

An underwater photograph of a colony of King penguins swimming in clear blue water. The penguins are seen from various angles, some swimming towards the camera and others away. They have dark grey backs and white chests with a distinctive yellow patch on their heads. The water is bright and clear, with some light reflections on the surface.

Diving Into the Impacts of Sea Level Rise

Anjana Mittal & Victoria Cicherski

Project Objectives

The background of the slide is a dark, atmospheric underwater scene. It depicts a cave or a deep-sea environment with rocky, uneven terrain. A bright light source, possibly an opening in the cave or a sunlit surface, is visible at the top center, casting a beam of light downwards. The water is dark blue, and numerous small, dark fish-like silhouettes are scattered throughout the scene, adding to the depth and mystery of the environment. Three large, iridescent bubbles are positioned in the foreground, each containing white text. The bubbles have a rainbow-like sheen, reflecting light in various colors. The overall mood is one of exploration and discovery.

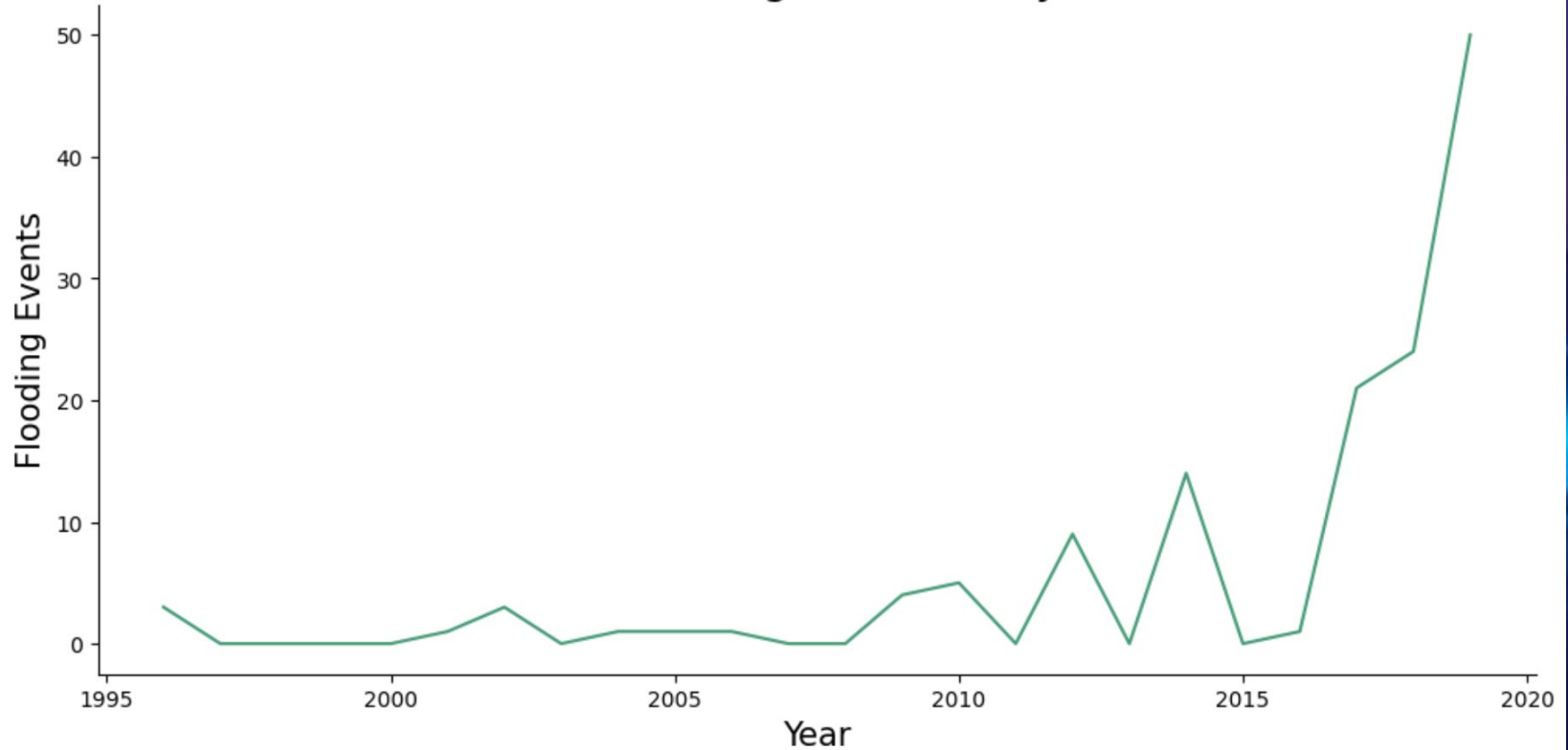
Data
Visualization
and Analysis

SLR Impact
Predictor
Algorithm

Communication
with end users

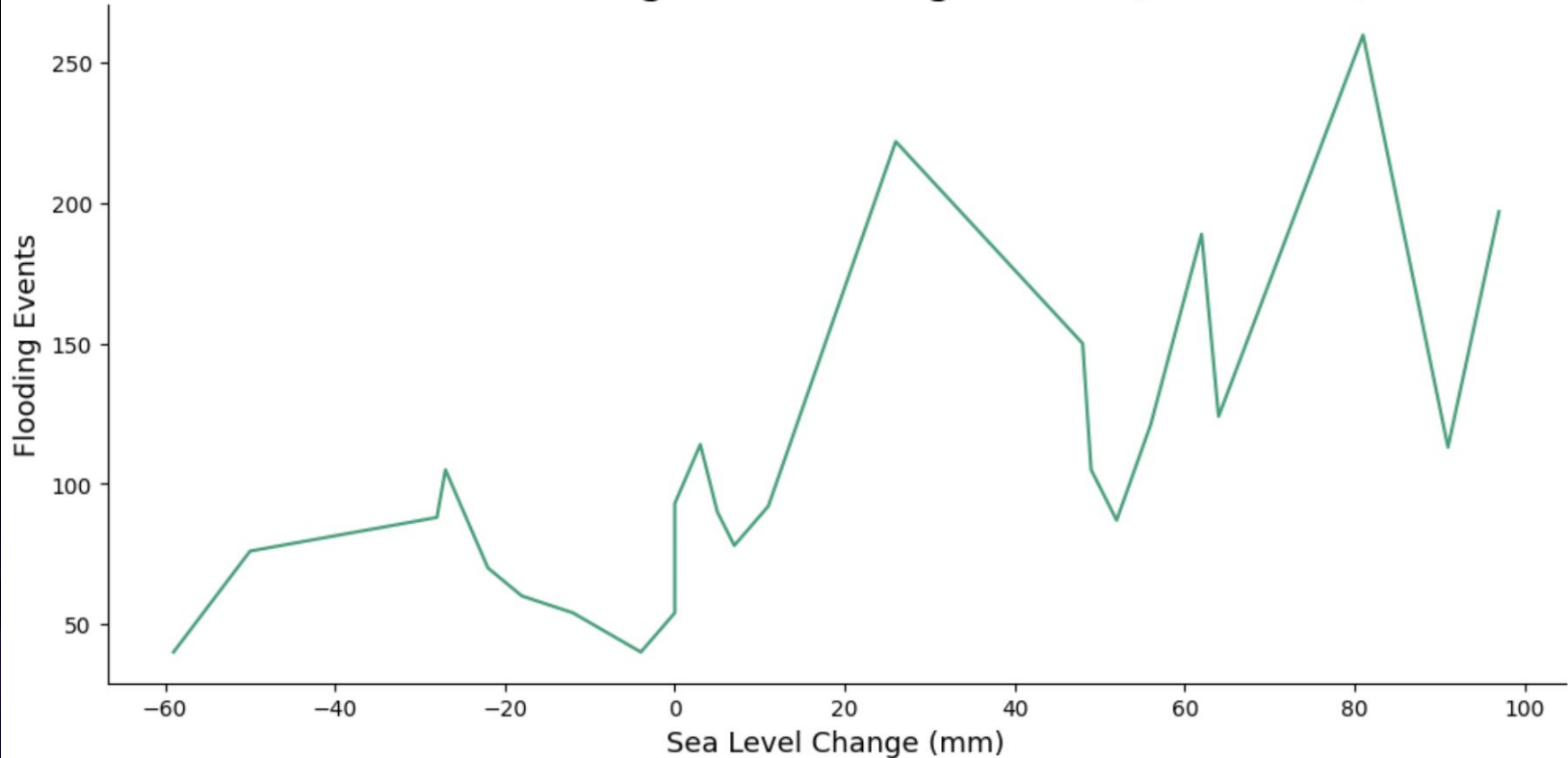
Data Visualizations

Annual Flooding Events (Bay Area)



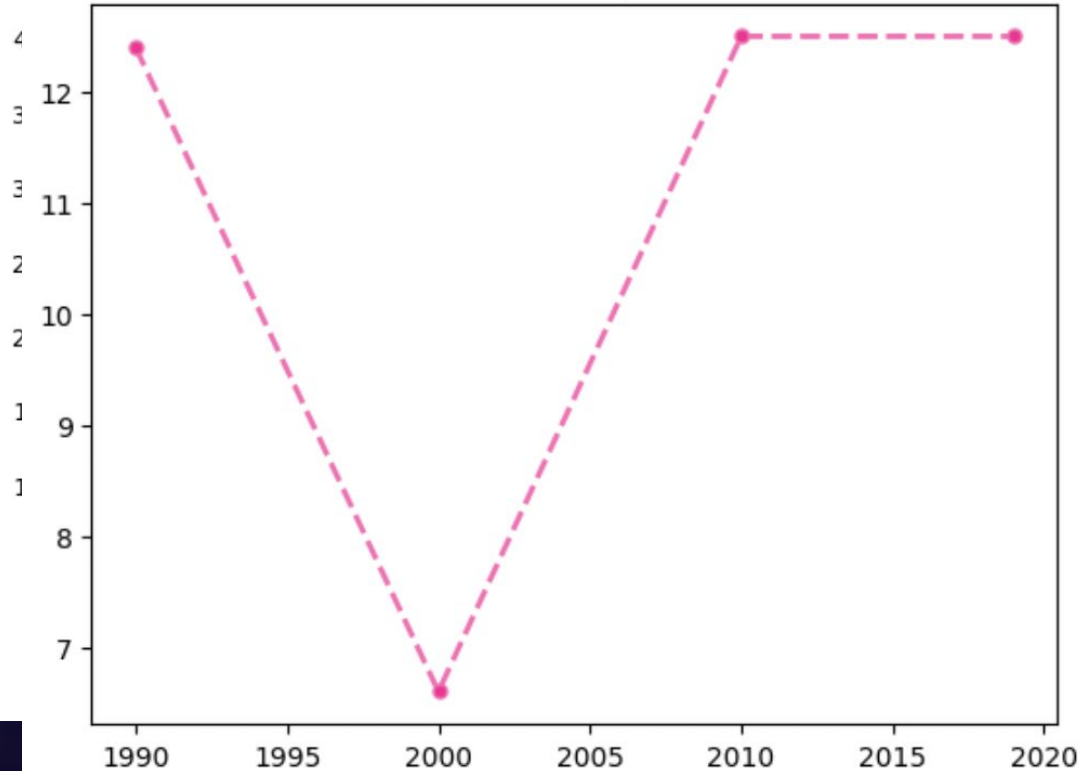
Data Visualizations

Sea Level Change vs Flooding Events (California)



Data Visualizations

% Below the Poverty Line in Bay Area from 1990 to 2019



—● % Below Poverty Line

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Some of the models we created....

Multivariate regression models

Multiple linear regression models

Simple linear regression models

Logistic regression models

Random forest models

Decision tree models



Polynomial Regression Model

R-squared: 0.84
MSE: 4.21

Flood Events (Bay Area)



Sea Level Change + Coastal Flooding Events



Recommendations



Limitations

Predicting Sea Level Rise Impacts

Optimizing data-driven conclusions to safeguard our future



Meet Team Penguins

Anjana Mittal

B.S. in Statistics

Victoria Cicherski

B.S. in Statistics, Minor in Computer Science



Our Vision

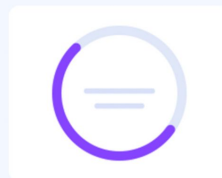
Our project sought to address the impact of sea level rise in San Francisco on the surrounding community and environment through machine-learning modeling and data visualizations.



Technology

Our work was accomplished with Python and the following libraries: numpy, sklearn, matplotlib, pandas, and seaborn.

The Machine-Learning Algorithm



The Dataset

For our analysis of the surrounding area of San Francisco, we used multiple datasets from various sources: the "Annual mean sea level trends" dataset from OEHH (California Office of Environmental

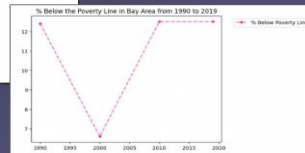
community. Action needs to be taken to mitigate the harm that will inevitably occur in the future by rising sea levels. We recommend protecting the coast of California with the following: building stormwater pumps, upgrading roads and bridges, constructing seawalls, and improving stormwater drainage systems.

response variable. The model had a mean squared error of 4.21, indicating that the predicted values barely deviated from the actual values. The R-squared value of the model was 0.84. This means that 84% of the variability observed in the number of floods can be explained by the model.



Data Visualizations

The following graphs were created to illustrate the relationship between sea level rise, coastal floods, and total floods. We also wanted to understand the community that is impacted by the rise in sea levels in San Francisco, thus graphs depicting demographic data are included. This exploration of data enables patterns to be identified that can be utilized for preventative measures to protect people and the environment.



Bibliography

Oehha.ca.gov. (n.d.-b).

<https://oehha.ca.gov/climate-change/epic-2022/impacts-physical-systems/sea-level-rise>

Historical flood risk and costs. FEMA.gov. (n.d.).

<https://www.fema.gov/data-visualization/historical-flood-risk-and-costs>

Ncei. (n.d.). *Storm events database.* National Centers for Environmental Information.

<https://www.ncdc.noaa.gov/stormevents/>

Census 2010 highlights - san francisco. (n.d.).

https://www.sfdph.org/dph/files/reports/PolicyProcOfc/CensusBureau2010Highlights_03062012.pdf

San Francisco City and County. Bay Area Census -- San Francisco County -- 1970-1990 census data. (n.d.).

<http://www.bayareacensus.ca.gov/counties/SanFranciscoCounty70.htm>

Marin County. Bay Area Census -- marin county. (n.d.).

<http://www.bayareacensus.ca.gov/counties/MarinCounty.htm>

A photograph of two penguins standing on a dark, rocky shore at sunset. The sky is a warm, golden yellow, and the ocean is visible in the background. A large, black-outlined speech bubble is positioned above the penguins, containing the text "Thank you!".

Thank you!