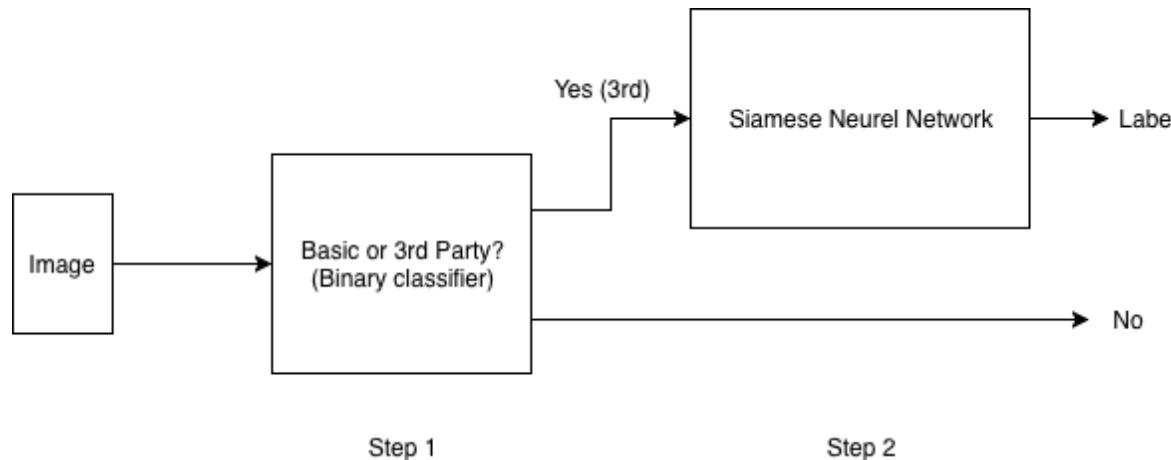
64855.jpg

Data Preprocessing

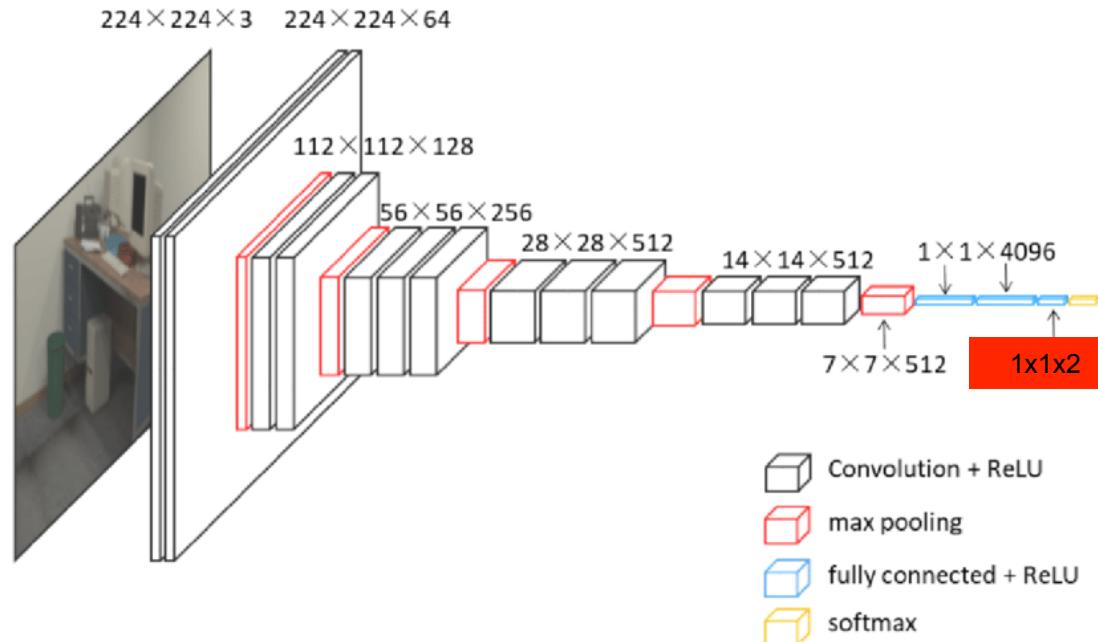
- 67 libraries, 800+ classes, 55K+ images
- 32 categories



Model



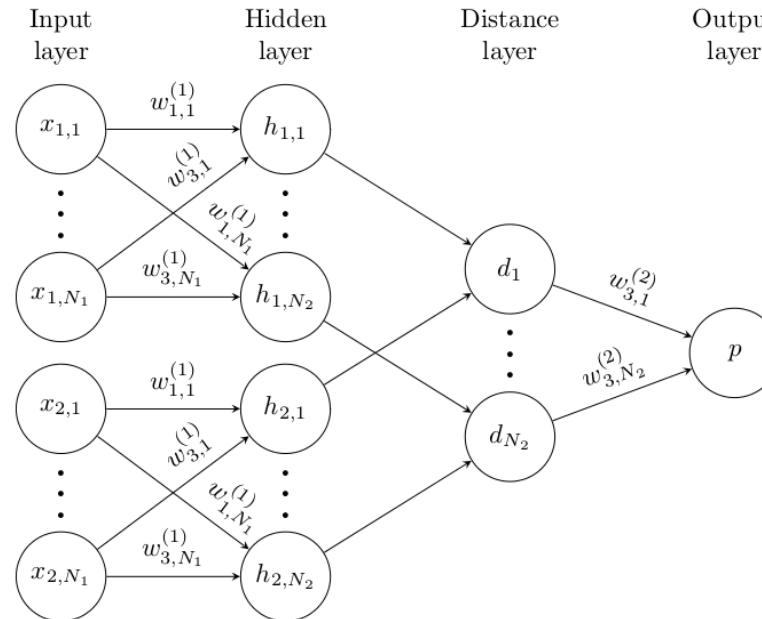
Step 1: VGG16 + Binary Classifier



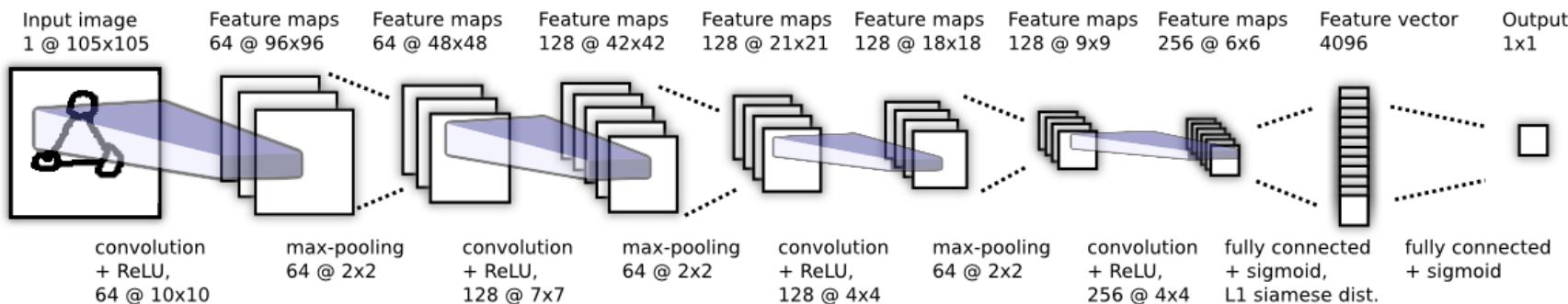
Step 2: Siamese Neural Network

- Requires relatively small examples in each class by paring samples.
- Rank similarity between inputs.
- Still produce state-of-art performance.

Siamese Neural Network



Siamese Neural Network



Result

- Yet to be finished
- Currently not very well
- Boundaries of categories are not satisfactorily clear

```
DrawerLayout cluster, accuracy: 0.1282051282051282
FlowLayout cluster, accuracy: 0.8
FaceBook_Login_Button cluster, accuracy: 0.18518518518518517
TabLayout_Bottom cluster, accuracy: 0.43243243243243246
PopUp_Info cluster, accuracy: 0.42857142857142855
PageIndicator_Circle cluster, accuracy: 0.20833333333333334
```

Future Work

- Finish model & thesis
- Dynamic components?

Q&A

Thank You

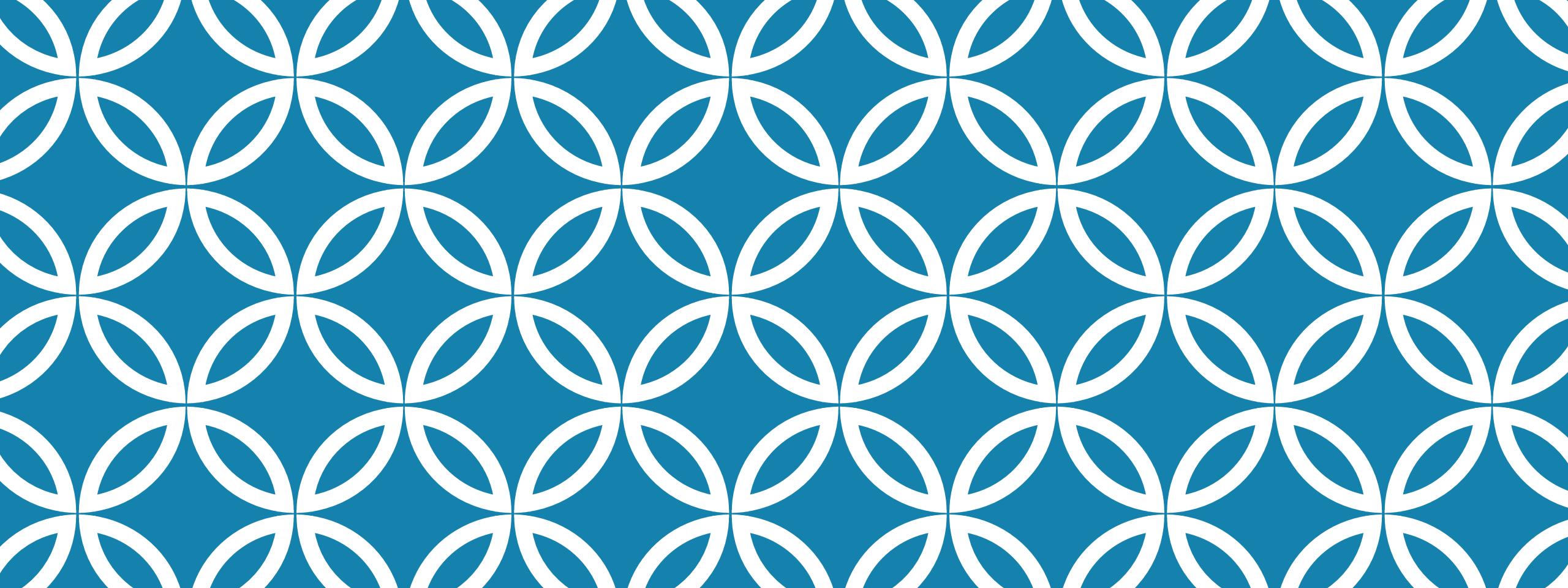


IMAGE2CODE

5/Jun/2019

CONTENTS

What is this?

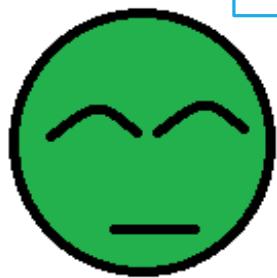
Problem Statement

Progress

Current Results

WHAT IS THIS?

User Scenario 1



Let's make a
FANCY
website!!!

John – Designer

Know nothing about coding



Why not? You
aren't the one
who writes code

Bob – Web Developer

Care about nothing except coding

WHAT IS THIS?

User Scenario 1



This is my
genius design !!!

John – Designer

Know nothing about coding

LOGO

Search

Bula Bula

Title

Bulabulabula

 Read

Title

Bulabulabula

 Read

AD

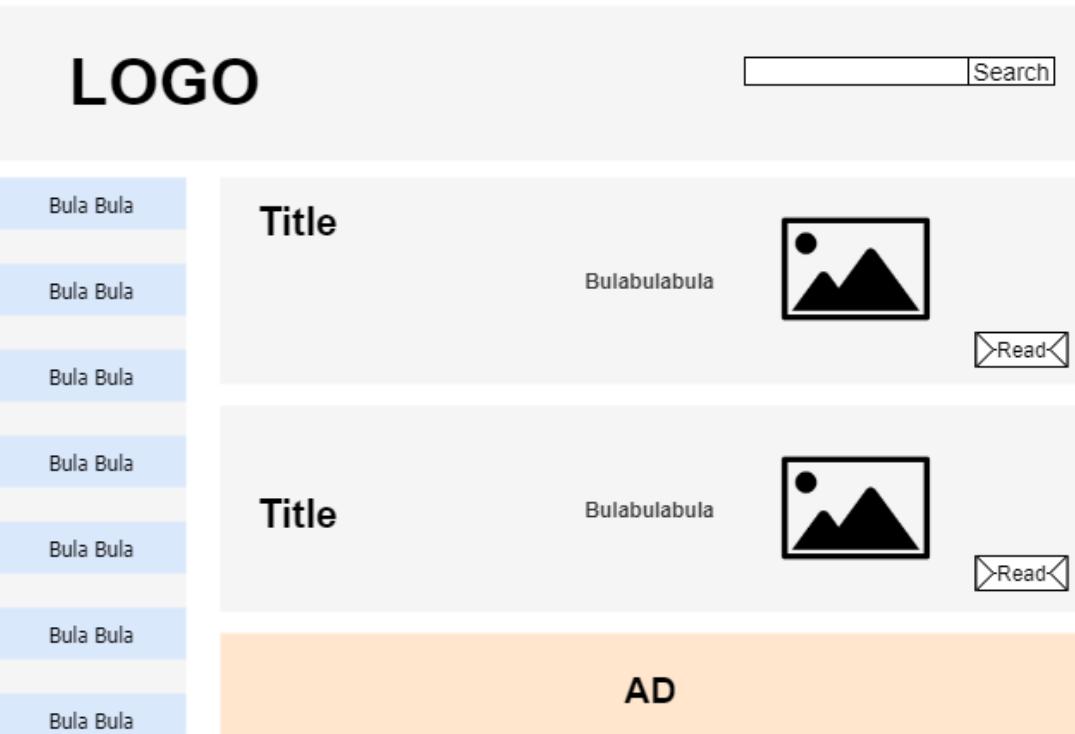


Image Prototype

WHAT IS THIS?

User Scenario 1



Okay, I will spend four days to transform this into code

Bob – Web Developer

Care about nothing except coding

LOGO Search

Bula Bula

Title

Bulabulabula

Read

Title

Bulabulabula

Read

AD

Image Prototype

WHAT IS THIS?

User Scenario 1



Bob – Web Developer

Care about nothing except coding

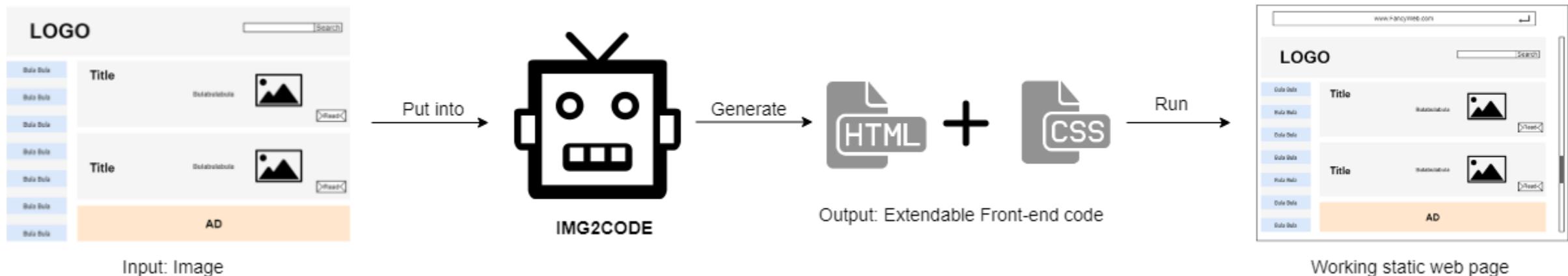
OR, I can take several
SECONDS to do so by
using the
IMG2CODE

The screenshot shows a static webpage with the URL 'www.FancyWeb.com' in the header. The page has a clean, modern design with a light gray background. At the top left is a logo placeholder. To its right is a search bar with a magnifying glass icon. On the far left, there's a vertical sidebar containing seven blue rectangular boxes, each with the text 'Bula Bula' inside. The main content area is divided into two sections, each featuring a title ('Title'), a small thumbnail image of a mountain landscape, the text 'Bulabulabula', and a 'Read' button. A large orange banner at the bottom is labeled 'AD'.

Working Static Webpage

WHAT IS THIS?

User Scenario 1: Image Design to Code



WHAT IS THIS?

User Scenario 2



Let me check Youtube

Bob – Web Developer

Care about nothing except coding

The screenshot shows the YouTube homepage. At the top, there's a search bar and navigation links for 'Home' and 'Trending'. A blue banner at the top says 'Choose your language' and indicates the user is viewing YouTube in English (US). Below the banner, a video thumbnail for 'Cathay Pacific - Move Beyond' is displayed, with a note that the browser does not recognize the video format. The main content area shows a grid of trending videos, including 'Milwaukee Bucks vs Toronto Raptors - Full Game 6 Highlights', 'Inside Jessica Alba's \$10M Los Angeles Home | Open Door | Architectural Digest', 'TERMINATOR: DARK FATE Teaser Trailer (2019) - Paramount Pictures', 'Former FBI Agent Explains How to Read Body Language | Tradecraft | WIRED', and 'Thor's Hammers | SI - E3 Tungsten Thor's Hammer (World's HEAVIEST) the Hacksmith'.

WHAT IS THIS?

User Scenario 2



This is what I want !!!
It would be perfect if I
can have the similar
design style !!!

Bob – Web Developer

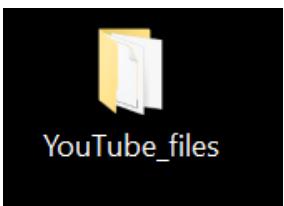
Care about nothing except coding

The image shows the YouTube homepage with a prominent ad overlay. The ad features a dark background with a video thumbnail for 'Cathay Pacific - Move Beyond'. A message on the right side of the ad says, 'Your browser does not currently recognize any of the video formats available. Click here to visit our frequently asked questions about HTML5 video.' Below the ad, the 'Trending' section displays several video thumbnails, including 'Milwaukee Bucks vs Toronto Raptors - Full Game 6 Highlights', 'Inside Jessica Alba's \$10M Los Angeles Home | Open Door...', 'TERMINATOR: DARK FATE - Official Teaser Trailer (2019) - Paramount Pictures', 'Former FBI Agent Explains How to Read Body Language | Tradecraft', and 'Thor's Hammers | Tungsten Thor's Hammer (World's HEAVIEST) the Hacksmith'. The YouTube interface includes a sidebar with categories like Music, Sports, Gaming, Movies, TV Shows, News, Live, and 360° Video.

WHAT IS THIS?

User Scenario 2

Conventional Way to Reuse UI



Download the Source Code

WHAT IS THIS?

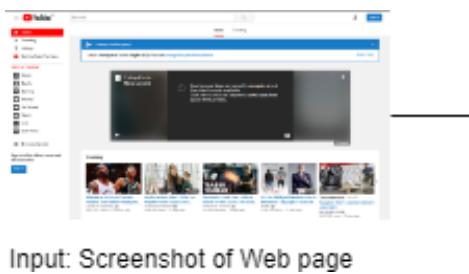
User Scenario 2

Conventional Way to Reuse UI

Analyze the Compressed Code

WHAT IS THIS?

User Scenario 2: Screenshot to Code – UI Reuse



Input: Screenshot of Web page



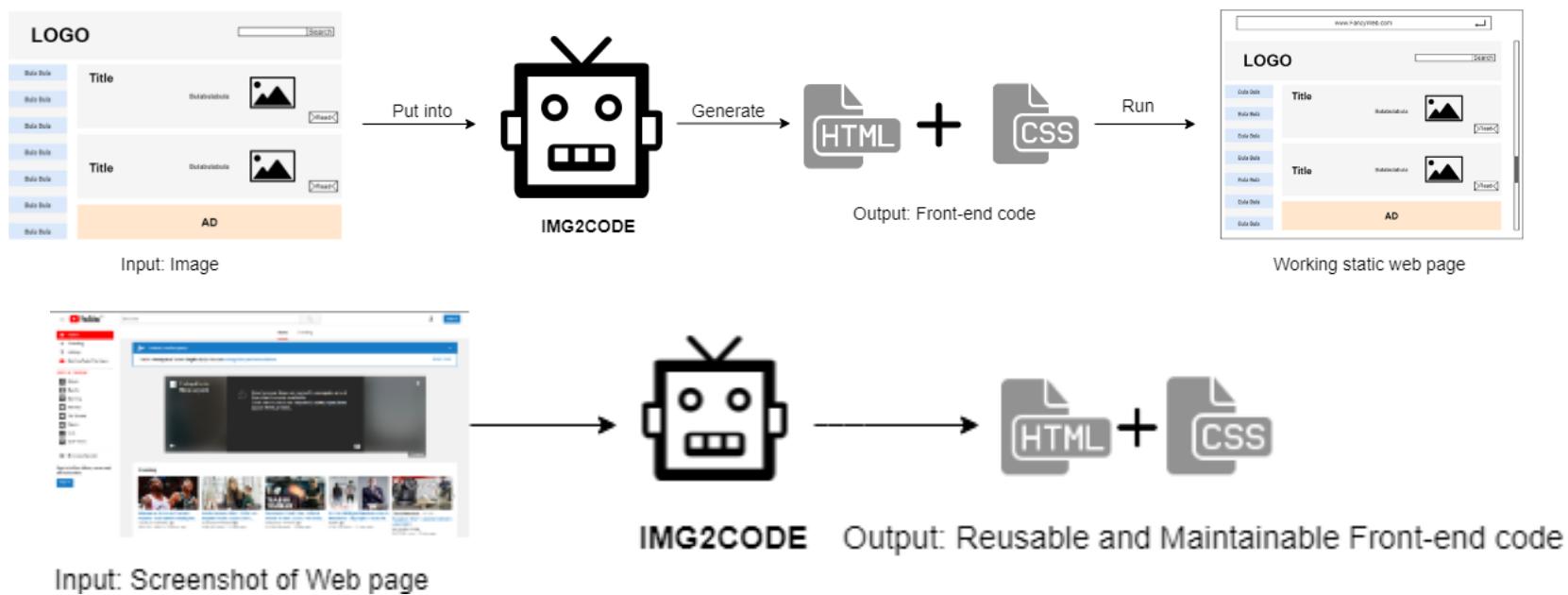
IMG2CODE Output: Reusable and Maintainable Front-end code

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>Title</title>
  <link rel="stylesheet" href="a.css" type="text/css">
</head>
<body>
<div class="generated_container">
  <div id="div0"></div>
  <div id="div1">
    <input id="input1">
    <input id="input2">
  </div>
  <div id="div2">
    <button id="button1">Button</button>
    <button id="button2">Button</button>
  </div>
  <div id="div3">
    <h1 id="h1">Text in H1</h1>
    <h2 id="h2">Text in H2</h2>
    <p id="p1">Text in p</p>
    <p id="p2">Text in p2</p>
  </div>
  <div id="div4"></div>
  <div id="div5"></div>
  <div id="img6"></div>
  <div id="img7"></div>
  <div id="img8"></div>
  <div id="img9"></div>
  <div id="img10"></div>
  <div id="img11"></div>
  <div id="img12"></div>
  <div id="img13"></div>
  <div id="img14"></div>
  <div id="img15"></div>
  <div id="img16"></div>
</div>
</body>
</html>
```

PROBLEM STATEMENT

Final Goal

Generate the front-end CODE from any given web page IMAGE



PROBLEM STATEMENT

Final Goal

Generate the front-end
CODE from any given web
page IMAGE



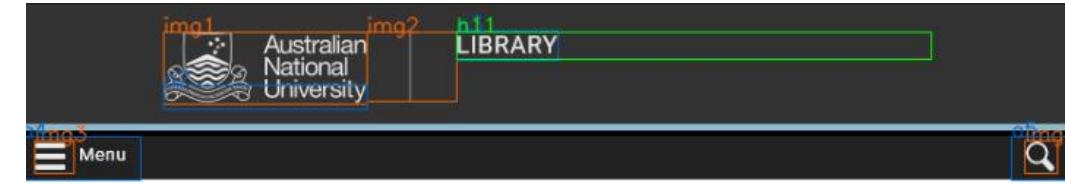
Sub Goals

1. Detect and classify UI components (Button, Text, Image) on the input image
2. Reversely generate usable front-end code (HTML, CSS)

PROBLEM STATEMENT

UI Components Detection and Classification

Tricky problem: Efficient detection of simple UI components



This screenshot shows a search interface with the following components:

- A dropdown menu with items: a6 SuperSearch, a7 Catalogue search, and a8 Full text e-journals.
- An input field labeled "input1" containing the placeholder "Search articles, books and more by keyword".
- A button labeled "input2" with the text "GO".
- Links: a9 advanced SuperSearch » and a10 about SuperSearch ».

This screenshot shows a grid of links labeled from a12 to a35. The grid is organized into four rows:

- Row 1: a12, a13, a14, a15, a16, a17, a18, a19, a20, a21, a22, a23
- Row 2: #, A, B, C, D, E, F, G, H, I, J, K
- Row 3: a24, a25, a26, a27, a28, a29, a30, a31, a32, a33, a34, a35
- Row 4: L, M, N, O, P, Q, R, S, T, U, V, W

Below the grid are three small boxes: X, Y, and Z.

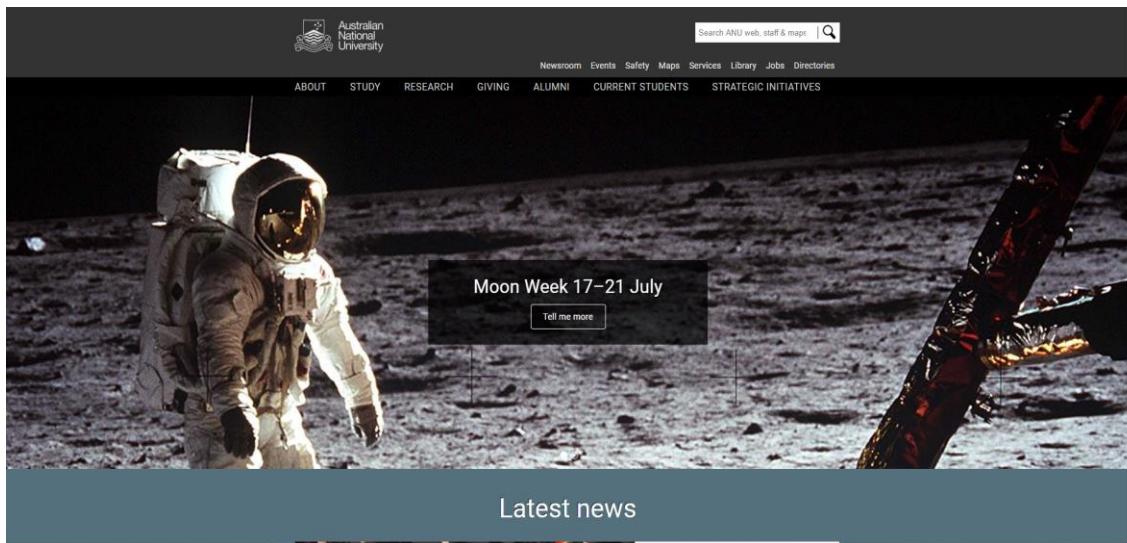
This screenshot shows three service links:

- img5 Opening hours »: A clock icon showing approximately 10:10. Below it is the text "Find out the".
- img6 Book a study room »: An icon of two people at a desk. Below it is the text "Book a study room »".
- img7 Past exam papers »: An icon of a pencil writing on a grid. Below it is the text "Search or browse the".

PROBLEM STATEMENT

UI Components Detection and Classification

Tricky problem: Misrecognize contents of the as the web components.



A screenshot of a YouTube channel page for "KinoCheck International". The channel has 2.5M subscribers. The main area shows recommended videos for "The Best Upcoming ACTION Movies 2019 & 2020 (Trailer)", "Pumba and Timon meet Simba Scene - THE LION ...", "PLAYING WITH FIRE Trailer (2019)", "Female Avengers Unite in Final Fight - AVENGERS 4: ...", and "THE RED SEA DIVING RESORT Trailer (2019) Netflix". Below this, there's a "BEST OF YOUTUBE" section with links to "ABC Song + More Nursery Rhymes & Kids Songs - ...", "Kit Harington vs Toothless Funny Clip - HOW TO TRAIN...", "Peppa Pig Official Channel | Peppa Pig and Edmund ...", "Pencilmate's Reaching GREAT Heights!", and "Peppa Pig Full Episodes | Police Station | Cartoons fo...". The URL https://www.youtube.com/watch?v=aV50wR9oS3o is visible at the bottom of the page.

PROBLEM STATEMENT

Maintainable Code Generating

Tricky problem: Make generated code easy to edit and extend.

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <title>Title</title>
  <link rel="stylesheet" href="a.css" type="text/css">
</head>
<body>
<div class="generated_container">
  <div id="div0"></div>
  <div id="div1">
    <input id="input1">
    <input id="input2">
  </div>
  <div id="div2">
    <button id="button1">Button</button>
    <button id="button2">Button</button>
  </div>
  <div id="div3">
    <h1 id="h11">Text in H1</h1>
    <h2 id="h21">Text in H2</h2>
    <p id="p1">Text in p</p>
    <p id="p2">Text in p2</p>
  </div>
  <div id="div4"></div>
  <div id="div5"></div>
  <div id="img6"></div>
  <div id="img7"></div>
  <div id="img8"></div>
  <div id="img9"></div>
  <div id="img10"></div>
  <div id="img11"></div>
  <div id="img12"></div>
  <div id="img13"></div>
  <div id="img14"></div>
  <div id="img15"></div>
  <div id="img16"></div>
</div>
</body>
</html>
```

```
#div0{
  width: 650px; height: 30px;
  margin-top: 10px; margin-left: 229px;
  position: absolute;
  border: grey solid 1px;
}
#div1{
  width: 56px; height: 29px;
  margin-top: 10px; margin-left: 1279px;
  position: absolute;
  border: grey solid 1px;
}
#div2{
  width: 186px; height: 28px;
  margin-top: 63px; margin-left: 21px;
  position: absolute;
  border: grey solid 1px;
}
#div3{
  width: 1056px; height: 79px;
  margin-top: 100px; margin-left: 269px;
  position: absolute;
  border: grey solid 1px;
}
#div4{
  width: 1060px; height: 51px;
  margin-top: 488px; margin-left: 267px;
  position: absolute;
  border: grey solid 1px;
}
#div5{
  width: 56px; height: 29px;
  margin-top: 544px; margin-left: 21px;
  position: absolute;
  border: grey solid 1px;
}
#img6{
  width: 850px; height: 264px;
  margin-top: 209px; margin-left: 372px;
  position: absolute;
  background: black;
}
```

PROGRESS

Attempts on UI Components Detection and Classification

1. End-to-End: Deep Learning

Object detection method

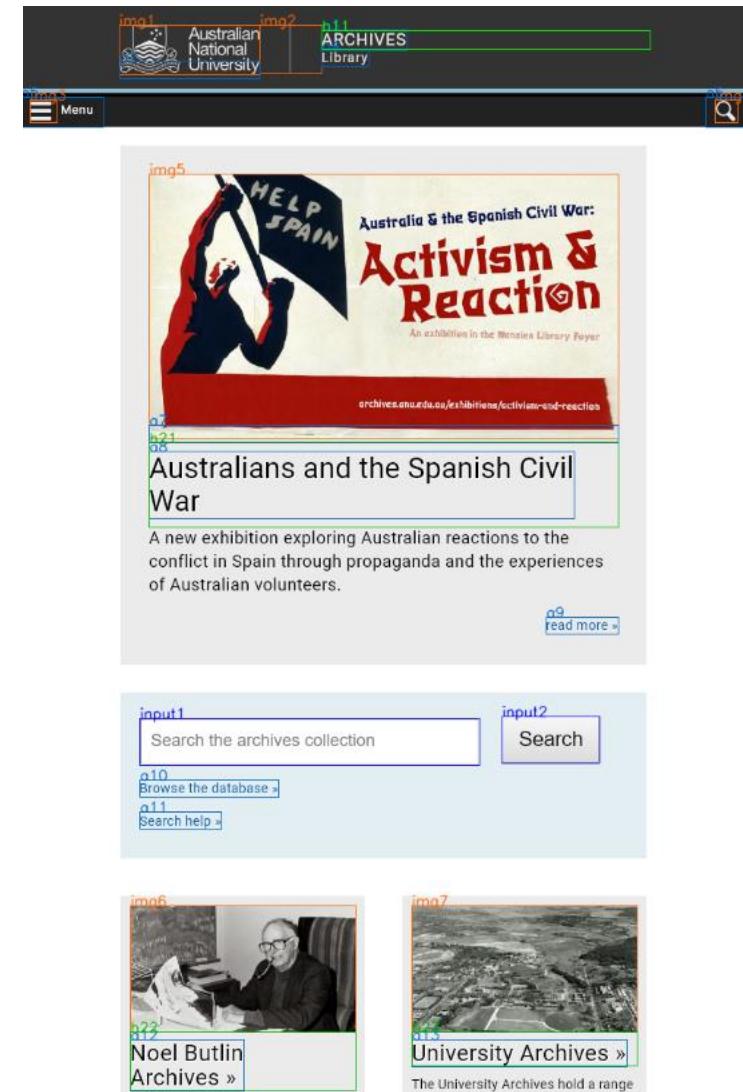
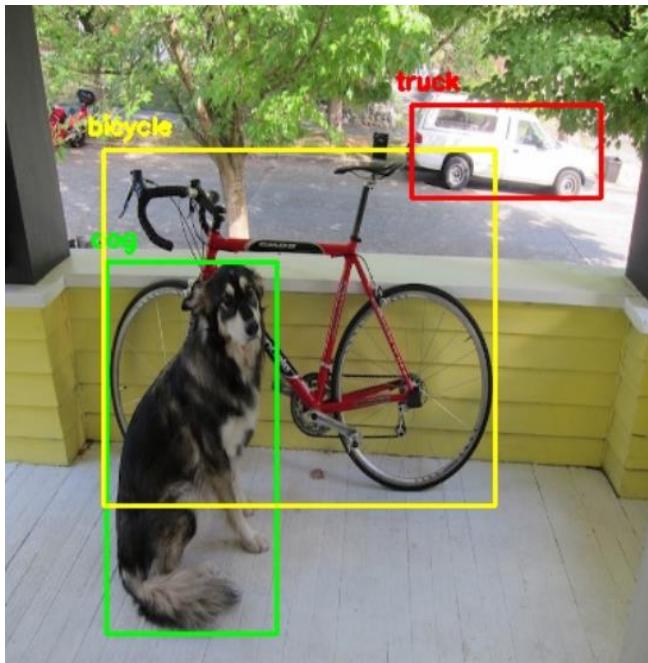
2. Divide and Conquer: Image Processing + Machine Learning

Decompose elements and Classify them

PROGRESS

End-to-End
(Deep Learning)

Refer to the Objection
Detection Method



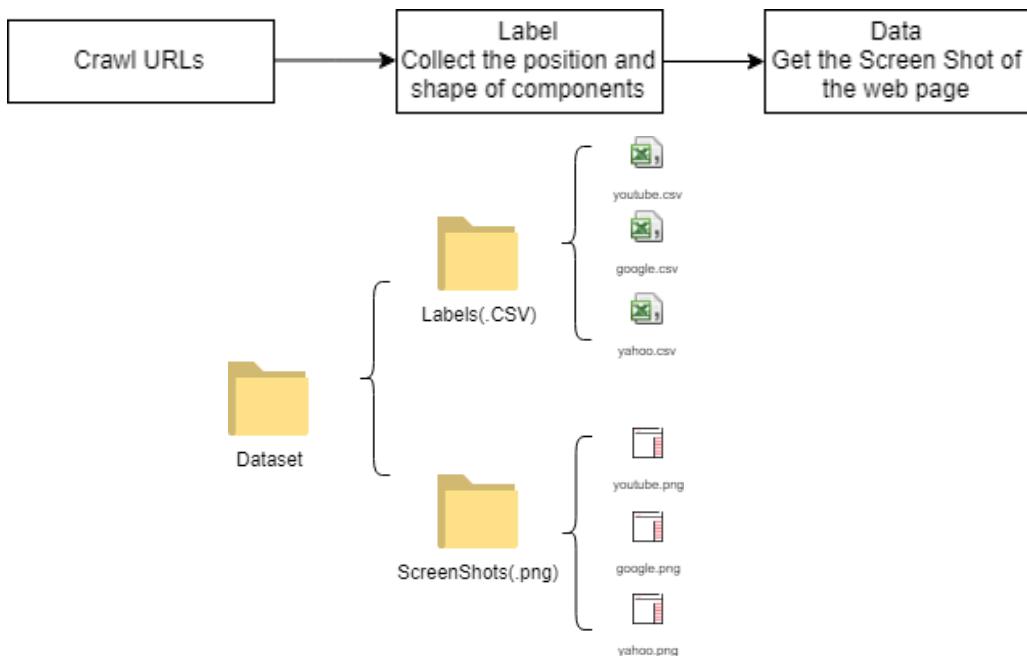
The screenshot shows the Australian National University Archives website interface. At the top, there's a header with the university logo, menu options, and a search bar. Below the header, several exhibition thumbnails are displayed:

- img1**: Australian National University
- img2**: ARCHIVES Library
- img3**: Menu
- img4**: Search
- img5**: HELP SPAIN Australia & the Spanish Civil War: Activism & Reaction An exhibition in the Menzies Library Foyer <archives.anu.edu.au/exhibitions/activism-and-reaction>
- img6**: Australians and the Spanish Civil War A new exhibition exploring Australian reactions to the conflict in Spain through propaganda and the experiences of Australian volunteers. [read more »](#)
- img7**: input1: Search the archives collection [a10 Browse the database »](#) [a11 Search help »](#)
- img8**: input2: Search [a9 read more »](#)
- img9**: Noel Butlin Archives »
- img10**: University Archives » The University Archives hold a range

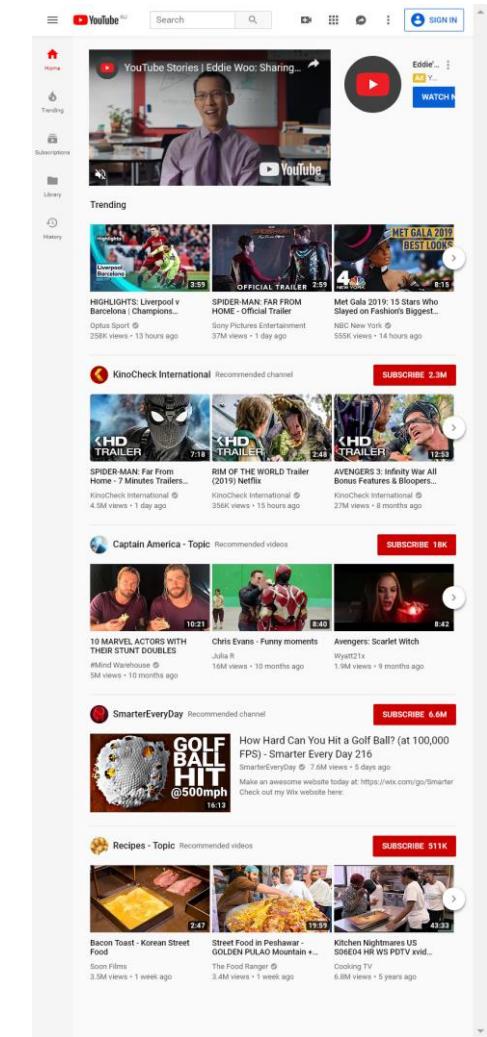
PROGRESS

End-to-End (Deep Learning)

Dataset Collection



A	B	C	D	E	F
0	179	200	80	80	img
1	637	142	16	16	img
2	704	142	16	16	img
3	732	142	16	16	img
4	102	737	210	118	img
5	316	737	210	118	img
6	530	737	210	118	img
7	744	737	210	118	img
8	958	737	210	118	img
9	1172	737	210	118	img
10	102	1051	210	118	img
11	316	1051	210	118	img
12	530	1051	210	118	img
13	744	1051	210	118	img
14	958	1051	210	118	img
15	1172	1051	210	118	img
16	102	1415	210	118	img
17	316	1415	210	118	img
18	530	1415	210	118	img
19	744	1415	210	118	img
20	958	1415	210	118	img
21	1172	1415	210	118	img
22	102	1729	210	118	img
23	316	1729	210	118	img
24	72	16	80	24	a
25	16	-1000	148	37	a
26	461	8	40	40	a
27	509	8	40	40	a
28	557	8	40	40	a

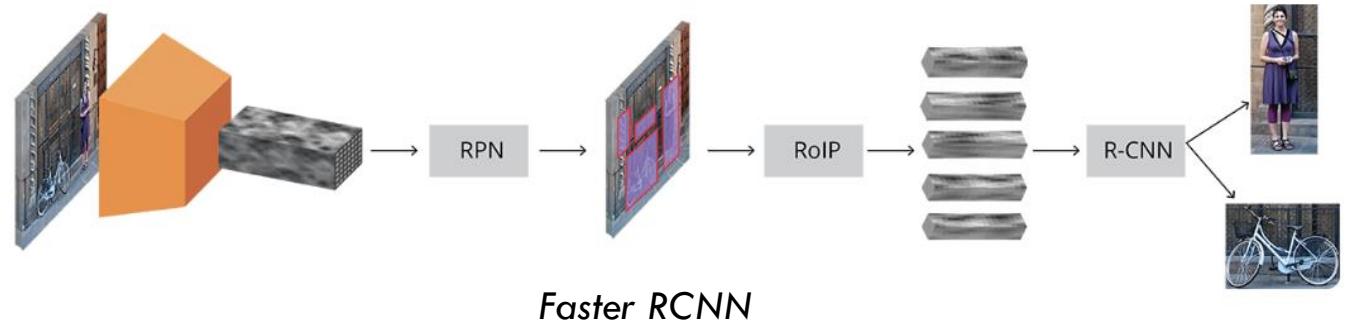


PROGRESS

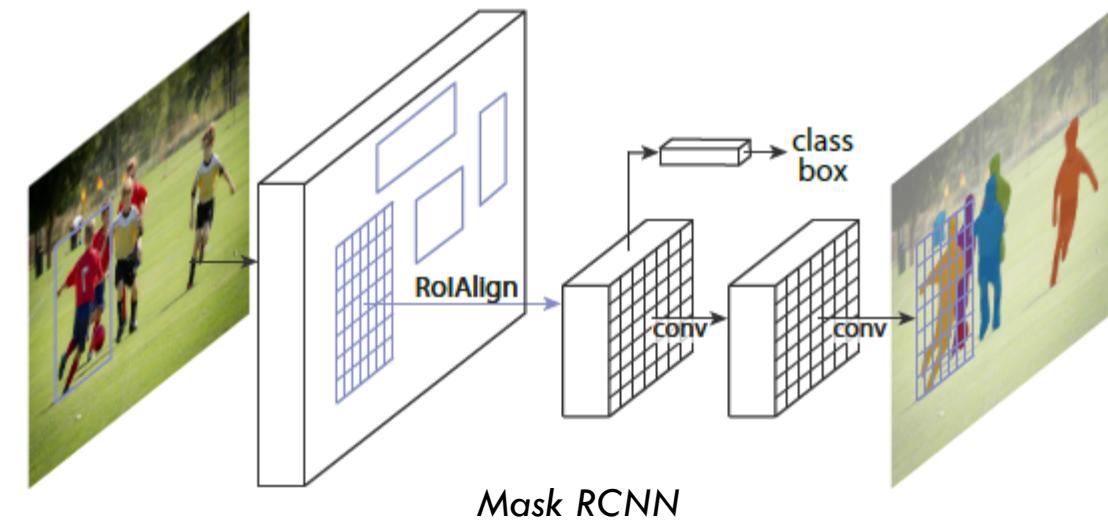
End-to-End
(Deep Learning)

Model Selection

1. YOLO v3
2. Faster RCNN
3. Mask RCNN



Faster R-CNN



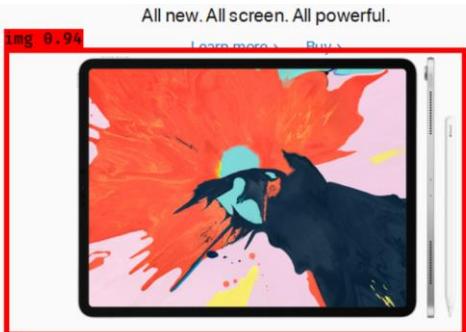
Mask R-CNN

PROGRESS

End-to-End (Deep Learning)

Experiment:

YOLOv3 + VGG16 (Base Net)



Eesti
Ελληνικά
Español
Esperanto
Euskara
فارسی^۱
Français
Galego
한국어^۲
Hrvatski
Bahasa Indonesia
Italiano
עברית^۳
ქართველო
Latviešu
Lietuvių
Magyar
Bahasa Melayu
Nederlands
日本語
Norsk
Norsk nynorsk
Polski
Português
Română
Русский
Simple English
Slovenčina
Slovenščina
Српски / srpski
Srpskohrvatski /

From today's featured list

The **Chief Minister of Karnataka** is the chief executive of the Indian state of Karnataka. As per the Constitution of India, the governor is a state's de jure head, but de facto executive authority rests with the chief minister. Following elections to the Karnataka Legislative Assembly, the state's governor usually invites the party (or coalition) with a majority of seats to form the government. The governor appoints the chief minister, whose council of ministers are collectively responsible to the assembly. Since 1947, twenty-two people have been Chief Minister of Mysore (as the state was known before 1 November 1973) and Karnataka. A majority of them belonged to the Indian National Congress party, including inaugural office-holder K. Chengalraya Reddy. The incumbent chief minister is the Janata Dal (Secular)'s H. D. Kumaraswamy (*pictured*), who was sworn in on 23 May 2018. ([Full list...](#))

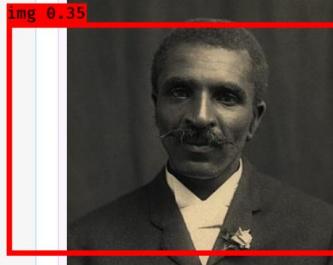
Recently featured: *Game of Thrones* episodes · Awards and nominations received by Alessia Cara · National monuments of the United States

[Archive](#) · [More featured lists](#)



img 0.66

Today's featured picture



img 0.35

George Washington Carver (1860s–1943) was an American agricultural scientist and inventor. Born into slavery in Diamond, Missouri, he was raised by his master Moses Carver after being emancipated, having been separated from his parents as an infant during a kidnapping incident. After college, Carver became a professor at Tuskegee Institute, where he developed techniques to improve soils depleted by repeated plantings of cotton. He wanted poor farmers to grow alternative crops, such as peanuts and sweet potatoes, as a source of their own food and to improve their quality of life. Carver spent years developing and promoting products made from peanuts, although none became commercially successful. Apart from his work to improve the lives of farmers, he was also a leader in promoting environmentalism. Carver received numerous honors for his work, including the NAACP's Spingarn Medal. In an era of very high racial polarization, his fame reached beyond the black community; he was widely recognized and praised in the white community for his many achievements and talents. In 1941, *Time* magazine dubbed Carver a "black Leonardo".

This picture of Carver was taken around 1910 and is in the collection of the Tuskegee University archives.

Photograph credit: Unknown; restored by Adam Cuerden

Indie Music - Topic Recommended

- img 0.47 **BACK TO THE 80'S** - Best of Synthwave And Retro Electro...
ThePrimeThanatos
14,784,370 views • 2 years ago
- img 0.68 **RELAXING SUNDAY MORNINGS Vol. 1**
alexrainbirdMusic
10,522,191 views • 2 years ago
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BASTILLEvideos
16,689,427 views • 4 years ago
- img 0.59 **Lovely** - Billie Eilish & Khalid | Cover | Nikki Lilly
Nikki Lilly
9,695,835 views • 3 months ago
- img 0.74 **Imagine Dragons - Not Today from ME BEFORE YOU**
Jhonaz
60,903,233 views • 2 years ago

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SurajFineArts - Abstract ART
4,132,470 views • 5 days ago
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Emergency Awesome
763,199 views • 4 days ago
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FORMULA 1
1,903,311 views • 3 days ago
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Unbox Therapy
1,987,002 views • 4 days ago
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MovieAccessTrailers
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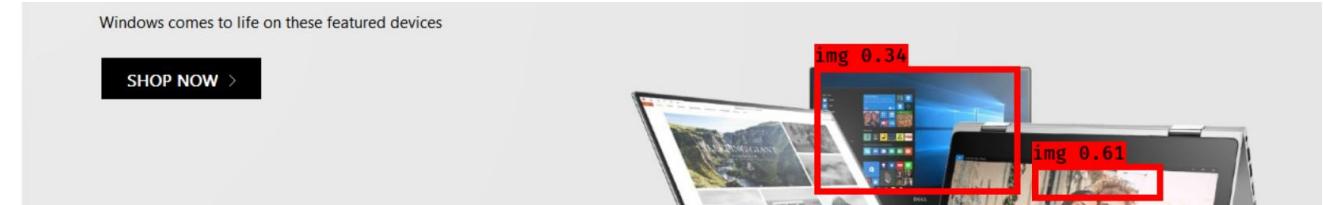
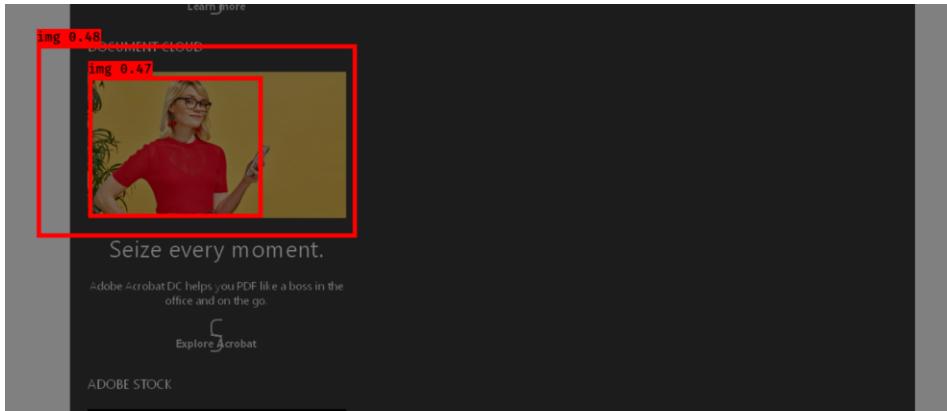
PROGRESS

End-to-End
(Deep Learning)

Experiment:

YOLOv3 + VGG16 (Base Net)

Trained on 1200 Images



For work



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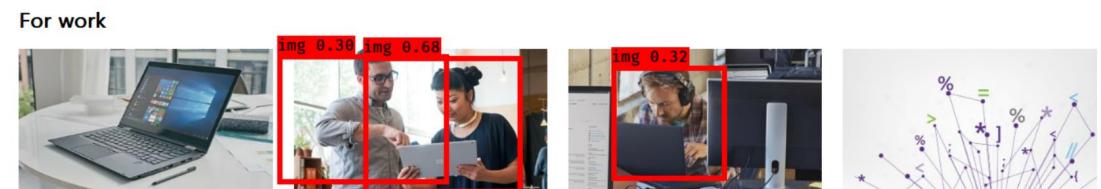
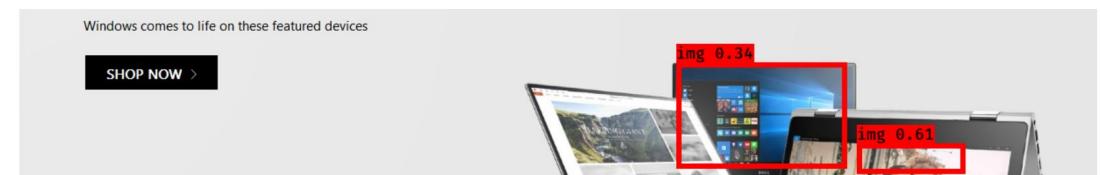
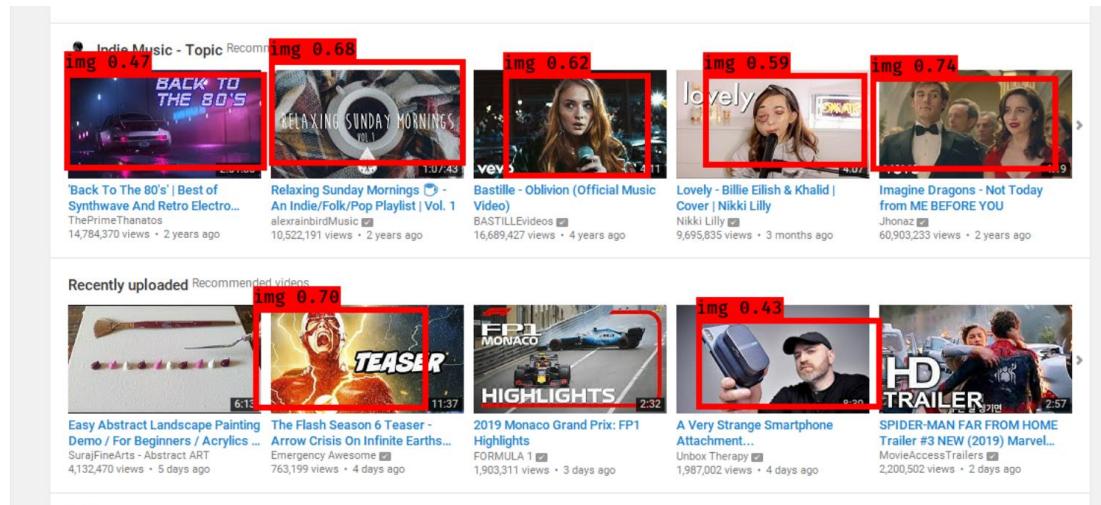
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PROGRESS

End-to-End (Deep Learning)

Issues:

1. Hard to predict the accurate position of elements
2. Susceptible to the complex image elements on the screenshot



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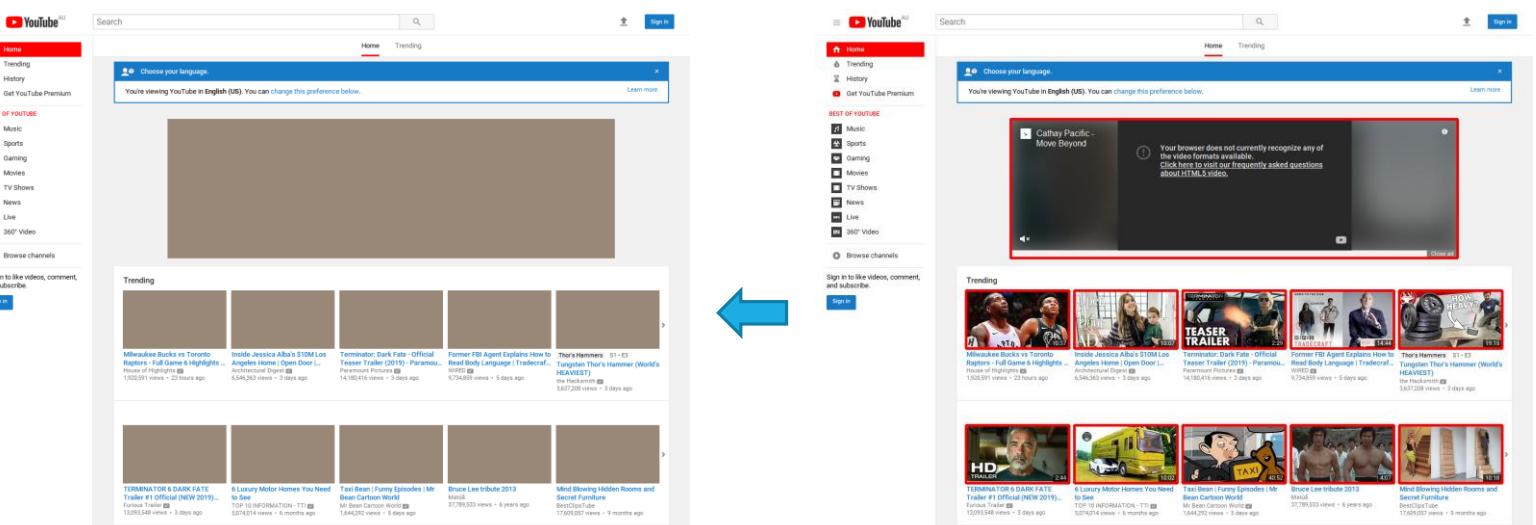
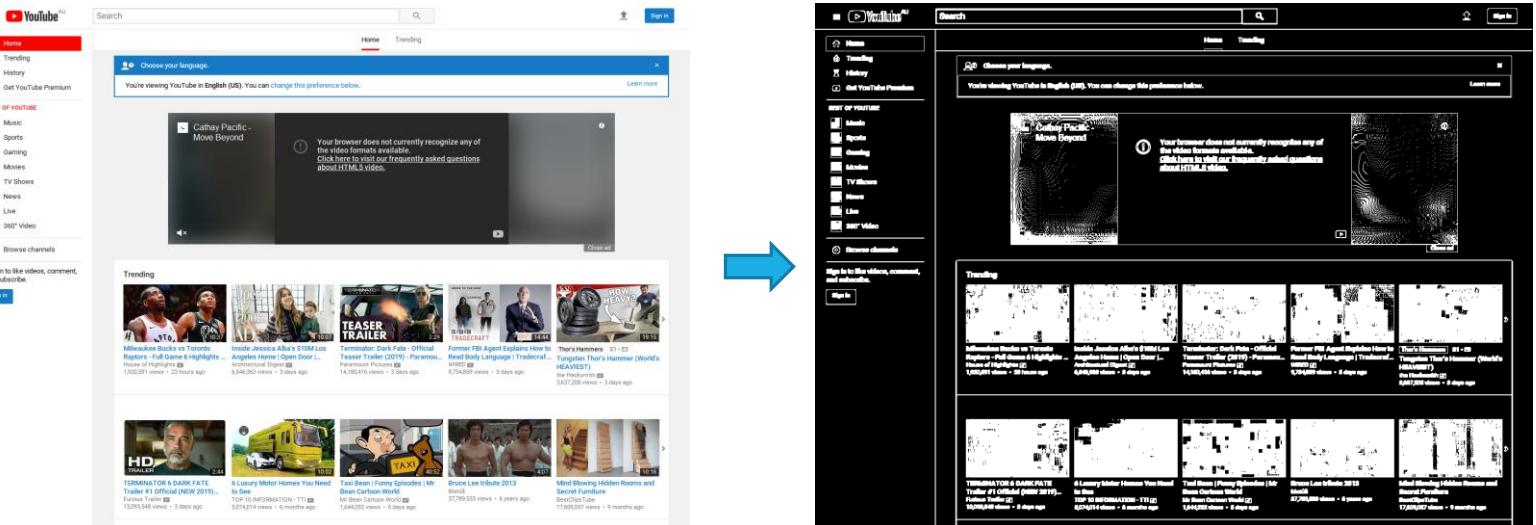
PROGRESS

Divide and Conquer (Computer Vision)

Process:

1. Detect and Separate the `<image>` components on the screenshot first

2. Classify the other UI components

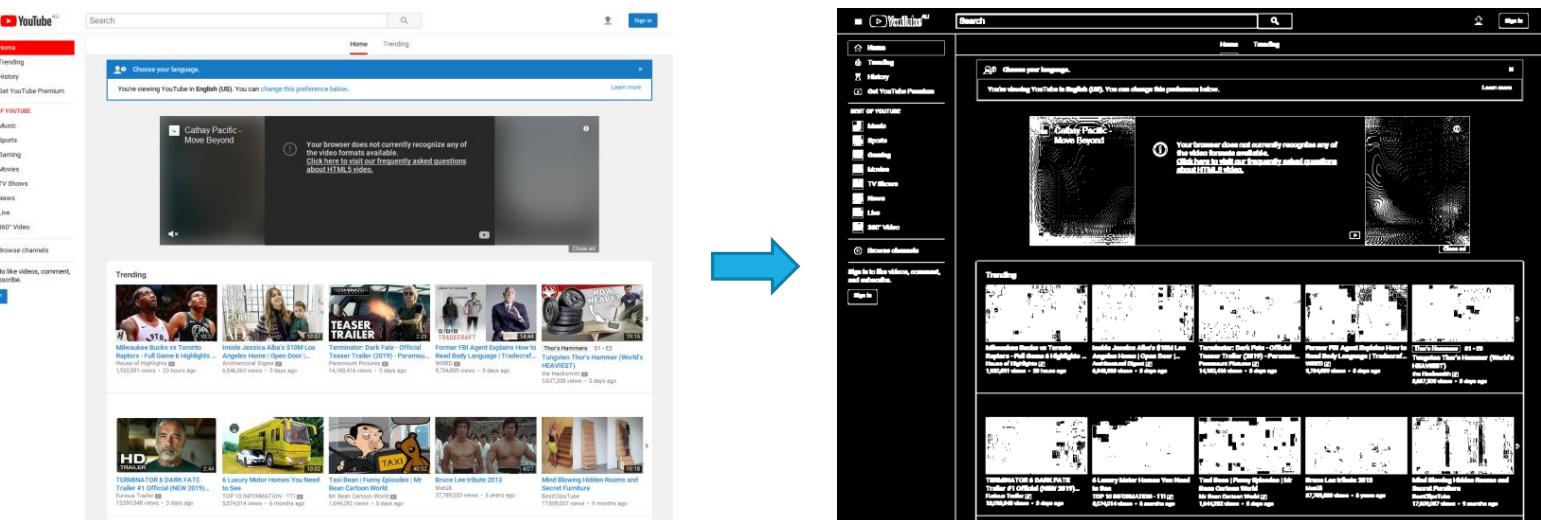
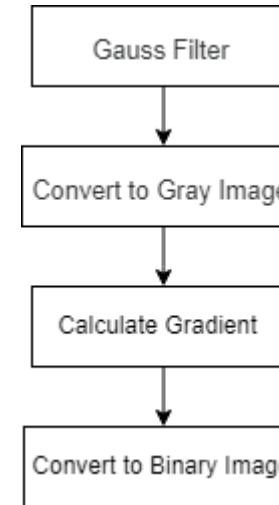


PROGRESS

Divide and Conquer (Computer Vision)

 Detection:

Original Image Processing
Algorithms



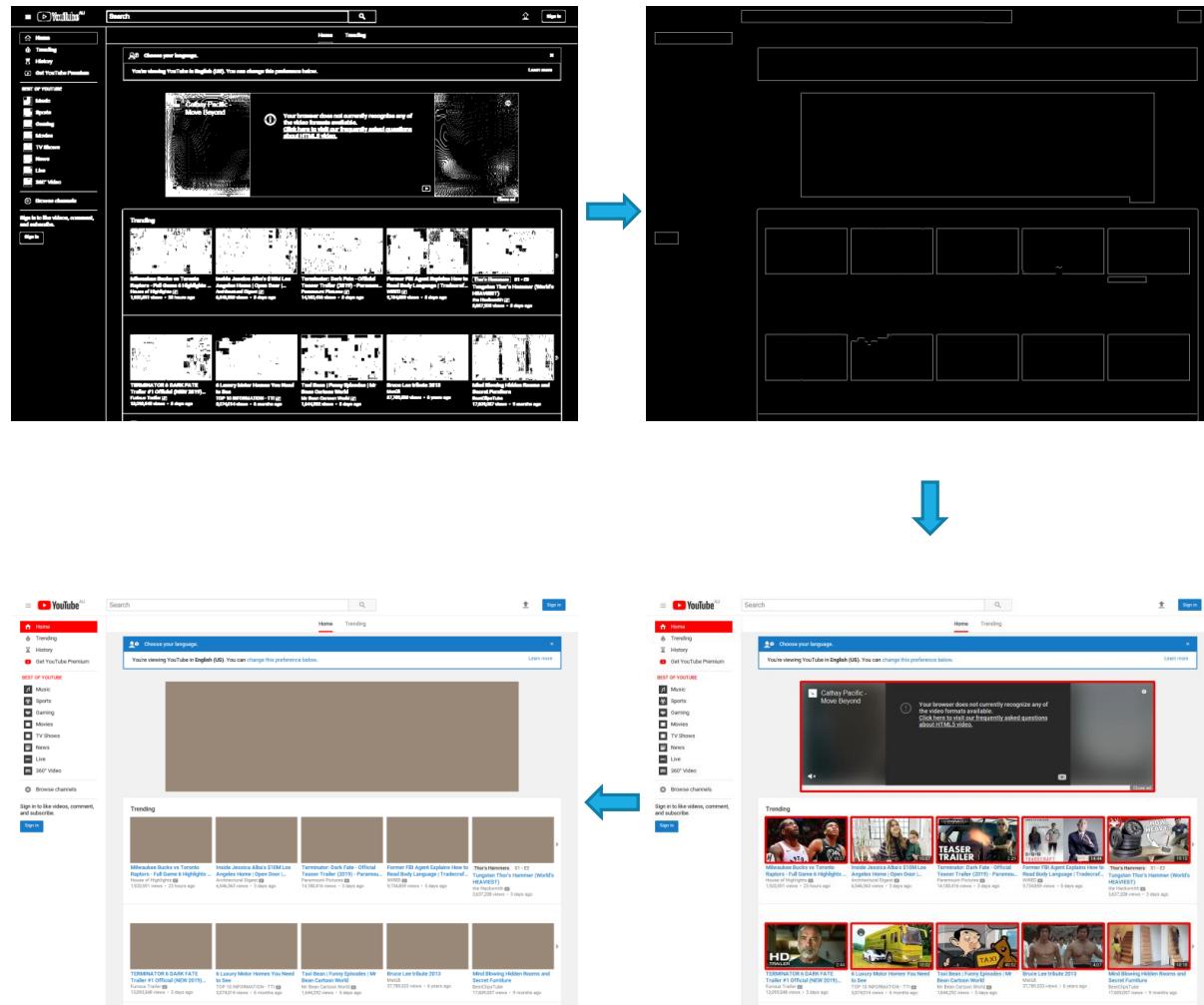
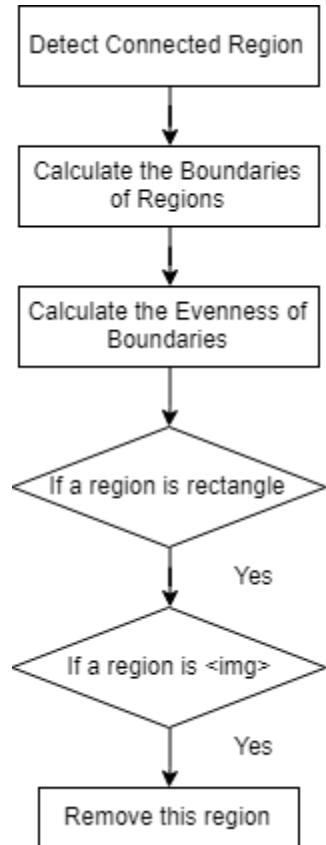
Pre-processing

PROGRESS

Divide and Conquer (Computer Vision)

 Detection:

Original Image Processing
Algorithms



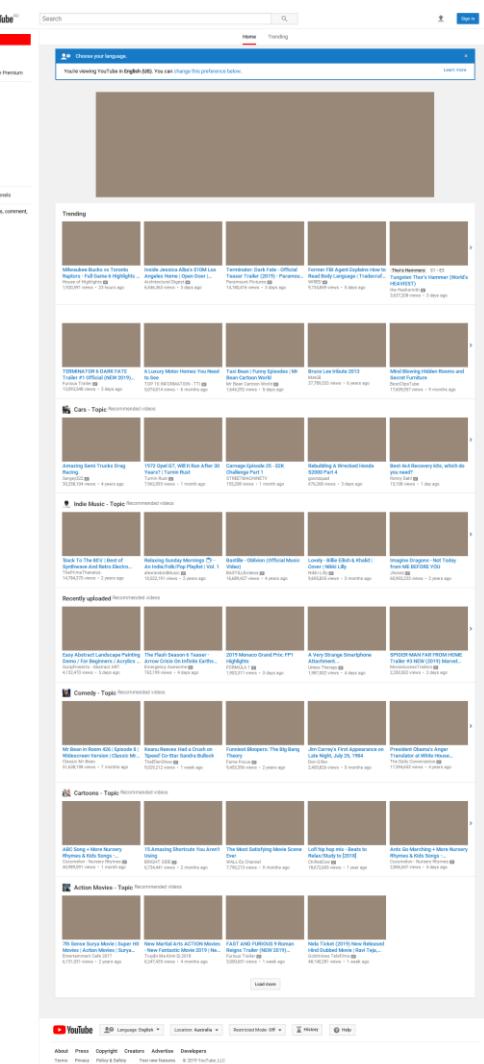
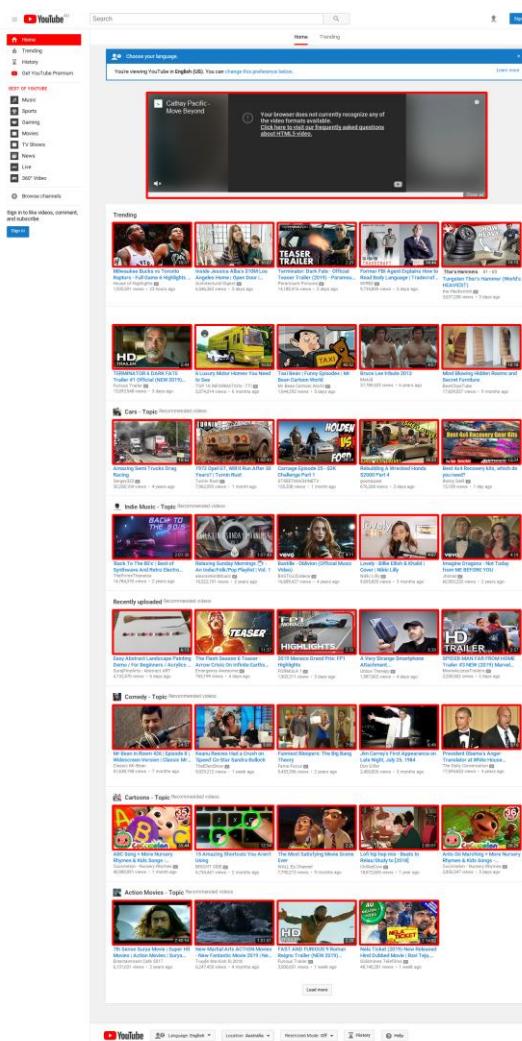
Region processing

PROGRESS

Divide and Conquer
(Computer Vision)

 Detection:

Original Image Processing
Algorithms



RESULTS

Image Detection

The screenshot shows a news website's homepage. At the top, there is a promotional banner for 'BelleMeet' featuring five different hooded jackets. Below the banner, a navigation bar includes links for DESTAQUES, NOTÍCIAS, EDUCAÇÃO, ECONOMIA, ESPORTES, ENTRETENIMENTO, ESTILO, HORÓSCOPO, TERRA TV, and ÚLTIMAS. The main content area displays several news thumbnails. One prominent thumbnail on the left shows a protest scene with many people and flags, with the headline 'Rebelião em presídio de Manaus deixa 15 mortos'. Other visible headlines include 'Manifestantes pró-Bolsonaro vão às ruas em todo o País', 'Atos não foram suficiente para vencer crise, dizem analistas', and 'Flamengo sofre, mas vence Athletico no Maracanã por 3 a 2'. The website has a clean, modern design with a white background and a red border around the main content area.

The screenshot shows the Yahoo homepage. At the top, the Yahoo logo is followed by a search bar and a navigation menu with links for Mail, News, Finance, Sport, Lifestyle, Entertainment, Weather, and More... The main feature is a large news article titled 'Man accused of killing woman found in park may be 'delusional and autistic''. The article includes a photo of a man and a woman, and a smaller photo of flowers. Below the main article, there are several other news thumbnails. Some of the visible headlines include 'Witness' shock claims about Diana's car crash', 'Suburbs where house prices have dropped to 2015 levels', 'Teen's inspiring 60kg transformation', 'Serena Williams' swipe at tennis officials in new outfit', 'Filthy: Never-before-seen moment caught on live TV', 'Lifestyle - AGT star washed dishes for \$6/hour after \$250k win', and 'MAFS star Jessika Power claims men 'can't stay away''. The layout is typical of a news aggregator site, with a mix of large and small images and text snippets.

RESULTS

Image Detection

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BBC REEL THE CHILDREN GETTING NEW LIMBS [WATCH NOW](#)

Welcome to BBC.com Monday, 27 May

Europe's biggest blocs lose grip on power
EU elections: Main centrist parties suffer significant losses as liberals, Greens and nationalists gain ground.
| EUROPE

Australia's bruised opposition elects new leader | AUSTRALIA
The wildest edge of the Roman Empire | TRAVEL
How your life story shapes you | FUTURE
Students walk out in global climate strike | WORLD

| News

Iraq court sentences French IS members to death | MIDDLE EAST
Everest queues not sole cause of deaths, says Nepal | ASIA
German Jews warned not to wear kippas | EUROPE
ADVERTISEMENT

| Sport

Man City rivals are jealous - chairman | FOOTBALL
Hamilton beats Verstappen for Monaco win | FORMULA 1
Atalanta reach first Champions League | EUROPEAN FOOTBALL

SYDNEY WEATHER [EDIT](#)

The Heart of the Canadian Rockies
The Soul of Jasper, Alberta
[READ NOW](#)
PRESENTED BY ROCKY MOUNTAINEER

RESULTS

Image Detection

VK for mobile devices

Install our official mobile app and stay in touch with your friends anytime and anywhere.

Phone or email
Password
Log in
Forgot your password?

First time on VK?
Sign up for VK

Your first name
Your last name
Date of birth
Day Month Year
Your gender
Female Male
Continue registration
Continue with Facebook

VK for Android
VK for iPhone
All products >

Main Page Talk

Wiki Loves Earth photo contest: Upload photos of Australia's natural heritage sites to help Wikipedia and win prizes!

Welcome to Wikipedia, the free encyclopedia that anyone can edit. 5,861,863 articles in English

From today's featured article

Arthur Mold (27 May 1863 – 29 April 1921) was an English professional cricketer. He began his cricket career playing for Banbury and Northamptonshire in the mid-1880s, then played first-class cricket for Lancashire as a left bowler between 1889 and 1901. A Wisden Cricketer of the Year in 1892, he was selected for England in three Test matches in 1893. Mold was one of the most effective bowlers in England during the 1890s but his career was overshadowed by controversy over his bowling action; many critics thought he threw rather than bowled the ball. He was penalised in 1900 and 1901 by the umpire Jim Phillips, who had targeted several prominent bowlers with dubious bowling actions. Although Mold took 1,673 wickets in first-class matches, many commentators viewed his achievements as tainted. After his departure from the game, throwing ceased to be a concern in English cricket for 50 years. (Full article...)

Recently featured: History of Aston Villa F.C. (1961–present) · Crawford expedition · Ashton-under-Lyne · Archive · By email · More featured articles

In the news

British Prime Minister Theresa May (pictured), under pressure over her handling of Brexit, announces her intention to resign.
A prison riot in Acarigua, Venezuela, leaves 29 prisoners dead and 19 guards injured.
A fire at a commercial complex in Surat, India, kills 22 students in a coaching centre.
The incumbent Bharatiya Janata Party and its allies, led by Narendra Modi, win a majority in the Indian general election.
Joko Widodo is re-elected President of Indonesia, and his party, PDI-P, wins the largest share of legislative votes.

Recent deaths: Murray Gell-Mann · Beaton Tulk · Judith Kerr · Binyavanga Wainaina · Nan Winton

Other recent events · Nominate an article

On this day

May 27. Memorial Day in the United States (2019)
1096 – The largest of the Rhineland massacres took place in Mainz, where at least 1,100 Jews were killed by the People's Crusade.
1644 – Manchu regent Dorgon (pictured) defeated rebel leader Li Zicheng of the Shun dynasty at the Battle of Shanhai Pass, allowing the Manchus to enter and conquer the capital city of Beijing.
1923 – French drivers André Lagache and René Léonard won the first running of the 24 Hours of Le Mans sports car race.
1971 – The deadliest road accident in England took place when the brakes on a coach failed and it crashed in North Yorkshire, killing 32 people.
1995 – American actor Christopher Reeve was thrown from his horse, leaving him a quadriplegic; he later became an activist on behalf of people with spinal cord injuries.

Antoine Daniel (b. 1601) · Julia Ward Howe (b. 1819) · Gérard Jean-Juste (d. 2009)

More anniversaries: May 26 · May 27 · May 28

Archive · By email · List of historical anniversaries

RESULTS

Code Generation

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Title</title>
    <link rel="stylesheet" href="a.css" type="text/css">
</head>
<body>
<div class="generated_container">
    <div id="div0"></div>
    <div id="div1">
        <input id="input1">
        <input id="input2">
    </div>
    <div id="div2">
        <button id="button1">Button</button>
        <button id="button2">Button</button>
    </div>
    <div id="div3">
        <h1 id="h11">Text in H1</h1>
        <h2 id="h21">Text in H2</h2>
        <p id="p1">Text in p</p>
        <p id="p2">Text in p2</p>
    </div>
    <div id="div4"></div>
    <div id="div5"></div>
    <div id="img6"></div>
    <div id="img7"></div>
    <div id="img8"></div>
    <div id="img9"></div>
    <div id="img10"></div>
    <div id="img11"></div>
    <div id="img12"></div>
    <div id="img13"></div>
    <div id="img14"></div>
    <div id="img15"></div>
    <div id="img16"></div>
</div>
</body>
</html>
```

```
#div0{
    width: 650px; height: 30px;
    margin-top: 10px; margin-left: 229px;
    position: absolute;
    border: grey solid 1px;
}
#div1{
    width: 56px; height: 29px;
    margin-top: 10px; margin-left: 1279px;
    position: absolute;
    border: grey solid 1px;
}
#div2{
    width: 186px; height: 28px;
    margin-top: 63px; margin-left: 21px;
    position: absolute;
    border: grey solid 1px;
}
#div3{
    width: 1056px; height: 79px;
    margin-top: 100px; margin-left: 269px;
    position: absolute;
    border: grey solid 1px;
}
#div4{
    width: 1060px; height: 51px;
    margin-top: 488px; margin-left: 267px;
    position: absolute;
    border: grey solid 1px;
}
#div5{
    width: 56px; height: 29px;
    margin-top: 544px; margin-left: 21px;
    position: absolute;
    border: grey solid 1px;
}
#img6{
    width: 850px; height: 264px;
    margin-top: 209px; margin-left: 372px;
    position: absolute;
    background: black;
}
```

FUTURE WORK

Image Processing

1. Simple UI components detection and classification (Object Detection)
2. Text detection (OCR)

Code Generation

1. Extendable and maintainable code
2. Fit to real developer's usual practice

Marshall Clifton

ANU Honours
AI Planning and SAT solving

Motivation

Find solutions to classical planning problems faster by better directing the search.

Background

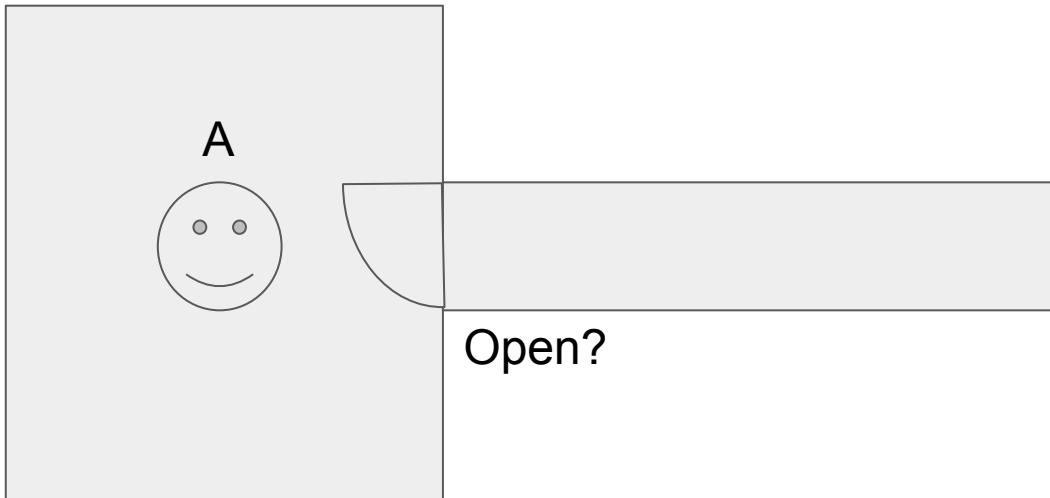
- Boolean Satisfiability
- Classical Planning
- SAT Planning

Boolean Satisfiability

Eg. $(\neg A \vee B) \wedge (\neg A \vee C) \wedge (B \vee \neg C)$

NP-Complete

Classical Planning



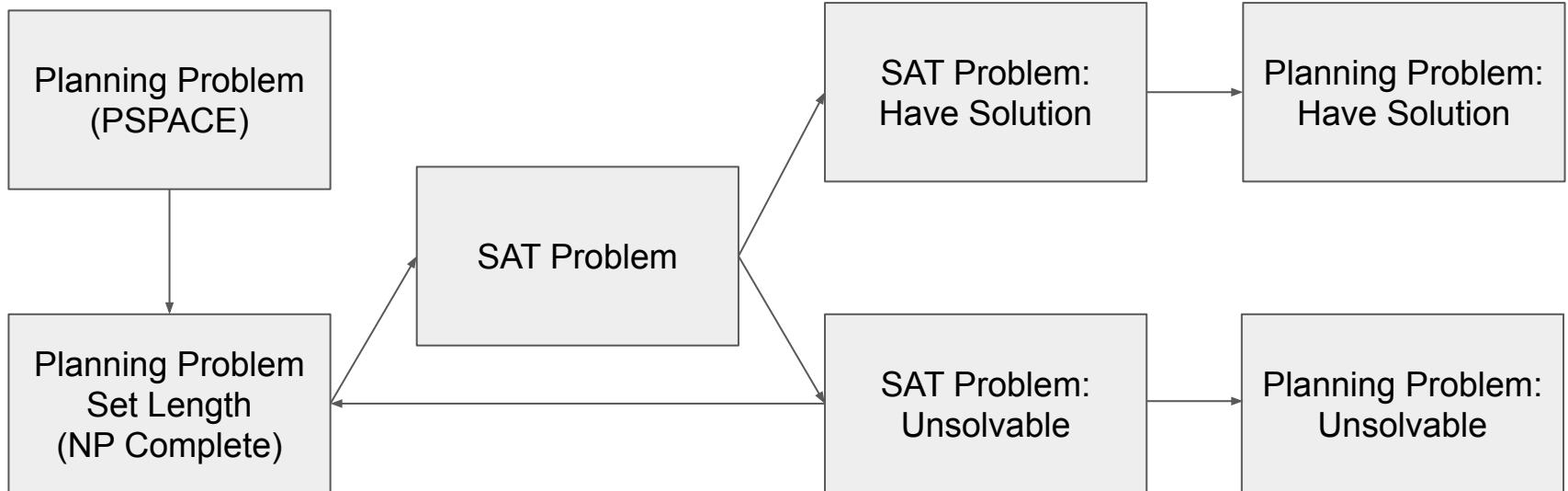
Open/close Door
Walk too/from end of corridor,
Walk up/down the path

Not Open => Open
Open => Not Open
A [if Open] => B
B => D, C, A
C => B
D => B

Start:
At A, not open

Goal:
At C

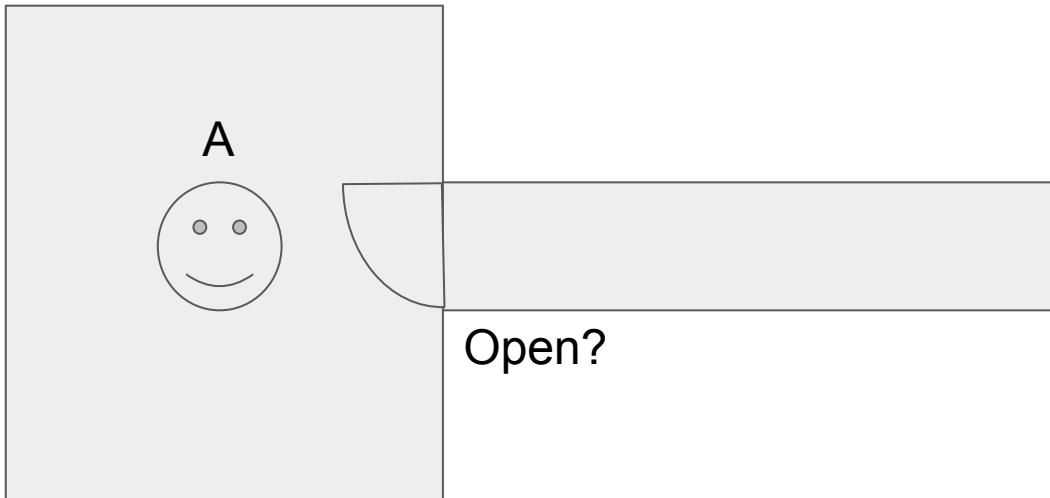
SAT Planning



Project Intuition

- Detect loops/repeat actions.
- Restrict the search from exploring these paths.

Classical Planning



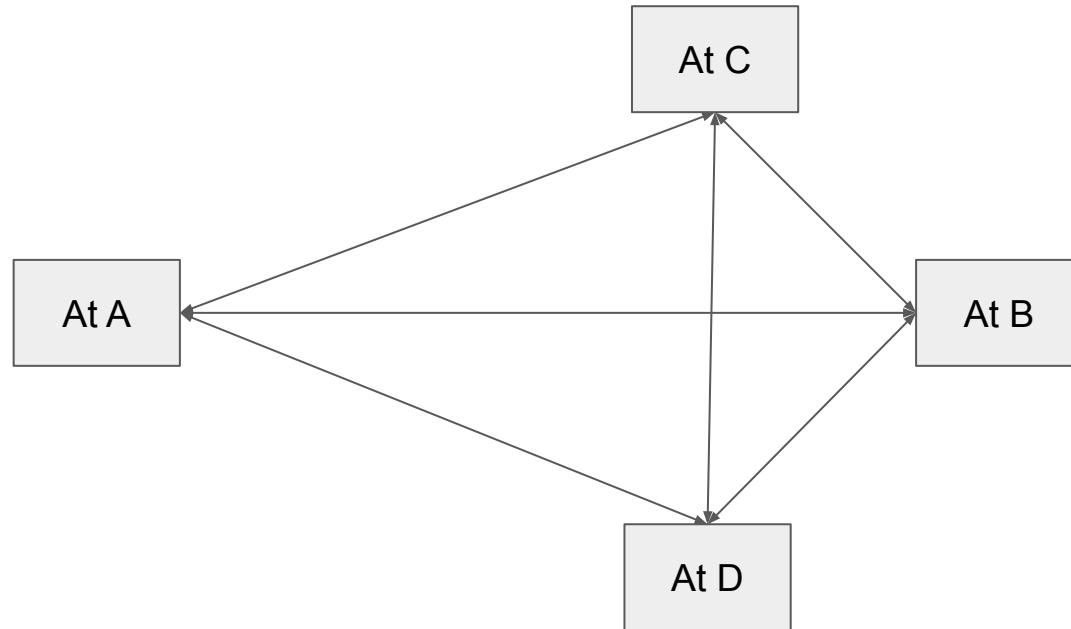
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D => B

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At A, not open

Goal:
At C

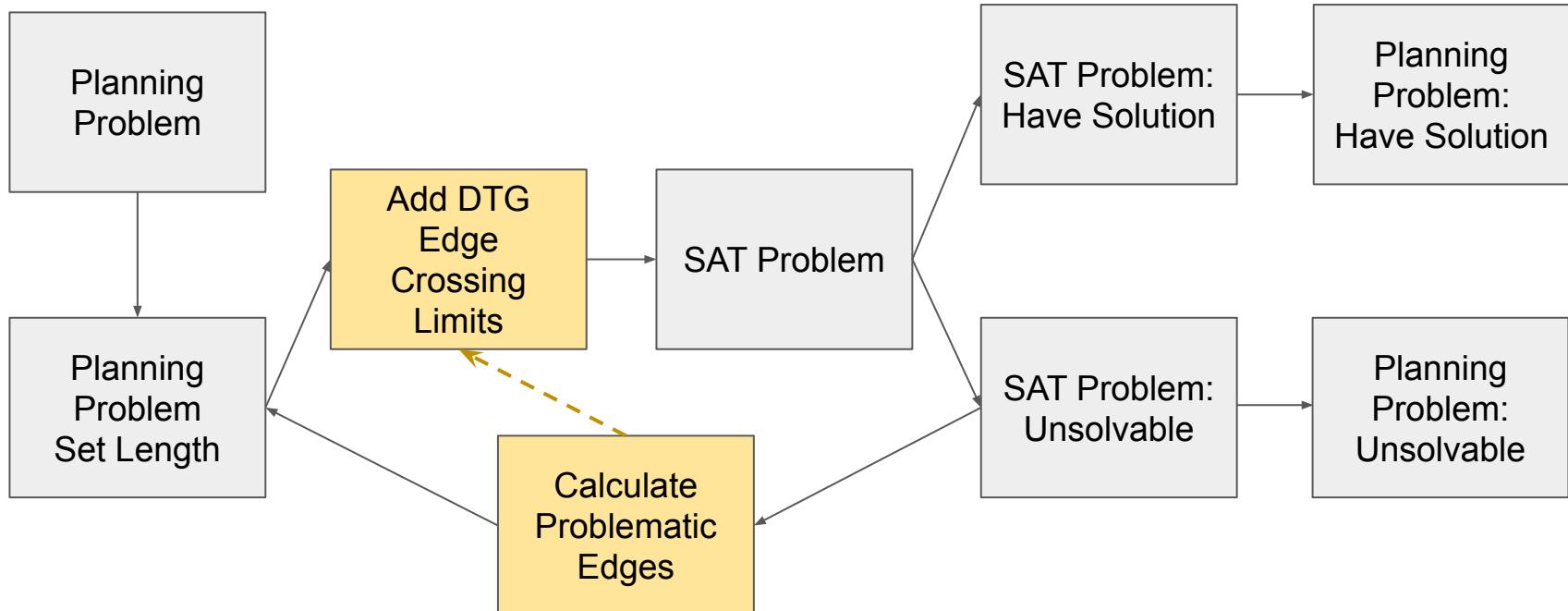
Mutex's



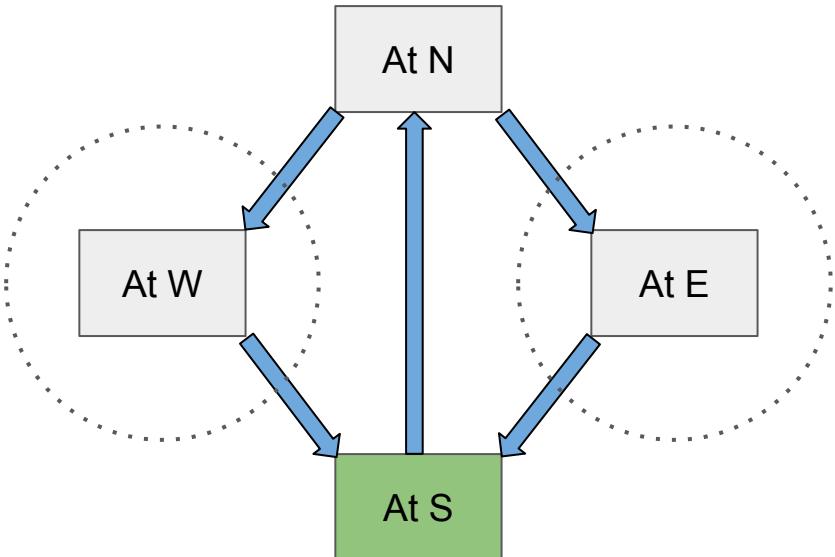
Brief Project Description

- Detect mutex propositions.
- Note actions that move between mutex propositions.
- Limit the crossing of arcs between these propositions.

SAT Planning Additions



Planning Example



Propositions:

{At N, At S, At W, At E, Visited E, Visited W}

Start State:

{At S}

Goal State:

{Visited W, Visited E}

Example Actions:

Head_S_to_N:

Pre: {At S}

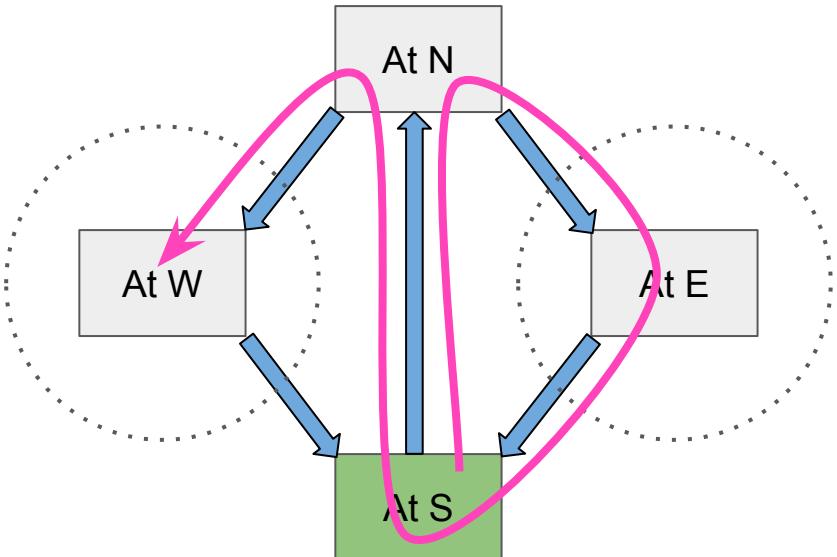
Post: {¬At S, At N}

Head_N_to_E:

Pre: {At N}

Post: {¬At N, At E, Visited E}

Planning Example



Propositions:

{At N, At S, At W, At E, Visited E, Visited W}

Start State:

{At S}

Goal State:

{Visited W, Visited E}

Example Actions:

Head_S_to_N:

Pre: {At S}

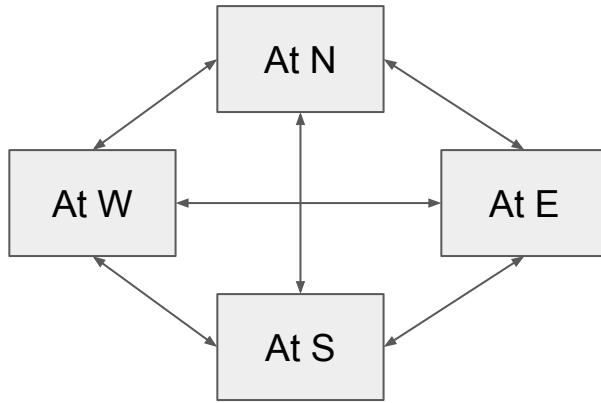
Post: {¬At S, At N}

Head_N_to_E:

Pre: {At N}

Post: {¬At N, At E, Visited E}

Mutex's



Extending Edge Crossings

- Unsatisfiable SAT proof shows the problematic edges.
- Need a scheme to relax edges.

Communication for Concurrency with Choreographies in CakeML

James Shaker

Supervised by Dr. Michael Norrish

July 23, 2019

Bugs are bad

The Cost of Inadequate Software Testing Infrastructure (billions)

Software developers	\$21.2
Software users	\$38.3
Total	\$59.5

Trustworthy Systems

Demand **logical proof** that our system **always** works*

* terms and conditions apply

Distributed and Concurrent Systems

Problem

Formal verification techniques aren't well suited to concurrent or distributed systems.

Distributed and Concurrent Systems

Problem

Formal verification techniques aren't well suited to concurrent or distributed systems.

Key Issue

How to reason about **global** system behaviour with techniques suited to **local** process level reasoning?

Distributed and Concurrent Systems

Problem

Formal verification techniques aren't well suited to concurrent or distributed systems.

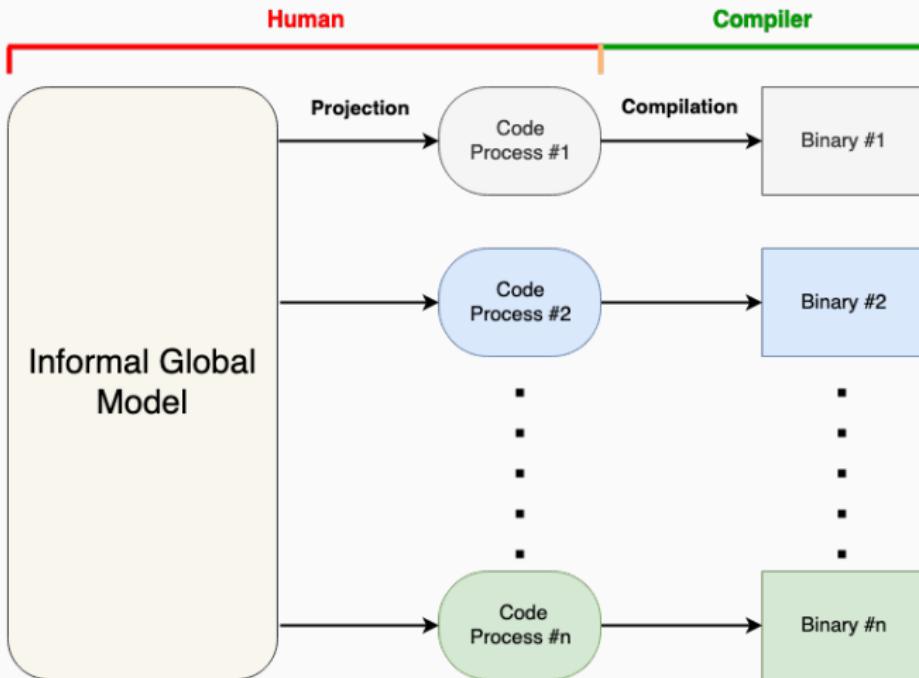
Key Issue

How to reason about **global** system behaviour with techniques suited to **local** process level reasoning?

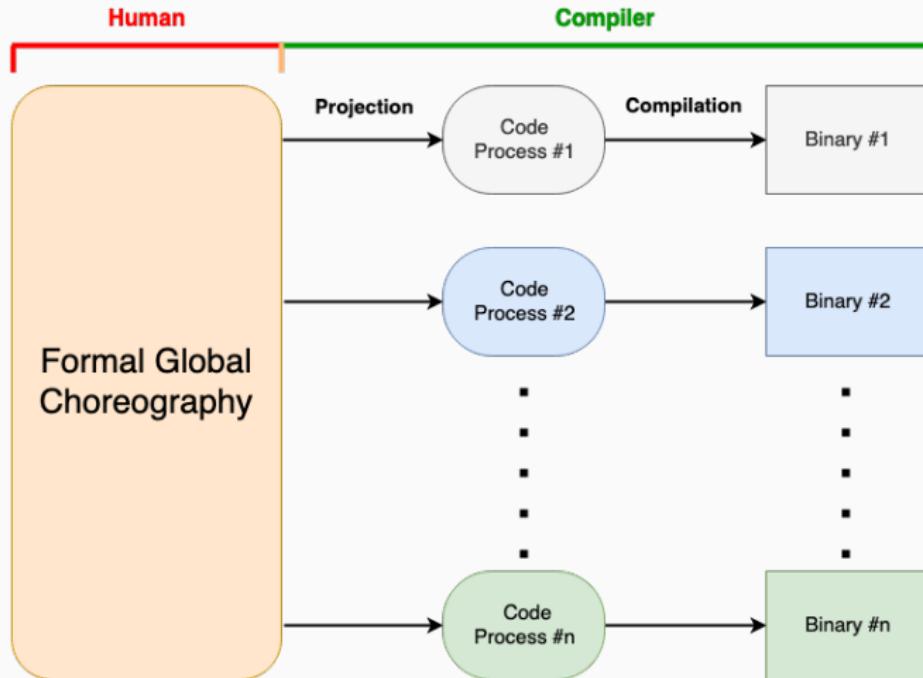
Solution

Don't.

Choreographies: The Old Approach



Choreographies: The New Approach



Goals

Ultimate Goal

Build strong **concurrency verification** methodologies around choreographic programming for **trustworthy** systems.

Goals

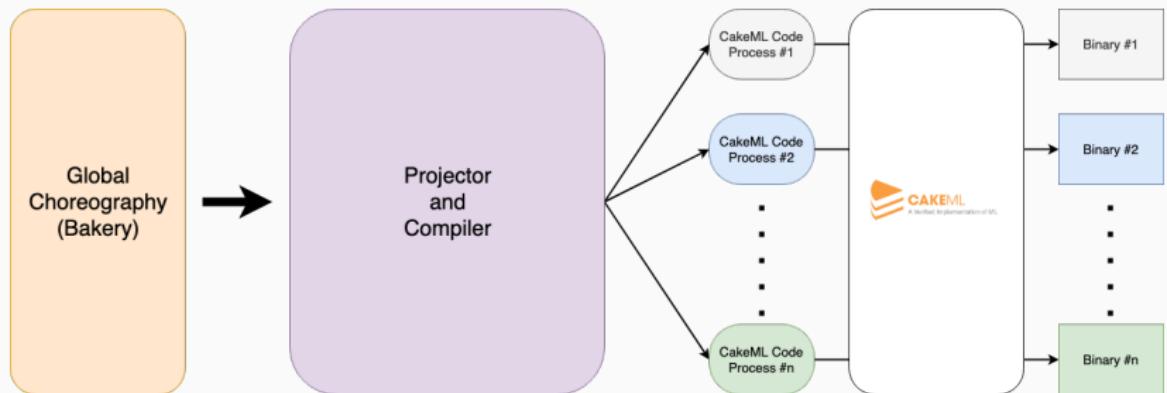
Ultimate Goal

Build strong **concurrency verification** methodologies around choreographic programming for **trustworthy** systems.

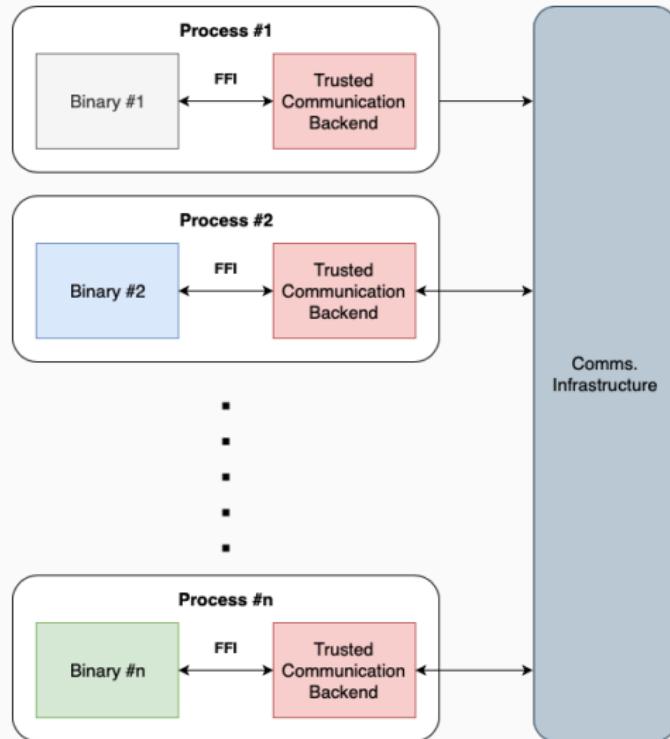
Project Goal

Produce a **trustworthy** process for the **projection** and **compilation** of a choreographic language into executable code.

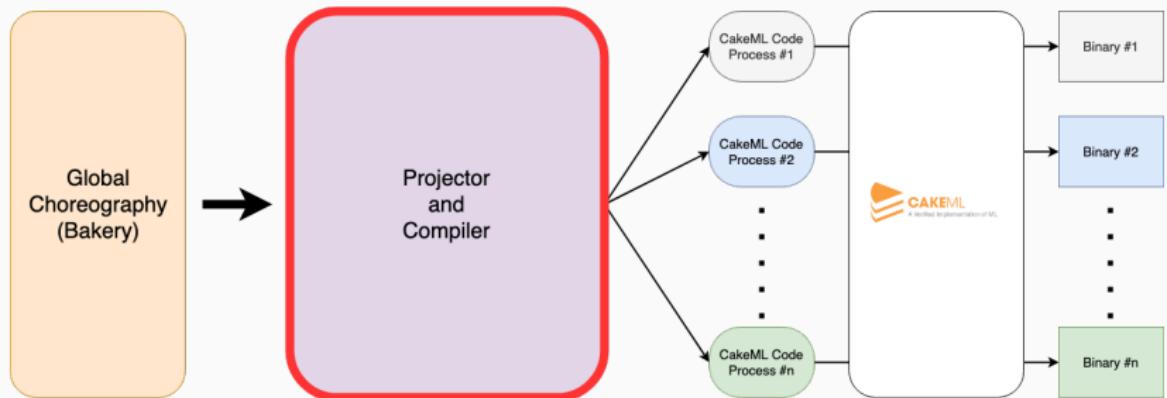
Bakery: Compilation



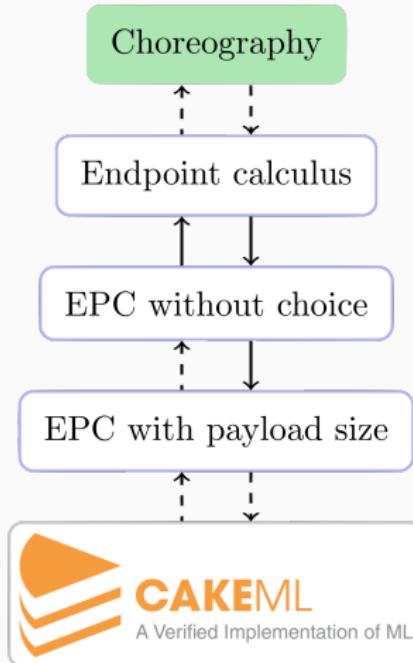
Bakery: Runtime



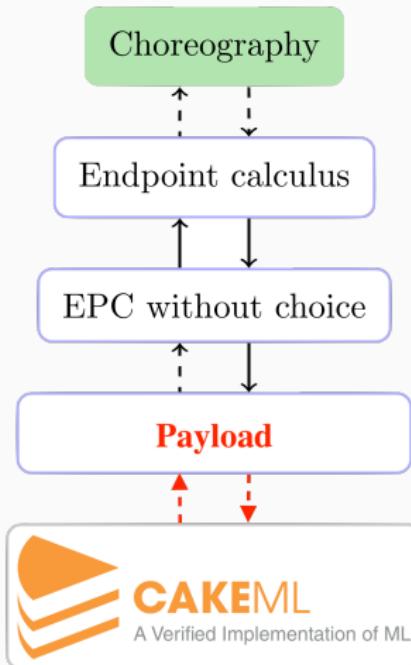
Bakery: Compilation



Bakery: Compilation



Bakery: Payload Compilation



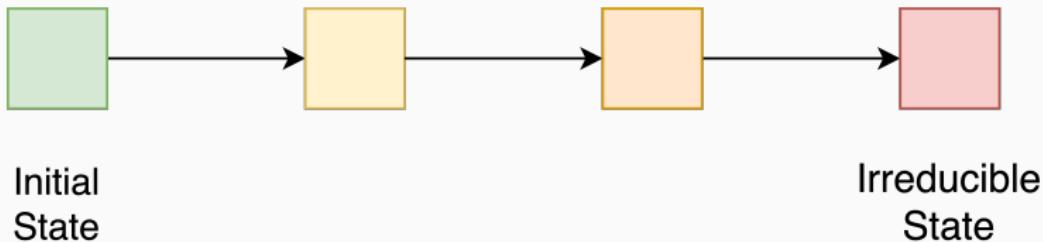
Payload Compilation: Problems

1. What does correctness mean?
2. How do we model the outside world?
3. How do we prove correctness?

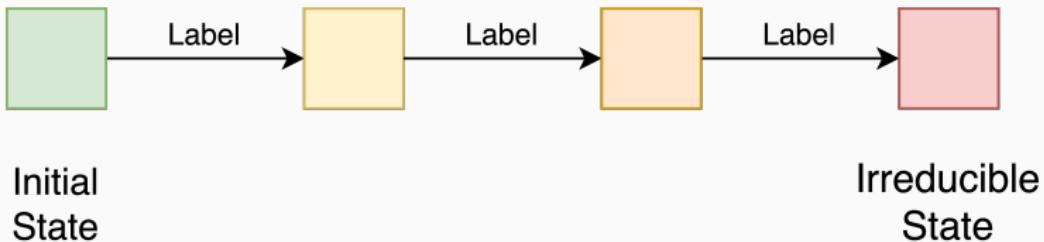
Payload Compilation: Problems

1. **What does correctness mean?**
2. How do we model the outside world?
3. How do we prove correctness?

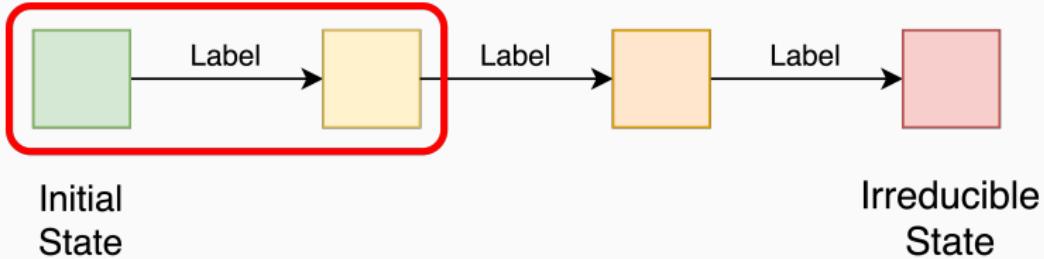
Correctness: Smallstep Semantics



Correctness: Smallstep Semantics



Correctness: Smallstep Semantics



Describe all possible **small steps**

Correctness: Functional Bigstep



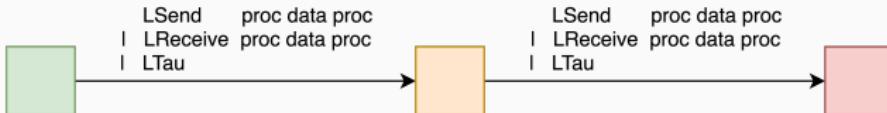
Correctness: Functional Bigstep



Essentially defining an **interpreter function**

Correctness: Payload and CakeML

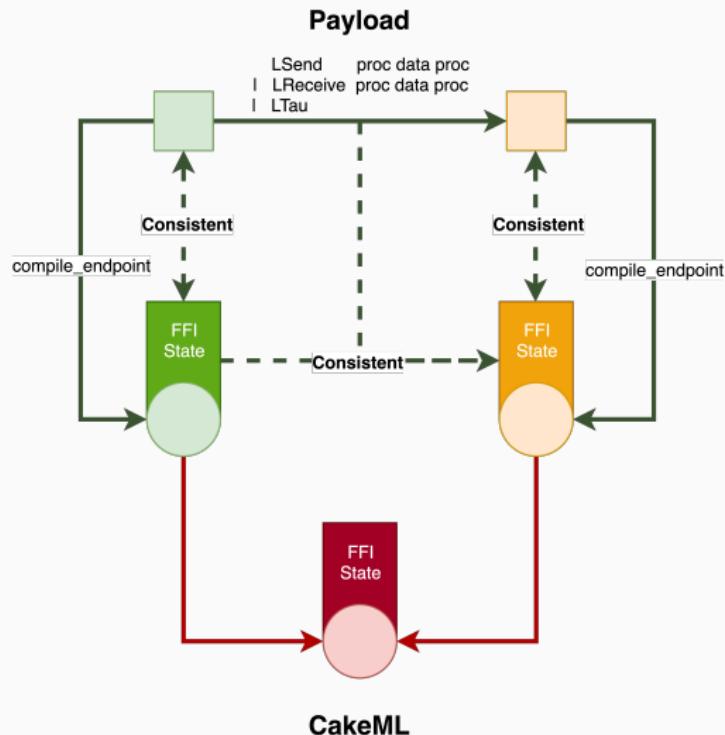
Payload



CakeML



Correctness: Payload and CakeML

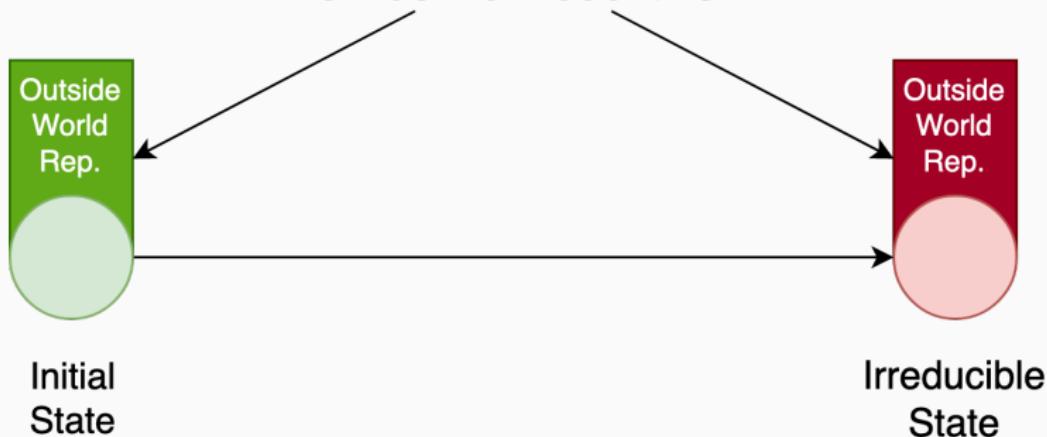


Payload Compilation: Problems

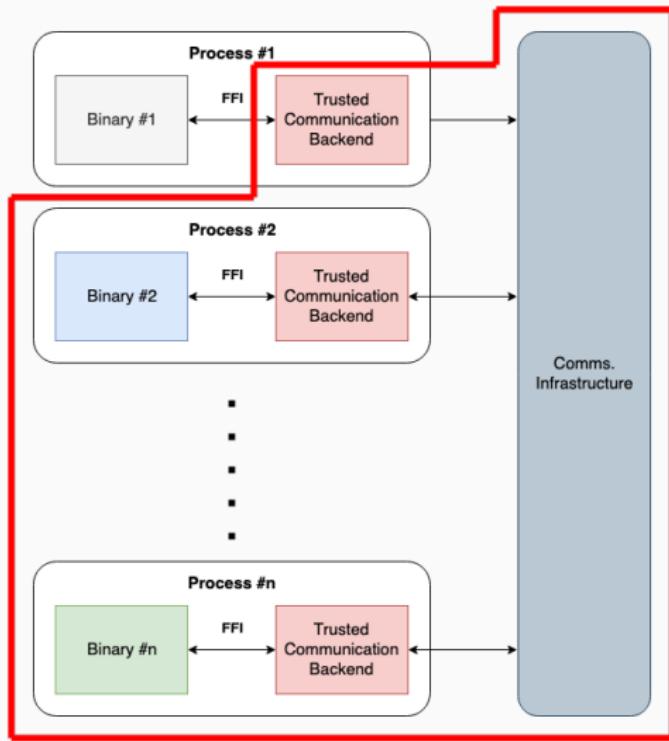
1. What does correctness mean?
2. **How do we model the outside world?**
3. How do we prove correctness?

FFI Model: Question

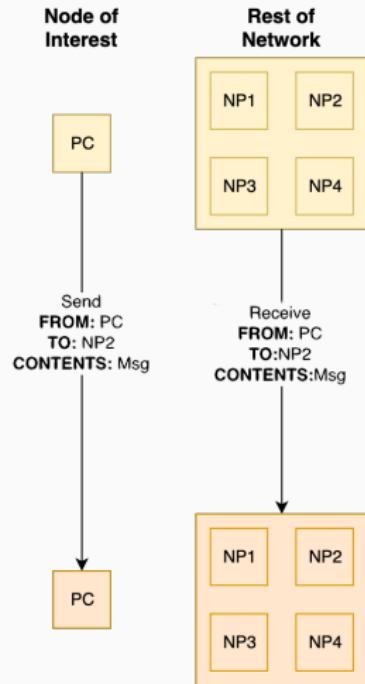
How do we model this?



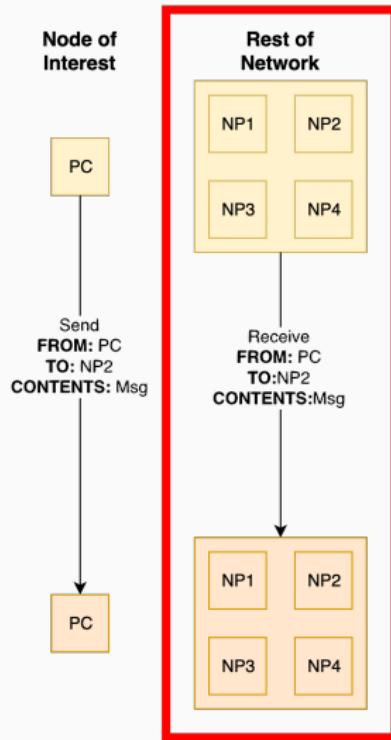
FFI Model: Behaviour



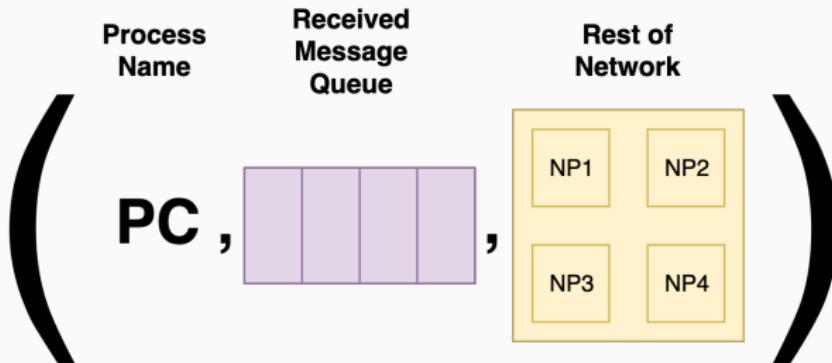
FFI Model: Payload Model



FFI Model: Payload Model



FFI Model: Result



- Define **ASend** and **AReceive** transitions on tuple
- FFI equivalence based on **bisimulation**
- CakeML interface functions perform transition if possible, fail if not

Payload Compilation: Problems

1. What does correctness mean?
2. How do we model the outside world?
3. **How do we prove correctness?**

Payload Compilation: Work Left

Complete

- Developed automation tools and frameworks
- Most of key invariant

Todo

- Utilise invariant and automation to produce final proof
- Investigate backwards ‘expressiveness’ proof

Thank you!

Questions?



Design Composition Critique

Presenter: Sidong Feng (U6063820)

Supervisor: Dr. Zhenchang Xing (ANU)

COMP 4540





Motivation

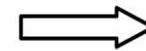
- How to be an outstanding app?
 - Practical Functions
 - Absorbing Graphical User Interface (GUI)
- Good GUI design is difficult and time consuming.
- Dress up game.



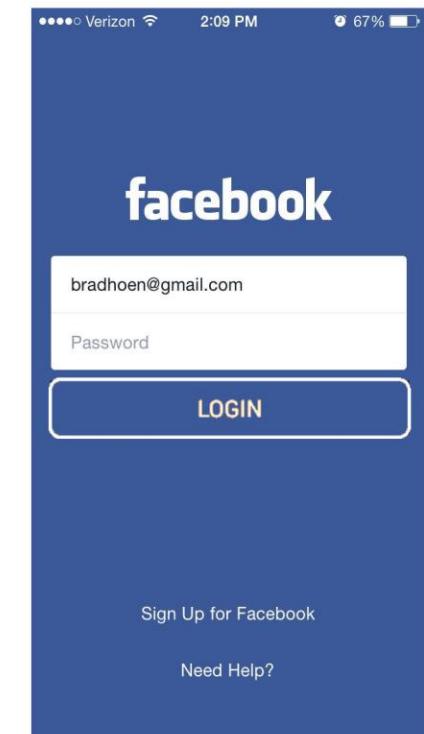
Demo



Prototype UI



Synthesis



Modification



Gallery

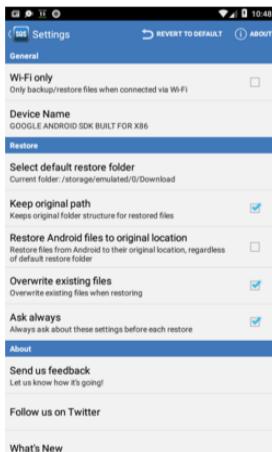
Project Objective

- Provide a large-scale GUI component: *Design Gallery*.
- Recommend and alter component intelligently: *Design Critique*.

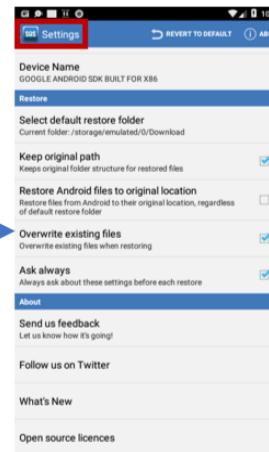


Design Gallery

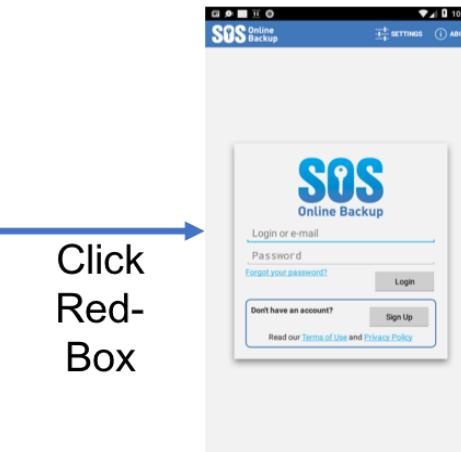
- Collect GUI screenshot annotated with the component information (including component type, size and position)



UI-1

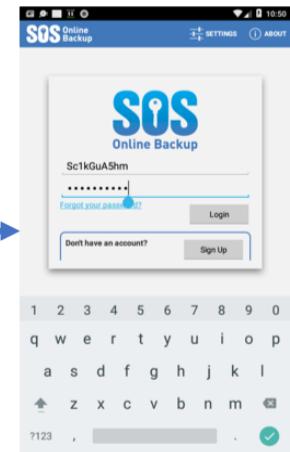


Scroll
Down



Click
Red-
Box

UI-3



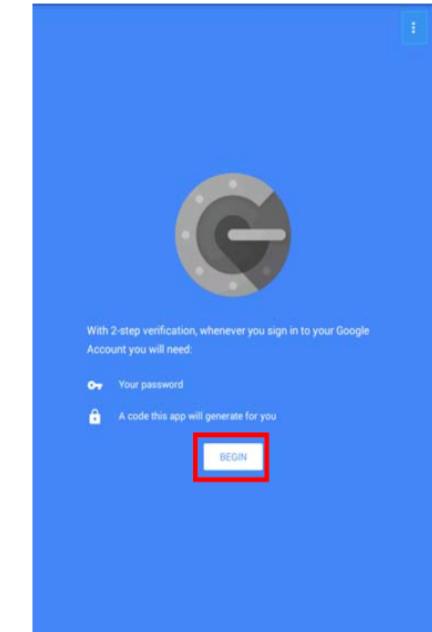
Input
Text

UI-4

Design Gallery

```
...
<node index="1" text="" bounds="[0,118][800,1216]">
  <node index="0" text="" bounds="[67,337][733,911]">
    <node index="0" text="" bounds="[273,337][526,590]" />
    <node index="1" text="With 2-step verification, whenever you sign in to your Google Account you will need:" bounds="[107,627][693,702]" />
    <node index="2" text="" bounds="[107,729][693,767]">
      <node index="0" text="" bounds="[107,729][139,761]" />
      <node index="1" text="Your password" bounds="[171,729][693,767]" />
    </node>
    <node index="3" text="" bounds="[107,788][693,826]">
      <node index="0" text="" bounds="[107,788][139,820]" />
      <node index="1" text="A code this app will generate for you" bounds="[171,788][693,826]" />
    </node>
    <node index="4" text="Begin" bounds="[336,847][464,911]" />
  </node>
</node>
...

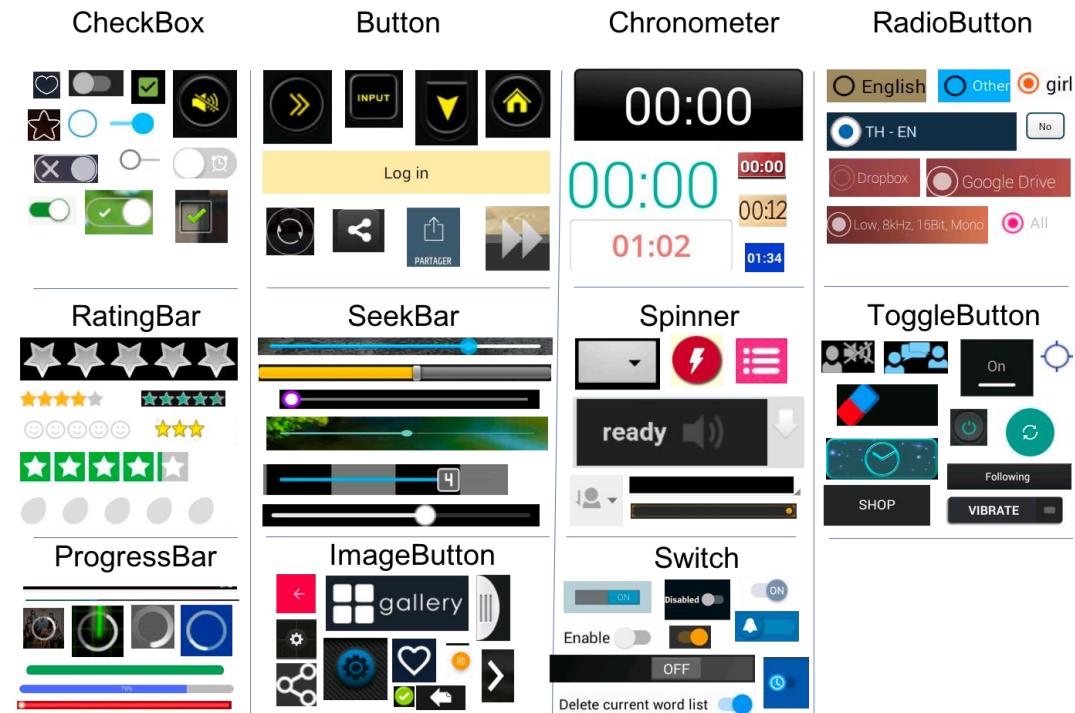
```





Design Gallery

- Crop 11 types of GUI components wireframed in application screenshots





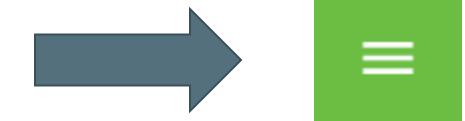
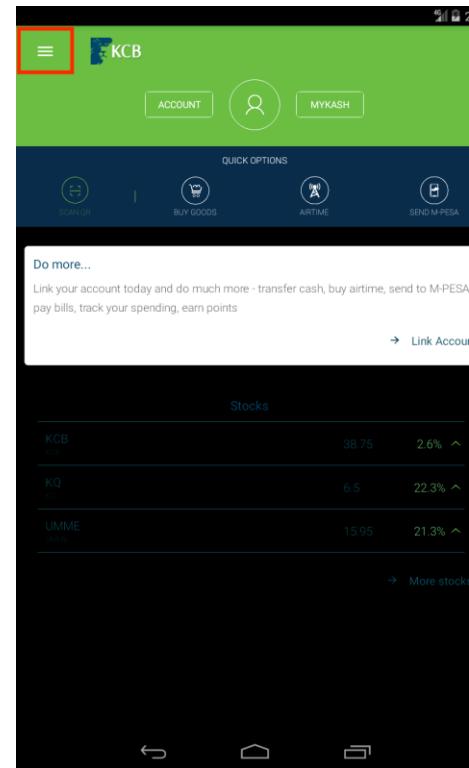
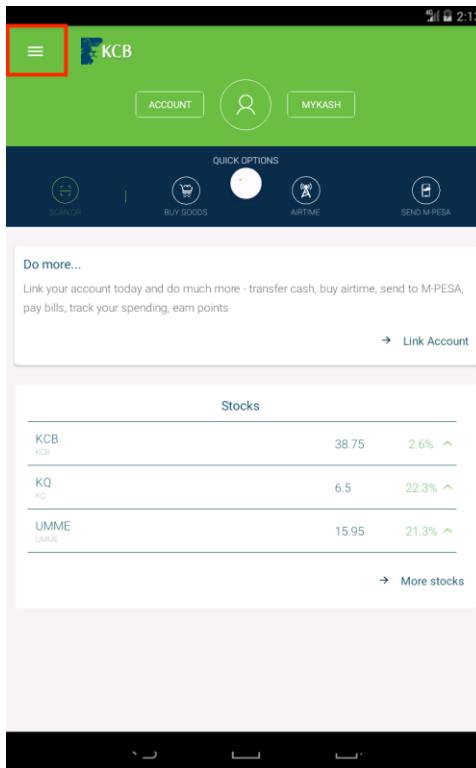
Problem Statement

- Duplicate component



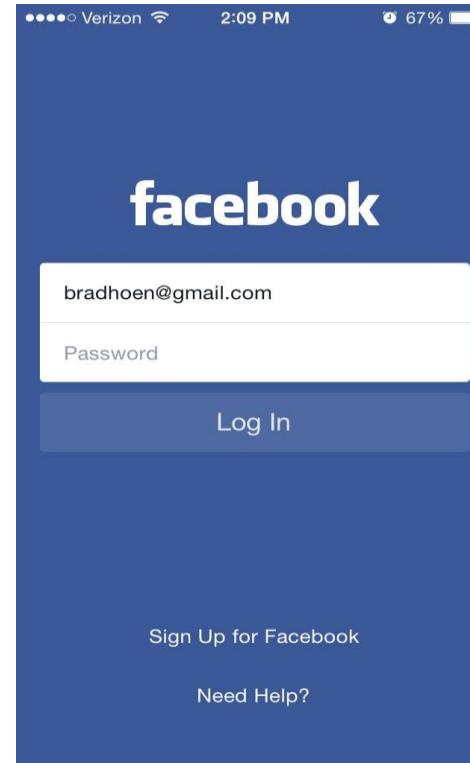
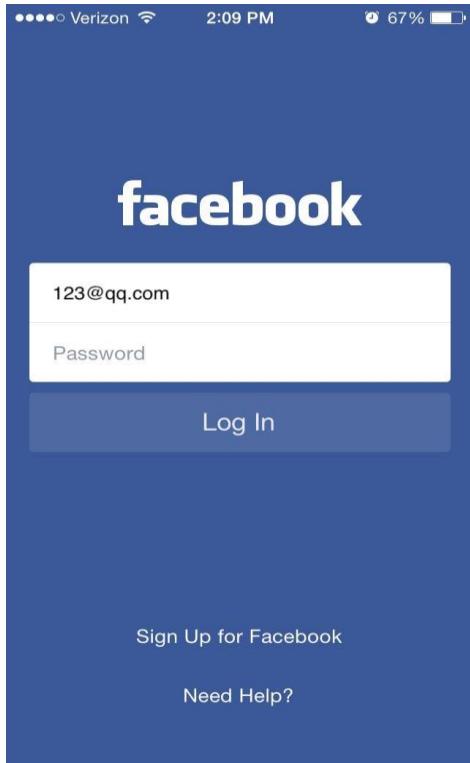
Problem Statement

- Design Consistency



Problem Statement

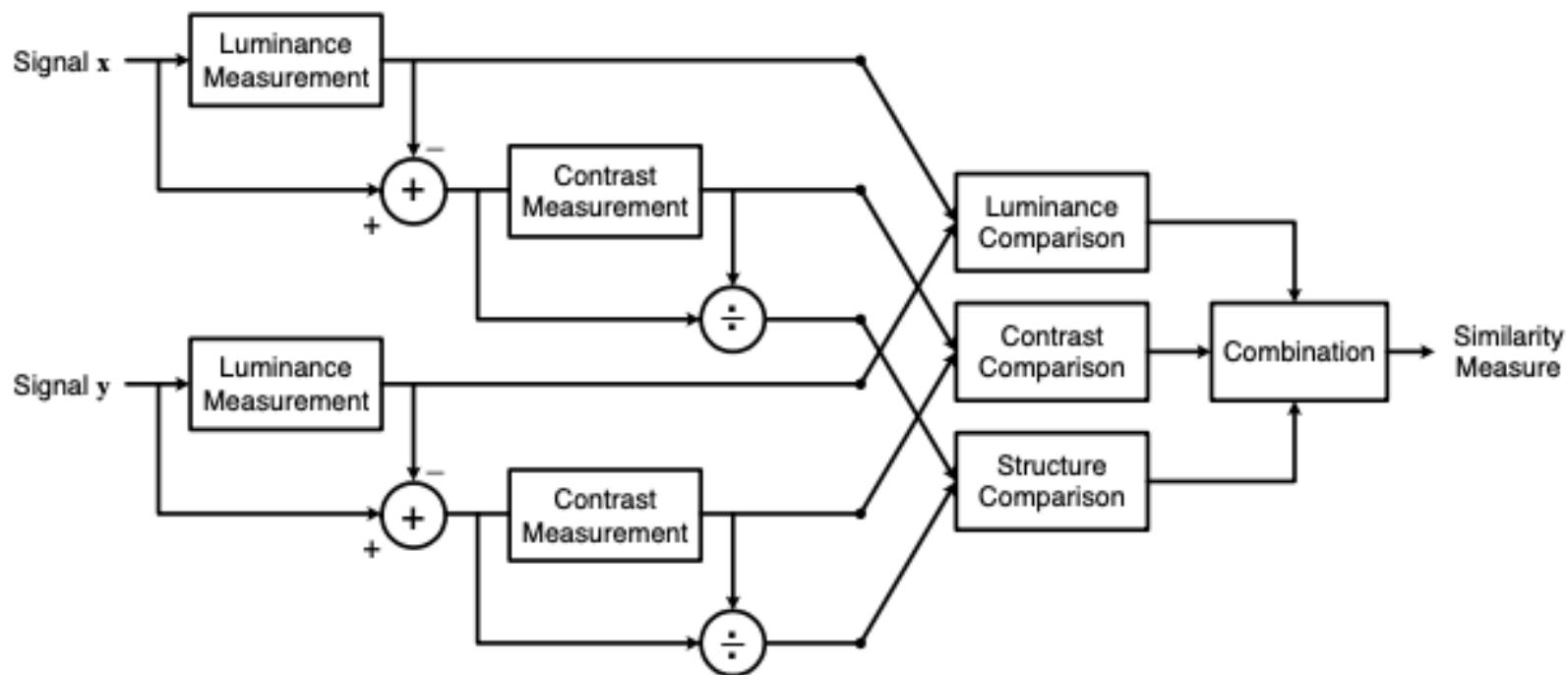
- Useless Collection





Design Gallery

- Removing duplicate GUI components by comparing their structural similarity index



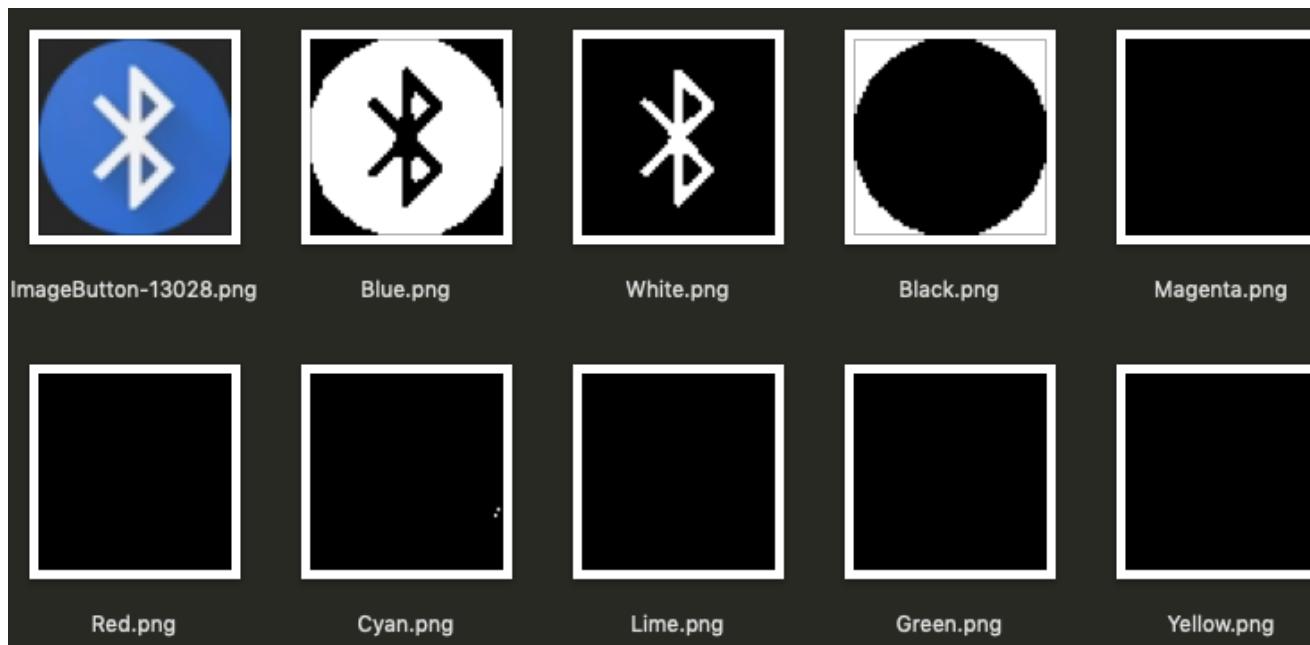


Design Gallery



Design Gallery

- Determining primary color of GUI components by HSV colorspace



Design Gallery

- Multi-faceted search of UI design gallery

Widget Class	Color	Category
<input type="text" value="All"/>	<input type="text" value="All"/>	<input type="text" value="All"/>
Sorting	Text	
<input type="text" value="Descending Number Of Application Downloads"/>	<input type="text" value="KeyWord"/>	
Height:	<input max="1280" min="0" type="range" value="1280"/> 0 - 1280	
Width:	<input max="800" min="0" type="range" value="800"/> 0 - 800	
<input type="button" value="SEARCH"/>		



Future Work

- Improve design sharing platform Design Gallery to facilitate searching. For example, design demographic, allows designers to understand the overall design landscape.
- Design Critique. How to critique a UI design is a bad design?



Questions?

Thank you for your listening.