



# Wildfires in California

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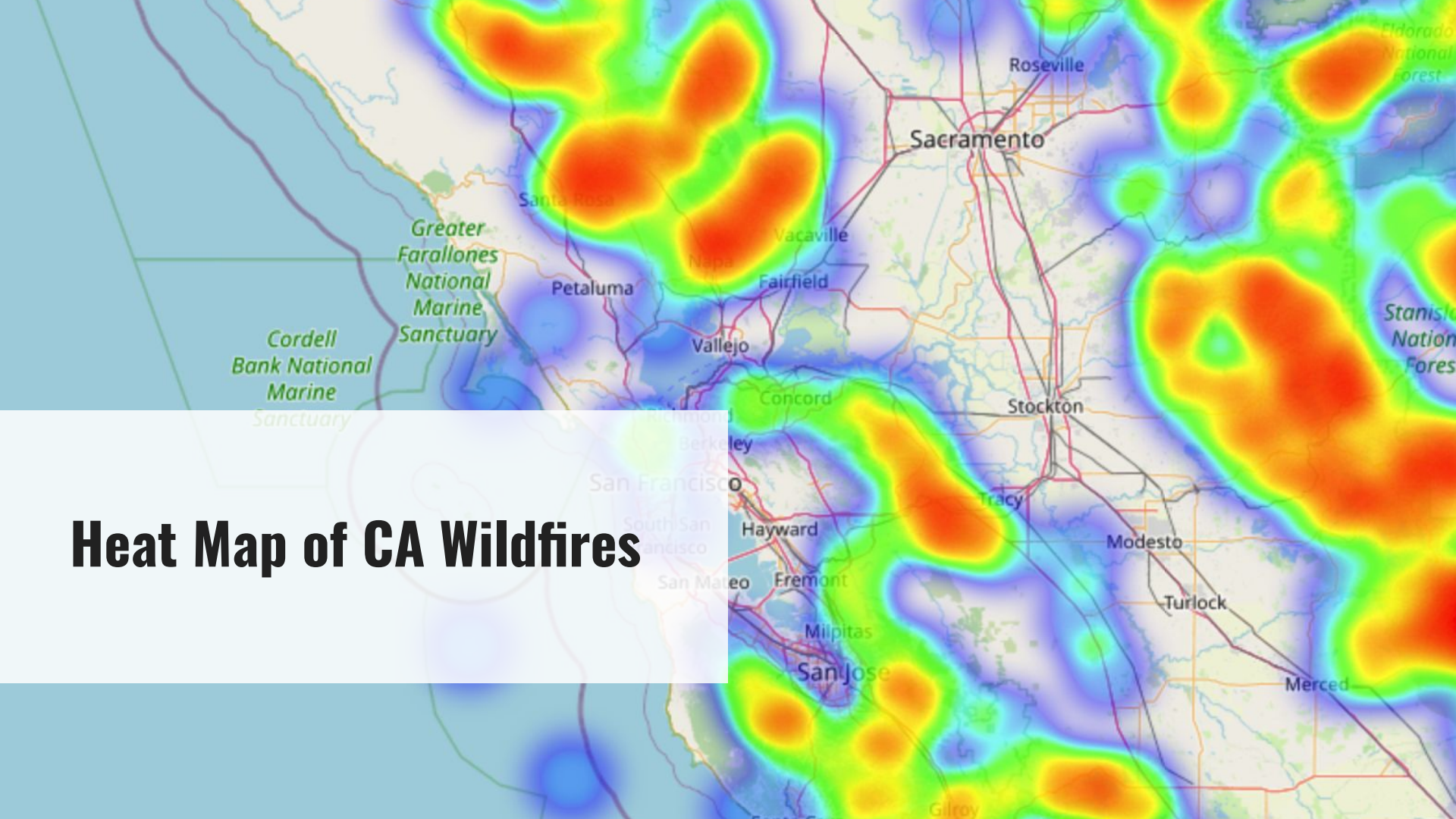
# OVERVIEW

- Increased intensity due to human-induced climate change
- Drastic rise in environmental, economic, and social costs due to wildfires



**4 MILLION+ ACRES**  
in 2020

# Heat Map of CA Wildfires





# Research Question

**Can we predict wildfire size based on weather elements 14 days prior and after the start of a wildfire?**



# EDA

## Removed NA's

Dropped fires that contained missing data

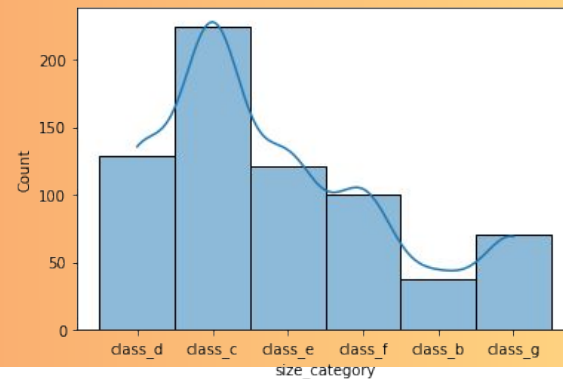
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## Aggregated Data

Averaged hourly data over a 24 hr period for each feature

# NAIVE BAYES

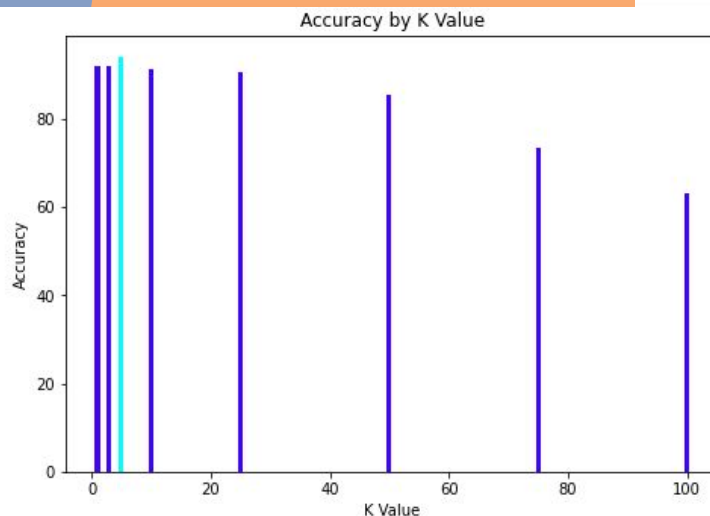
Models	F1 Score	Fits
BernoulliNB	0.29	Binary Features ❌
GaussianNB	0.55	<u>Normally Distributed Classes</u> ❌
CategoricalNB	0.94	Discrete Features ✅
MultinomialNB	0.82	Discrete Features ✅



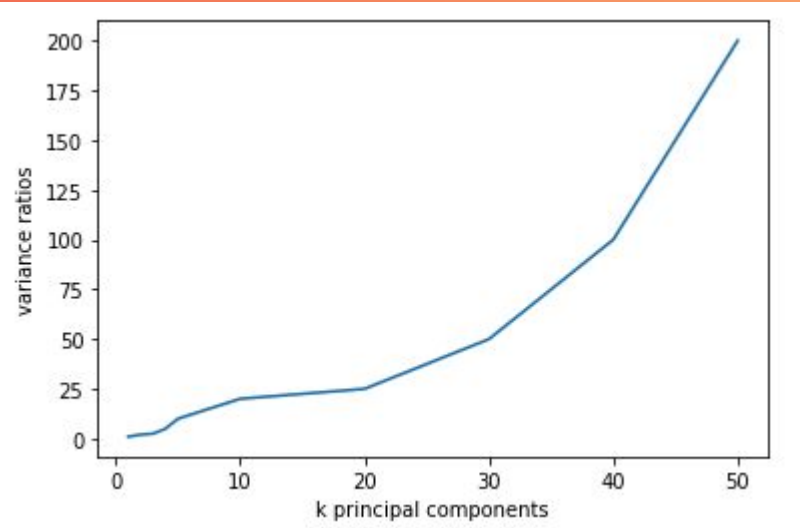
# K NEAREST NEIGHBORS

- The K Nearest Neighbors model is non-linear and works well with classes
- The training data contains about 400 points, so it is understandable that K Values of 75 and 100 would produce relatively low accuracy scores, since they are classifying by using a large fraction of the data
- Best: 5 KNN with 94.11% accuracy

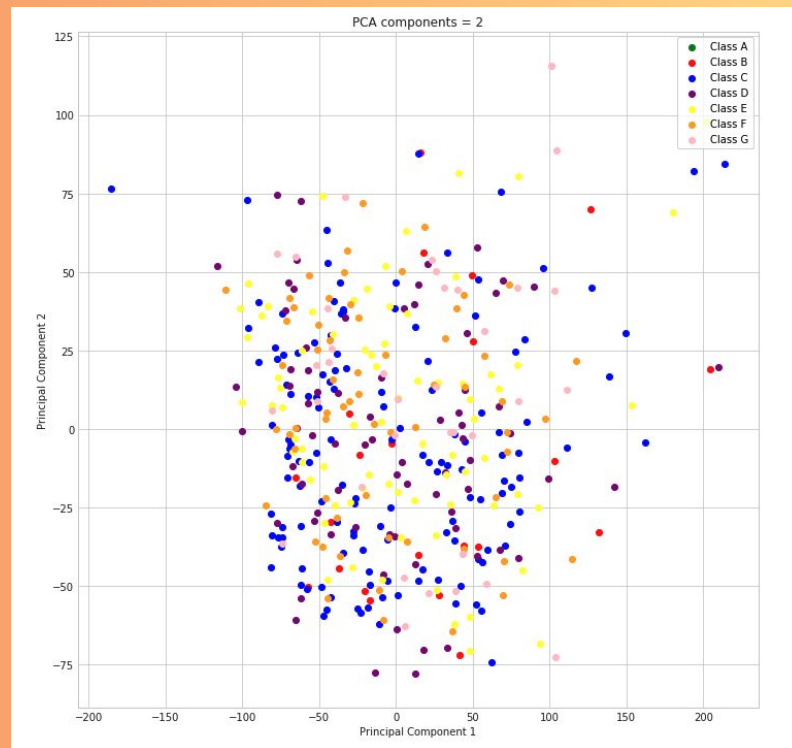
K Values	Scores
5	94.117647
1	91.911765
3	91.911765
10	91.176471
25	90.441176
50	85.294118
75	73.529412
100	63.235294



# PCA



k components = [1, 2, 3, 4, 5, 10, 20, 30, 40, 50]



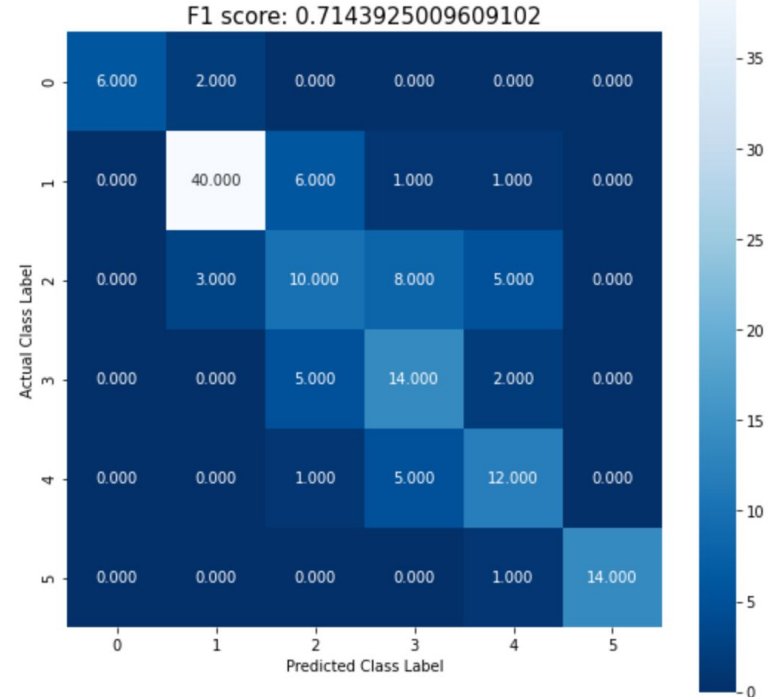
PCA with 2 principal components



# LOGISTIC REGRESSION

- Now we'll use Multinomial Logistic Regression to model the probability of a certain fire size class.
- Our main findings were:
  - The optimal value for C is 7.0.
  - F1 score for a Logistic Regression classifier using the optimal value for C: 0.7144.

```
Text(0.5, 1.0, 'F1 score: 0.7143925009609102')
```



# LINEAR REGRESSION

## Use All Features

No manipulation was done  
on the feature space

## Negative $R^2$

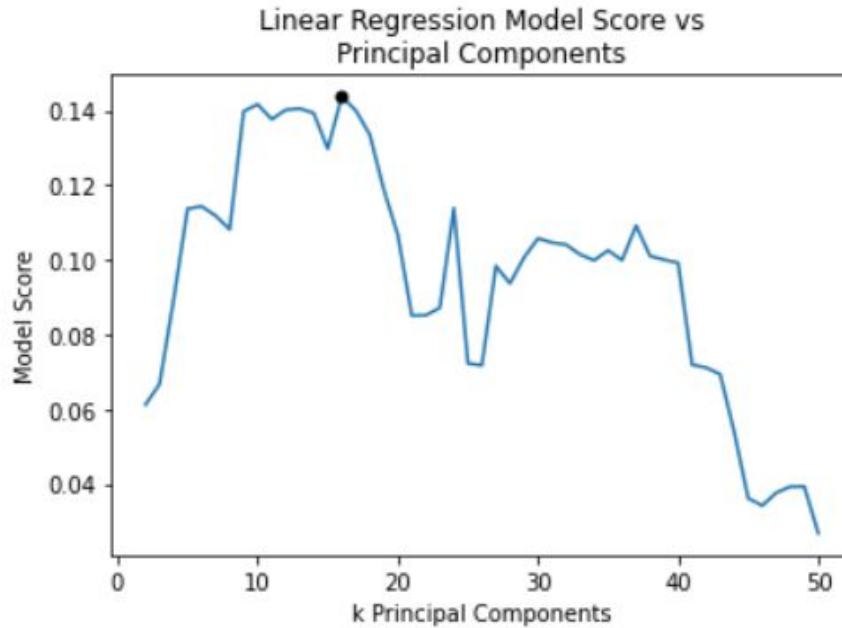
Can't capture variation in  
the dataset

	log_sizes	predicted
0	8.052615	3.815292
1	5.521461	5.127927
2	5.802118	6.329192
3	4.983607	3.508105
4	4.700480	0.045942
...	...	...
131	4.290459	5.277446
132	3.970292	5.545927
133	7.293018	2.325221
134	3.332205	4.941196
135	1.791759	9.273558

136 rows × 2 columns

First Model

# LINEAR REGRESSION: PCA



# LINEAR REGRESSION

## Reduce Feature Space

Use PCA with 16 components

## Improved $R^2$

Model captures about  
14.38% of variation  
( $R^2 = 0.1438$ )

	log_sizes	predicted
0	8.052615	4.591681
1	5.521461	5.165711
2	5.802118	8.600421
3	4.983607	3.921614
4	4.700480	4.268586
...	...	...
131	4.290459	4.482017
132	3.970292	4.442077
133	7.293018	3.823545
134	3.332205	5.873307
135	1.791759	4.584004

136 rows × 2 columns

First Model



# BEST PERFORMING MODELS

## Categorical Naive Bayes

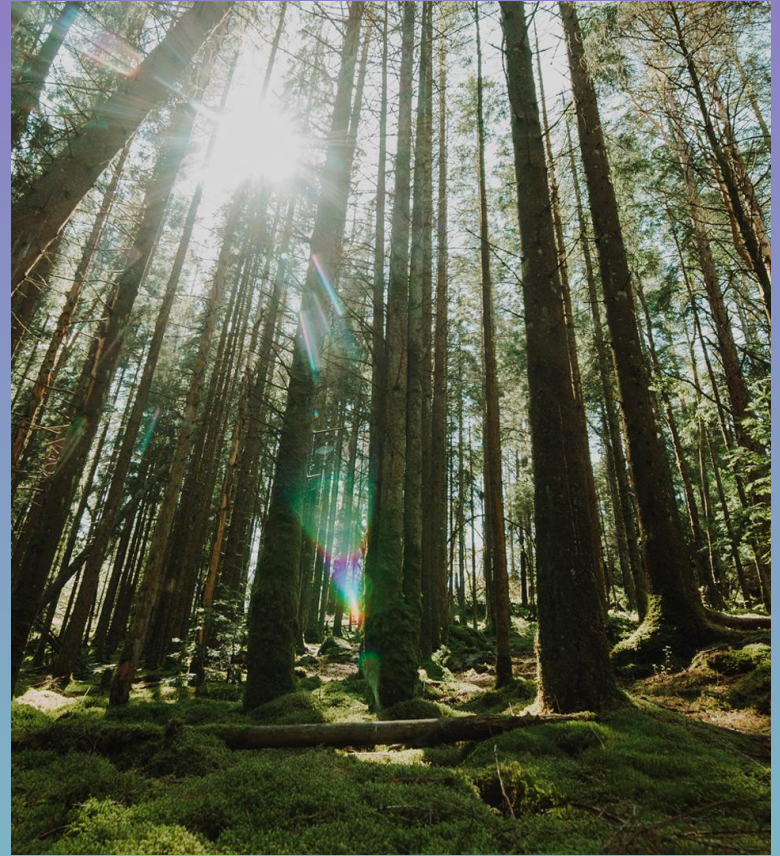
Produces 94% accuracy

## KNN

Nearest Neighbor Value of 5  
produces 94.1% accuracy

# What We Learned

- We are able to predict with fairly high accuracy wildfire size based on weather elements 14 days before and after the start of the fire
- This information can be highly useful in containing fires
- However, human actions are necessary to reduce the increasingly harmful effects of climate change





# THANK YOU

Any questions?



# THANKS

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QUESTIONS?

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Mercury is the closest planet to the Sun  
and the smallest one

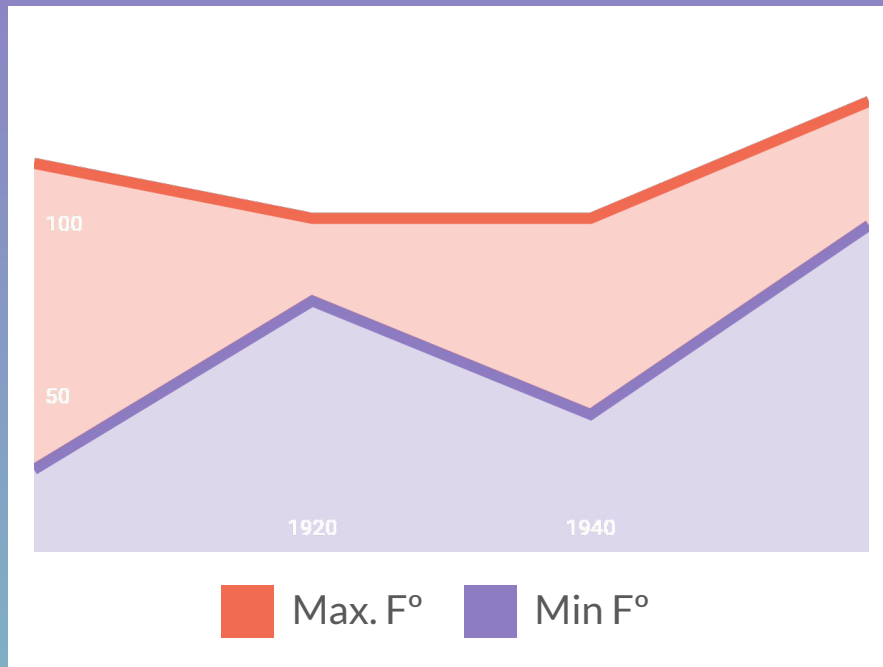
## **VENUS**

Venus has a beautiful name and is the  
second planet from the Sun

# THIS IS A GRAPH

## REPLACE IT

To modify this graph, click on it,  
follow the link and change the data.  
Then paste the new graph here



# SOMETIMES, REVIEWING CONCEPTS IS A GOOD IDEA



## MERCURY

Mercury is the closest planet to the Sun



## JUPITER

It's the biggest planet in the Solar System



## VENUS

Venus has a beautiful name, but it's terribly hot



## SATURN

Saturn is the ringed one and a gas giant



## MARS

Despite being red, Mars is actually a cold place



## NEPTUNE

Neptune is the farthest planet from the Sun

# INFOGRAPHICS MAKE YOUR IDEA UNDERSTANDABLE

Mercury is the closest planet

Jupiter is the biggest planet

Venus is terribly hot



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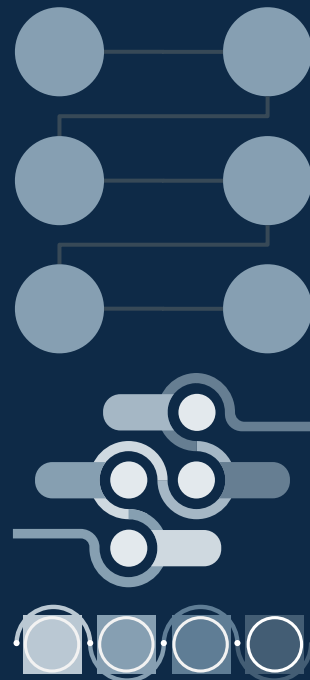
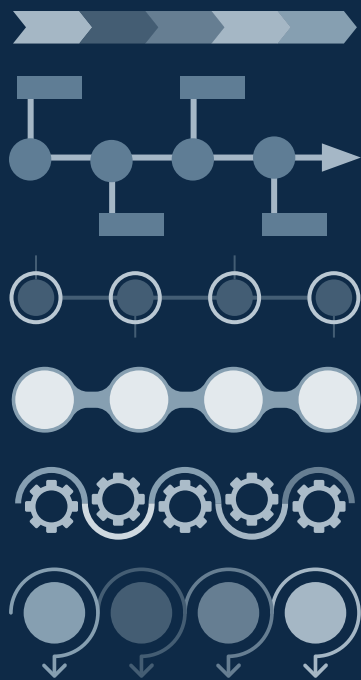
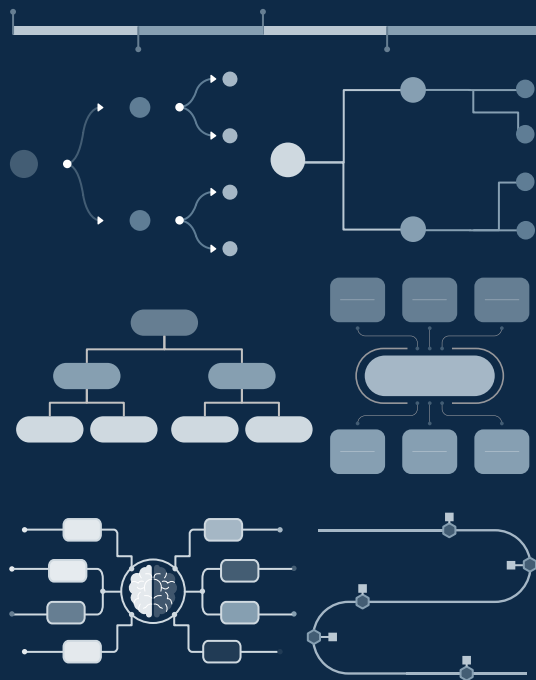
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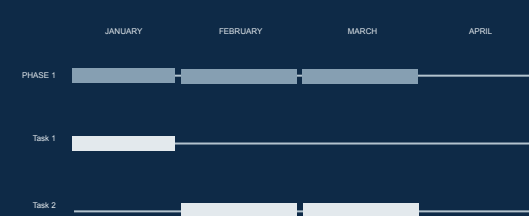
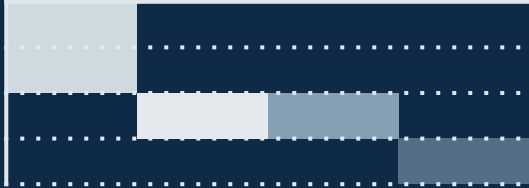
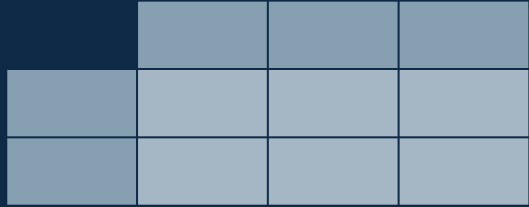
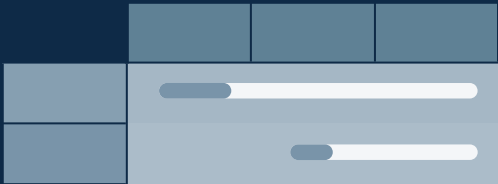
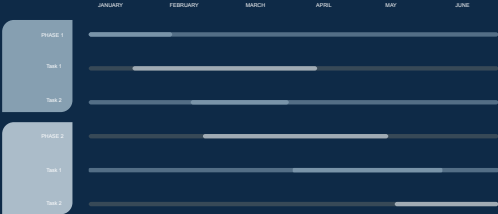
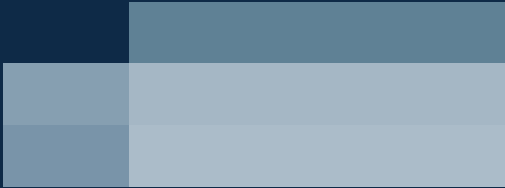
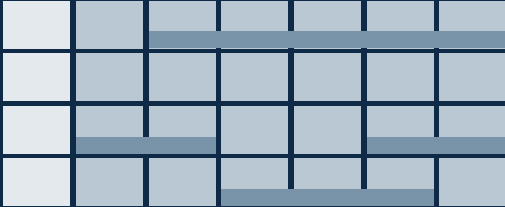
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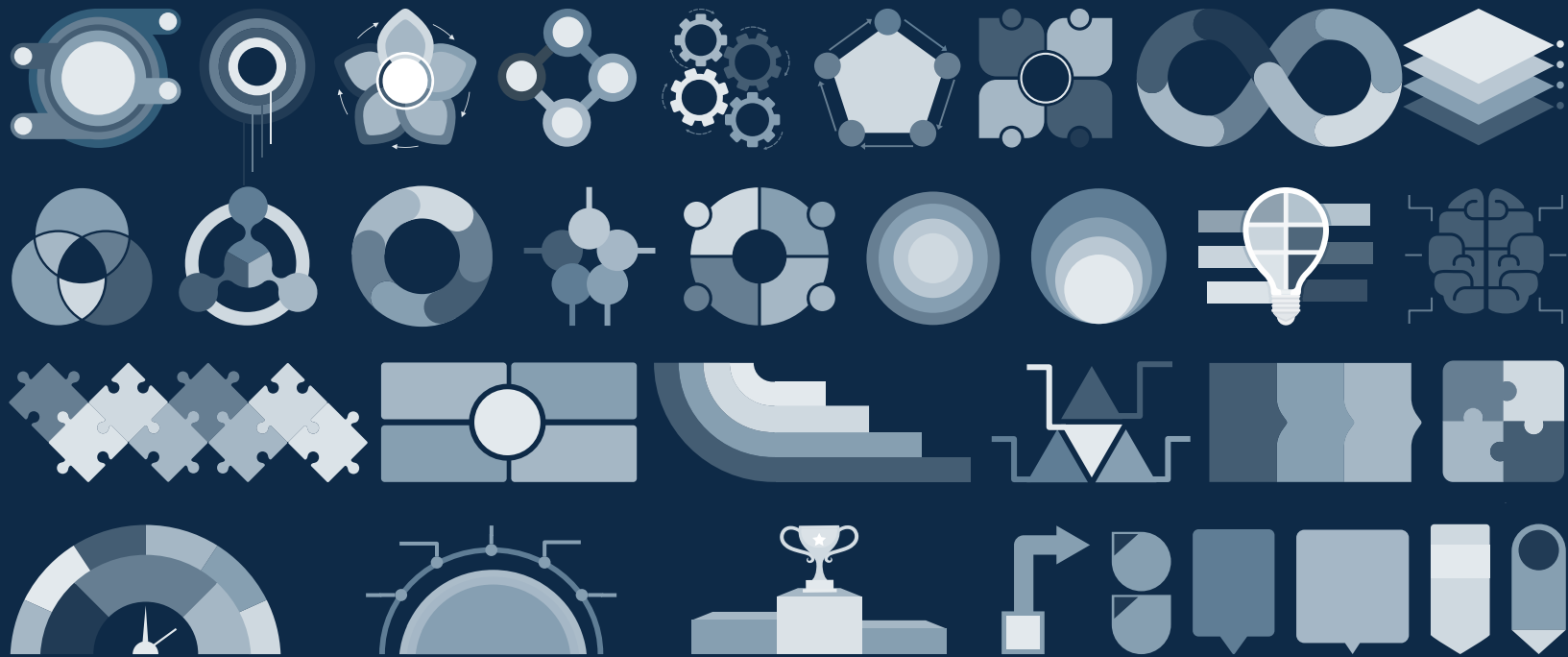


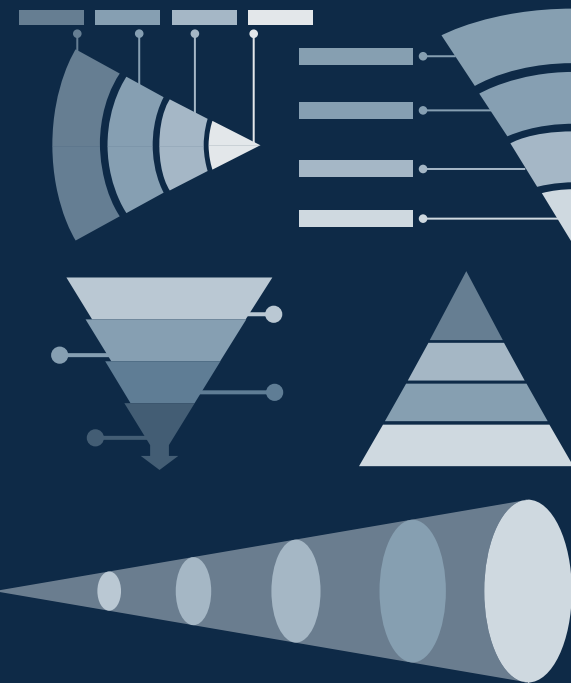
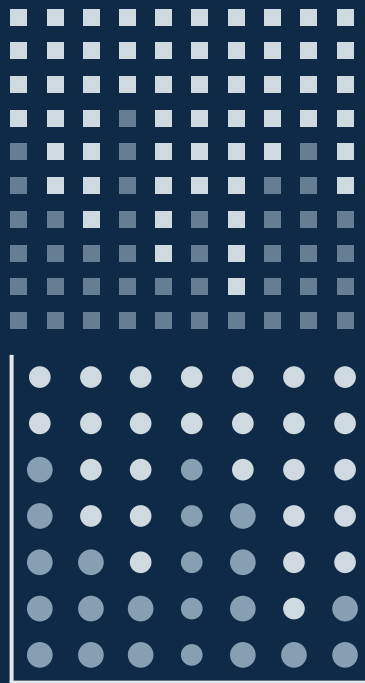












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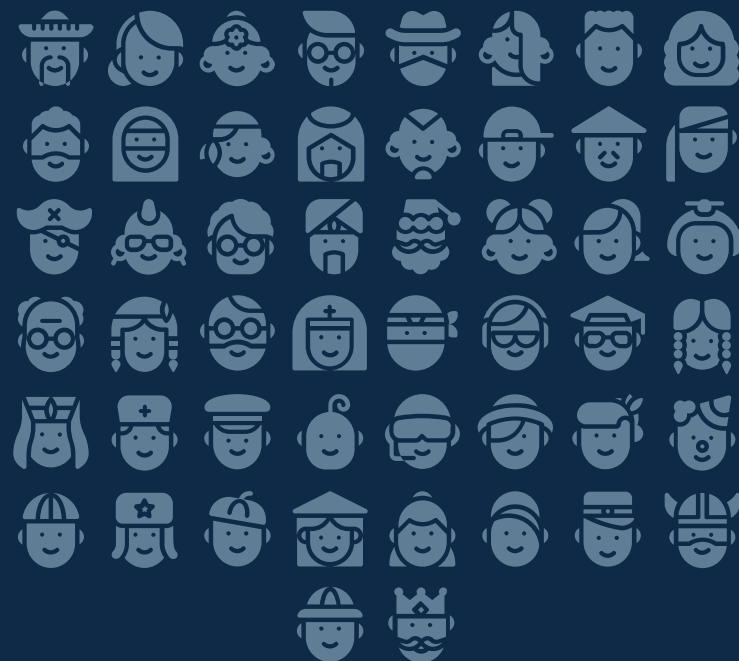




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