Brillio Ad Detection

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AGENDA

Business Problem

How do we help marketers?

01

02

Our Solution

Overview of our methodology and model?

Future Improvements

How could our project be expanded?

03

Business Problem

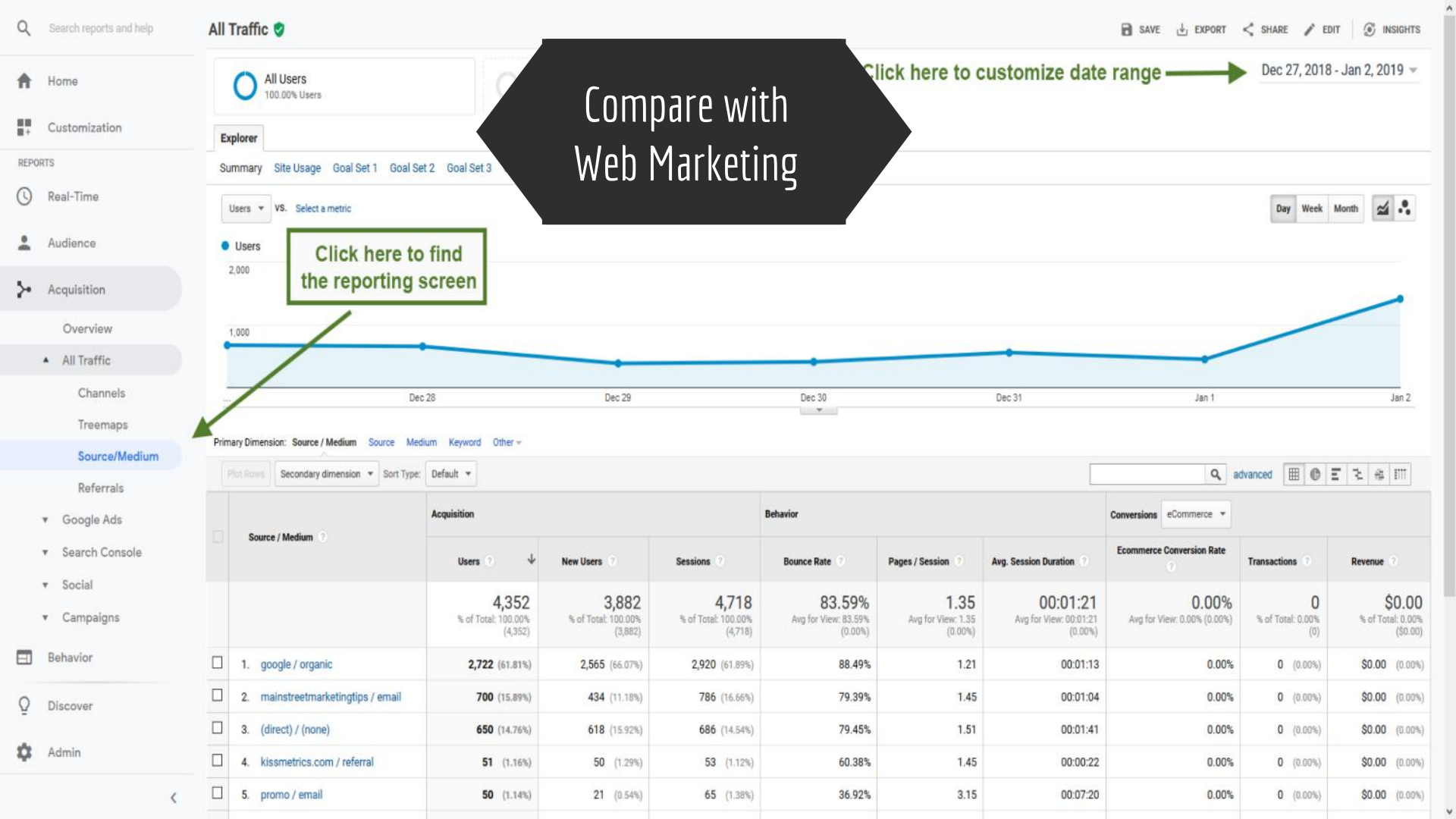
Business Problem

Companies spend many millions to show their logos during sporting events.

Traditionally, there are a few good ways to quantify the effects of sponsorships.

Both ad buyers and sellers do not know if current ad pricing is too high or too low.


Is this working for you?
AAA.com
@LAKERS
PECHANGA
LAKERS
20
26
BONUS
1ST
1:57
:16


Search reports and help
All Traffic
SAVE
EXPORT
SHARE
EDIT
INSIGHTS
Home
Customization
REPORTS
Real-Time
Audience
Acquisition
Overview
All Traffic
Channels
Treemaps
Source/Medium
Referrals
Google Ads
Search Console
Social
Campaigns
Behavior
Discover
Admin
All Users
100.00% Users
Compare with
Web Marketing
Click here to customize date range
Dec 27, 2018 - Jan 2, 2019
Explorer
Summary
Site Usage
Goal Set 1
Goal Set 2
Goal Set 3
Users
vs.
Select a metric
Day
Week
Month
Click here to find
the reporting screen
2,000
1,000
Dec 28
Dec 29
Dec 30
Dec 31
Jan 1
Jan 2
Primary Dimension: Source / Medium
Source
Medium
Keyword
Other
Plot Rows
Secondary dimension
Sort Type:
Default
advanced
Source / Medium
Acquisition
Behavior
Conversions
eCommerce
Users
New Users
Sessions
Bounce Rate
Pages / Session
Avg. Session Duration
Ecommerce Conversion Rate
Transactions
Revenue
4,352
% of Total: 100.00% (4,352)
3,882
% of Total: 100.00% (3,882)
4,718
% of Total: 100.00% (4,718)
83.59%
Avg for View: 83.59% (0.00%)
1.35
Avg for View: 1.35 (0.00%)
00:01:21
Avg for View: 00:01:21 (0.00%)
0.00%
Avg for View: 0.00% (0.00%)
0
% of Total: 0.00% (0)
$0.00
% of Total: 0.00% ($0.00)
1. google / organic
2,722 (61.81%)
2,565 (66.07%)
2,920 (61.89%)
88.49%
1.21
00:01:13
0.00%
0 (0.00%)
$0.00 (0.00%)
2. mainstreetmarketingtips / email
700 (15.89%)
434 (11.18%)
786 (16.66%)
79.39%
1.45
00:01:04
0.00%
0 (0.00%)
$0.00 (0.00%)
3. (direct) / (none)
650 (14.76%)
618 (15.92%)
686 (14.54%)
79.45%
1.51
00:01:41
0.00%
0 (0.00%)
$0.00 (0.00%)
4. kissmetrics.com / referral
51 (1.16%)
50 (1.29%)
53 (1.12%)
60.38%
1.45
00:00:22
0.00%
0 (0.00%)
$0.00 (0.00%)
5. promo / email
50 (1.14%)
21 (0.54%)
65 (1.38%)
36.92%
3.15
00:07:20
0.00%
0 (0.00%)
$0.00 (0.00%)

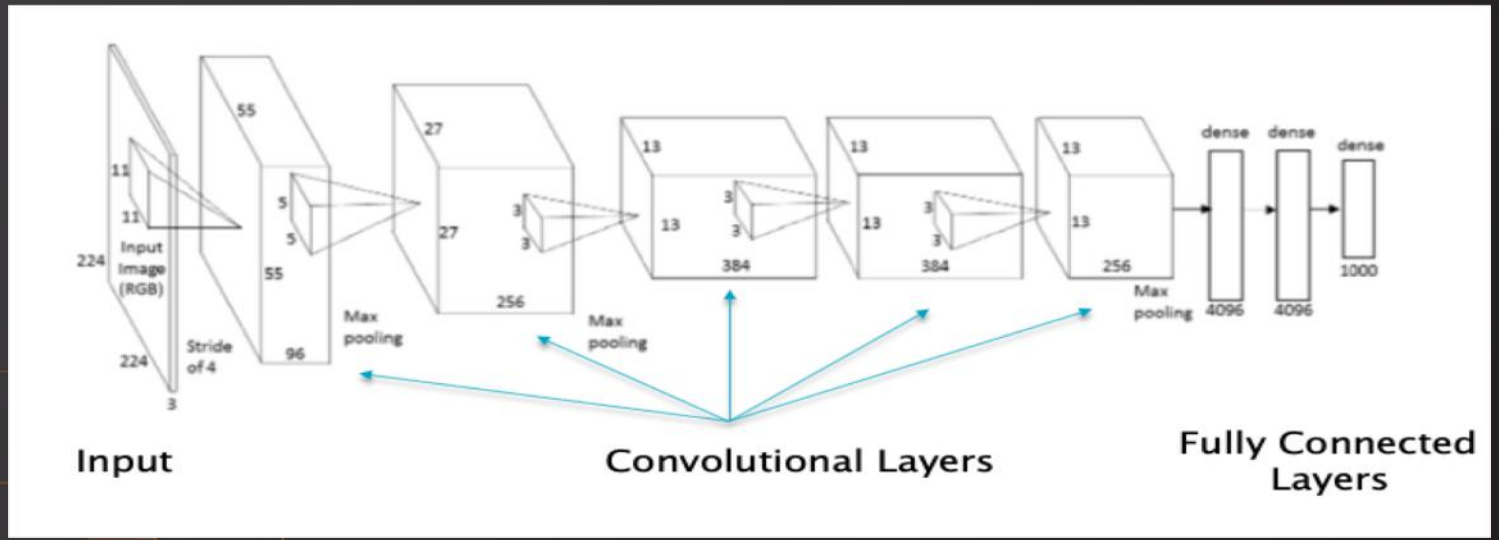
Our Solution

Build a Deep Learning Model with CNNs to quantify logo exposure during a sports broadcast.

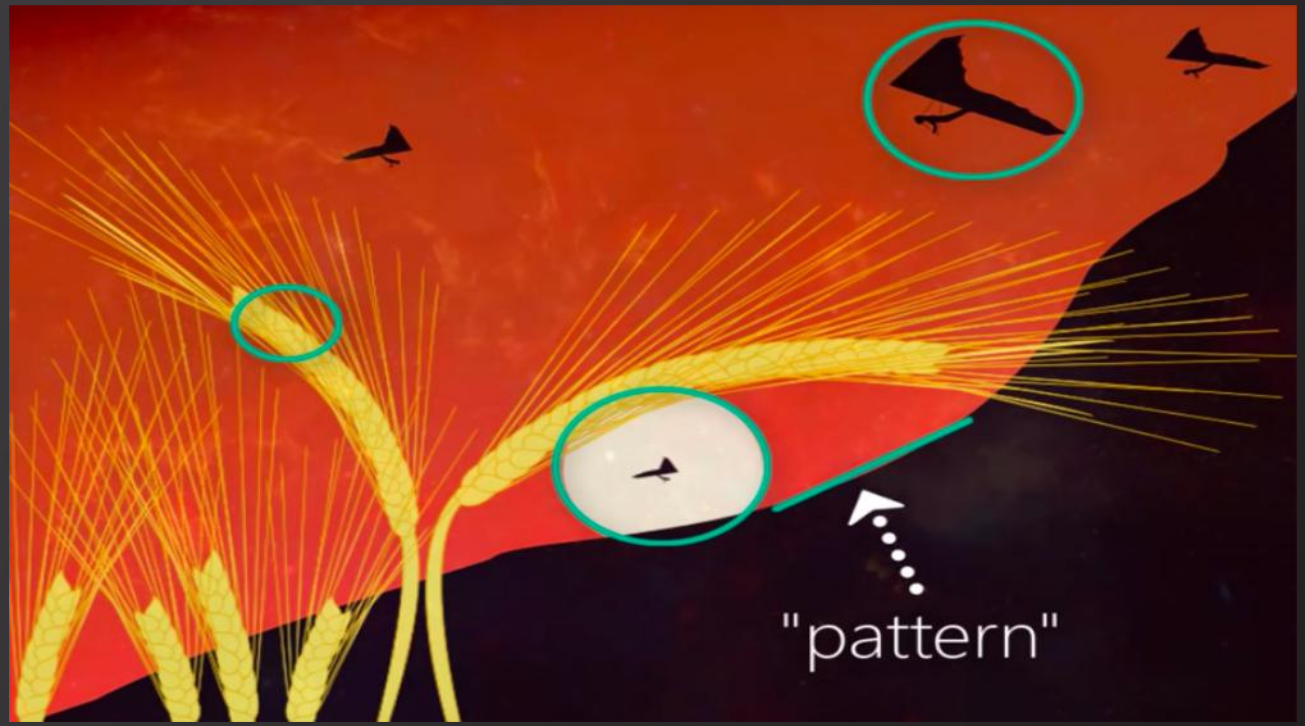
We can now know how effective displaying a logo during a game really is.

What are ConvNets?

A Convolutional Neural Network (CNN/ConvNet) is neural network with some convolutional layers.
A convolutional layer has a number of filters that has convolutional operations.



Detecting Patterns



Project Steps

DEFINE SCOPE

Logo detection in NBA Games

GATHER DATA

Gather NBA footage with StateFarm logo

BUILD AND TRAIN

Build and train a CNN model

TUNE MODEL

Adjust parameters to maximize accuracy

TEST MODEL

Test model to check accuracy

DEPLOY MODEL

Use model to predict new videos

Data Preparation

YouTube clips were downloaded and converted to frames

Logo

Train
Validation
Test

Split labeled data into Train, Validation and Test sets.

No Logo

Train
Validation
Test

Manually label data as having a logo or not.

The Dataset

Sample Images with Logo

Our Process

Model Training & Tuning

Adding/deleting layers to CNN based on previous results.

Calculate Logo Exposure

Calculate display time based on the results of classification.

Prediction

Perform classification on new video clip.

Determine Success Rate

Compare display time with other metrics like Ad spends to calculate ROI.

Final Results

	Duration	Frames (2 frames per second)	Frames with logo	Exposure %	Display Time
Video 1	9:46 mins	1172	940	80.02	7.83 mins
Video 2	1:45 mins	210	57	27.14	28.5 secs

$$\text{Logo Exposure in \%} = \frac{\text{Frames with logo}}{\text{Total Frames}} \times 100$$

$$\text{Display Time} = \frac{\text{Frames with logo}}{2*60}$$

Business Applications

Determining Return on Investment

Now that ad buyers can know how long and ad can be seen, they can decide if certain spots are worth the price.

Determine Best Locations

Using the model, marketers can now quantify what locations get the most screen time.

FUTURE EXPLORATIONS

Use techniques like YOLO for real time object detection.

Improve model to detect multiple logos instead of one.

Expand the project to other sports broadcasts and events.

THANK YOU

QUESTIONS?

APPENDIX

Defining the Scope

Focus on NBA Games

Video footage is widely available on Youtube

Clearly visible Logos on all sides of the court

Focus on 9 min highlight videos

Focus on Statefarm logo

Logo is distinct and easy to recognize

Can easily find additional training images

Data Gathering

1. Find Videos

Searched for NBA highlight videos on YouTube

2. Download Videos

Download highlight videos as MP4 files

3. Convert To Frames

Convert videos to a series of images using VLC media player

4. Label Data

Frames segregated as with logo and without logo and divided into train, test and validation datasets.

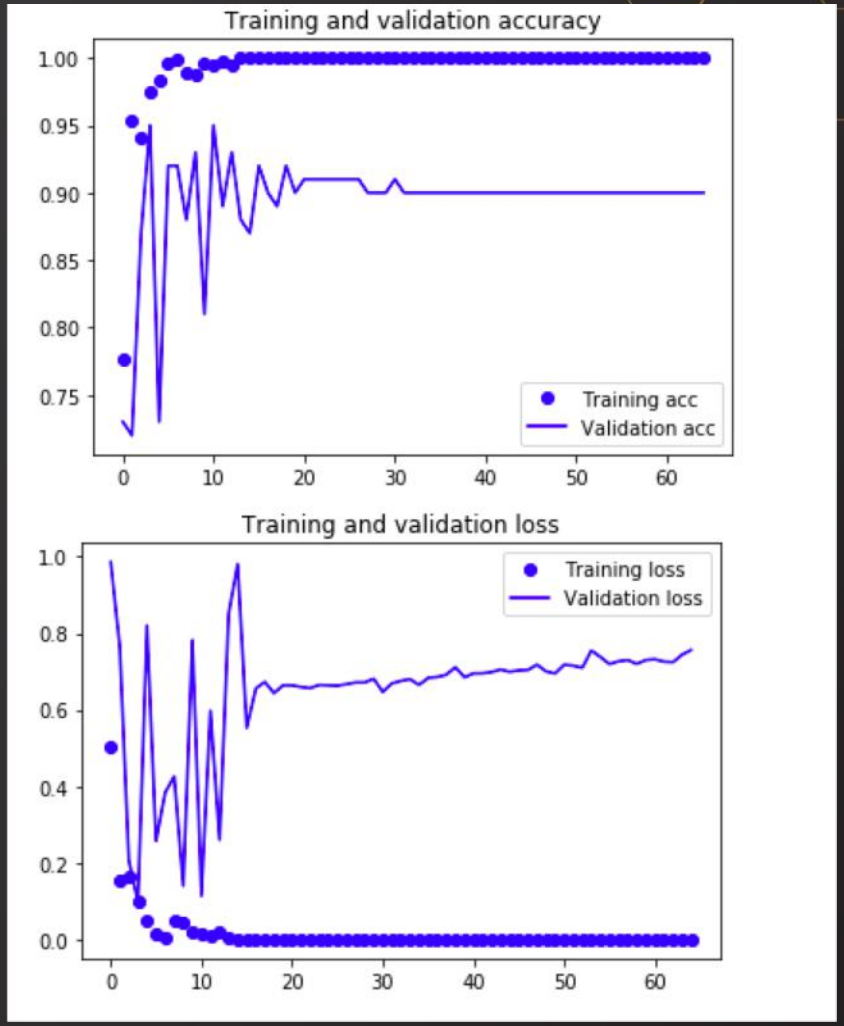
5. Data Storage

Labelled Dataset uploaded to Google Drive for easy access and use.

Model Layers

```
Model: "sequential_2"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_6 (Conv2D)            (None, 148, 148, 32)      896
_________________________________________________________________
max_pooling2d_6 (MaxPooling2 (None, 74, 74, 32)        0
_________________________________________________________________
conv2d_7 (Conv2D)            (None, 72, 72, 64)        18496
_________________________________________________________________
max_pooling2d_7 (MaxPooling2 (None, 36, 36, 64)        0
_________________________________________________________________
conv2d_8 (Conv2D)            (None, 34, 34, 128)       73856
_________________________________________________________________
max_pooling2d_8 (MaxPooling2 (None, 17, 17, 128)       0
_________________________________________________________________
conv2d_9 (Conv2D)            (None, 15, 15, 128)       147584
_________________________________________________________________
max_pooling2d_9 (MaxPooling2 (None, 7, 7, 128)         0
_________________________________________________________________
conv2d_10 (Conv2D)           (None, 5, 5, 128)         147584
_________________________________________________________________
max_pooling2d_10 (MaxPooling (None, 2, 2, 128)         0
_________________________________________________________________
flatten_2 (Flatten)          (None, 512)               0
_________________________________________________________________
dense_3 (Dense)              (None, 512)               262656
_________________________________________________________________
dense_4 (Dense)              (None, 1)                 513
=================================================================
Total params: 651,585
Trainable params: 651,585
Non-trainable params: 0
_________________________________________________________________
```

Model Results



Model Test Results

Test our model

```
[18] test_generator = test_datagen.flow_from_directory(
             test_dir,
             target_size=(150, 150),
             batch_size=32,
             class_mode='binary')

     test_loss, test_acc = model.evaluate_generator(test_generator, steps=13)
     print('test acc:', test_acc)
```

```
Found 103 images belonging to 2 classes.
test acc: 0.8826979475636636
```