

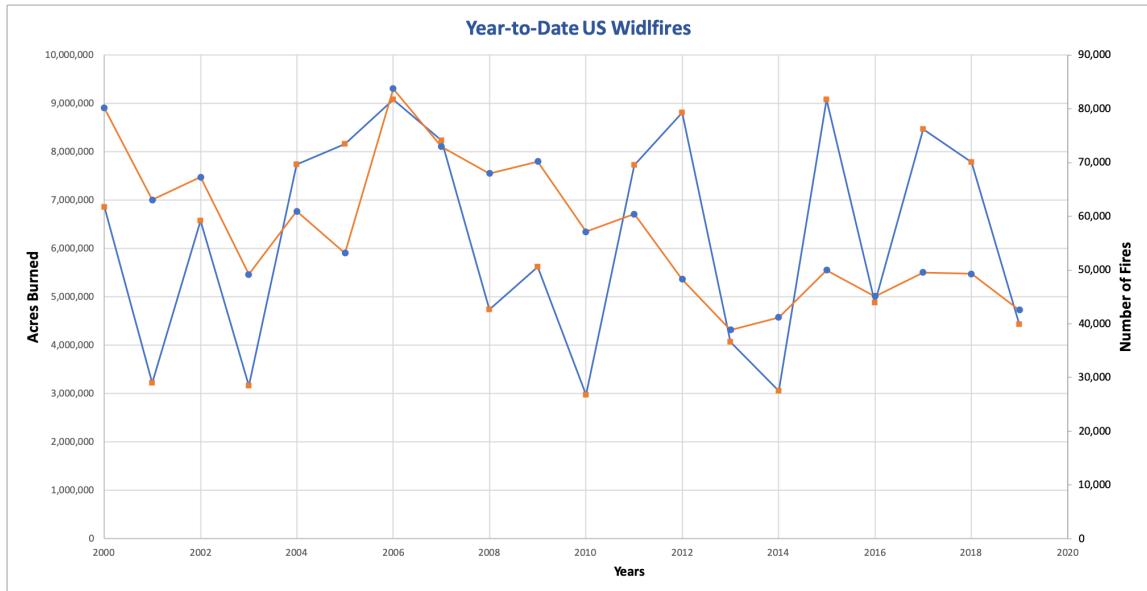


Project A.O.T.L

By Team Oozma Kappa

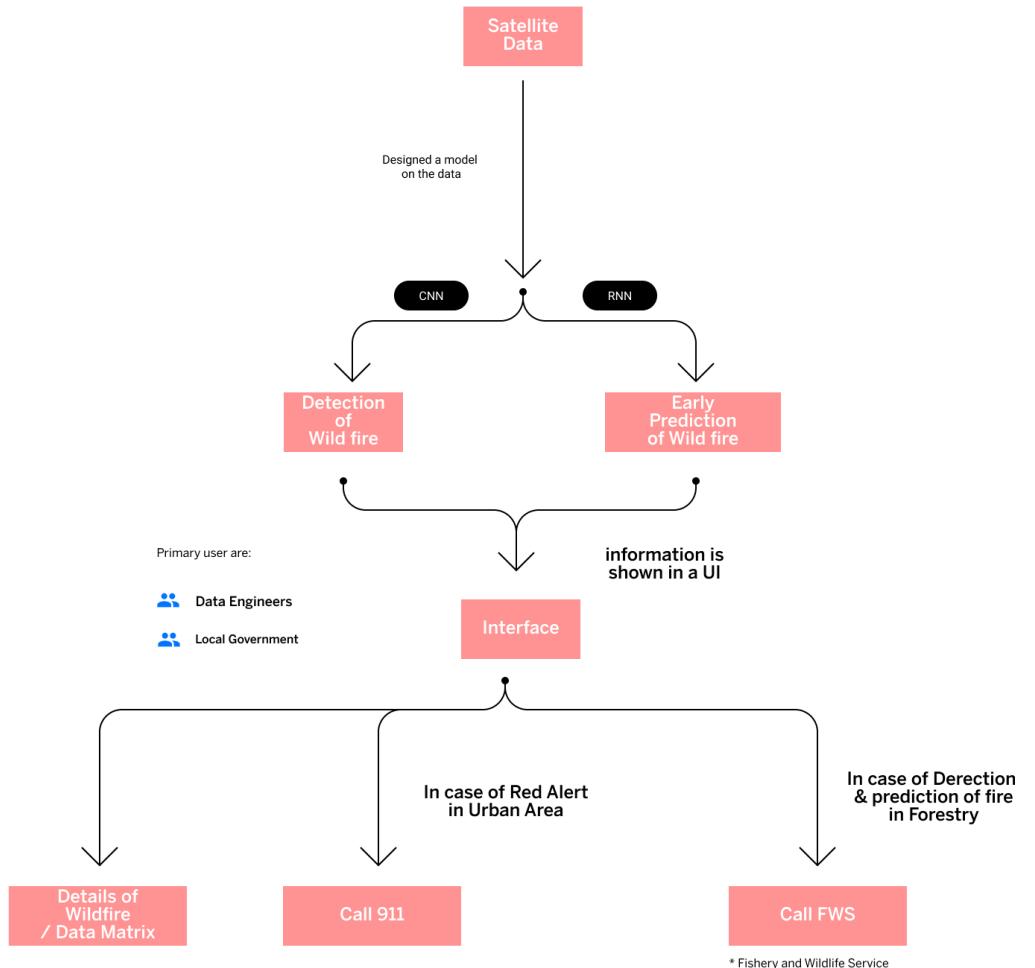
Deep Learning-based Multi-Modal Service for Early Prediction of Wildfires using
Satellite Data

Project Idea



[Source: National Interagency Fire Center](#)

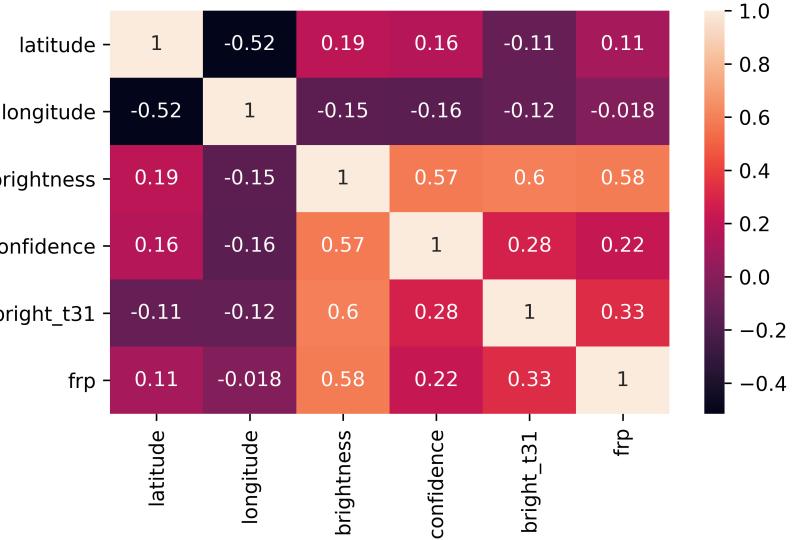
- To forecast occurrence of wildfires within next 2 hours in different areas of the United States (and globally, in the future) utilizing deep learning algorithm.
- To detect presence of fire in digital imagery with a predicted confidence value.
- To timely alert local government, emergency services and wildlife management authorities of the possibility of next fire occurrence.



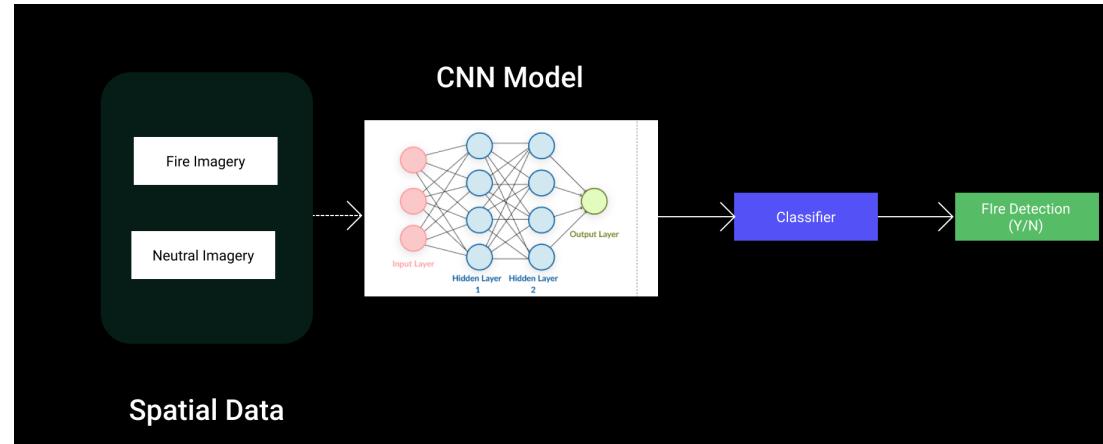
Service Design – High Level Flow

Deep Learning Model Dynamics

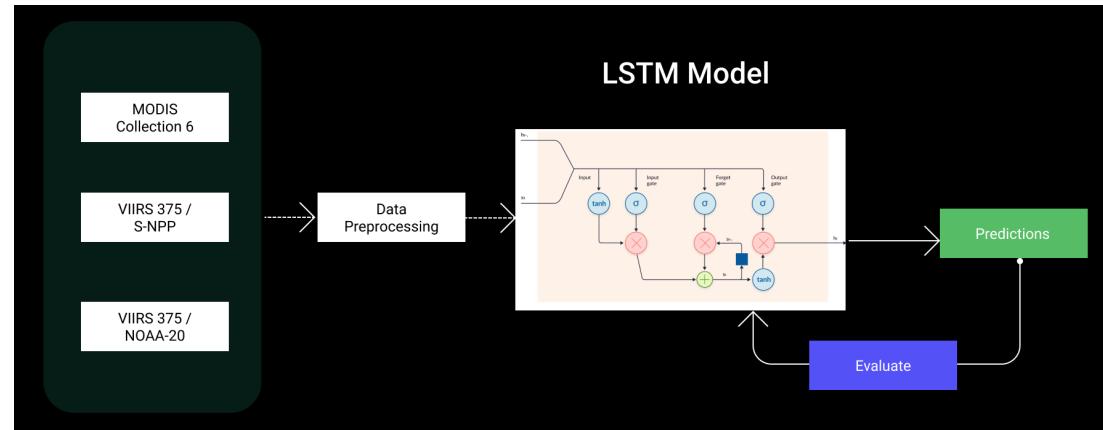
- Spatial Stream:** 2000 labeled street images with fire and neutral (non-fire) visuals acquired from DeepQuest AI image repositories.
- Temporal Stream:** 8806 temporal records from the VIIRS 375m S-NPP and MODIS C6 Active Fire Data spanning from 09/26/2020 to 10/03/2020 with following feature-set.



Correlation matrix of temporal feature-set



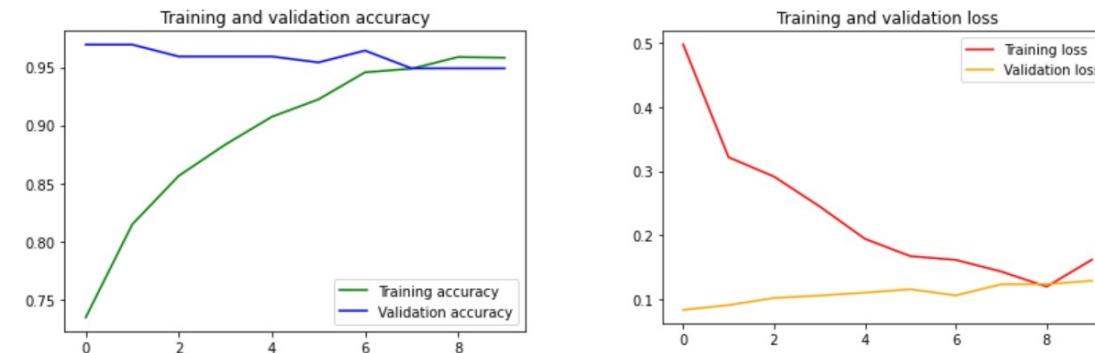
Spatial modelling architecture diagram



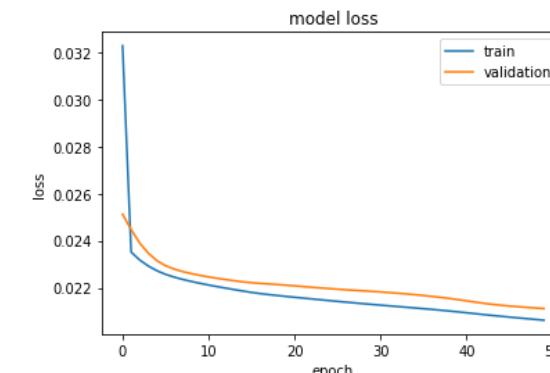
Temporal modelling architecture diagram

Models Results

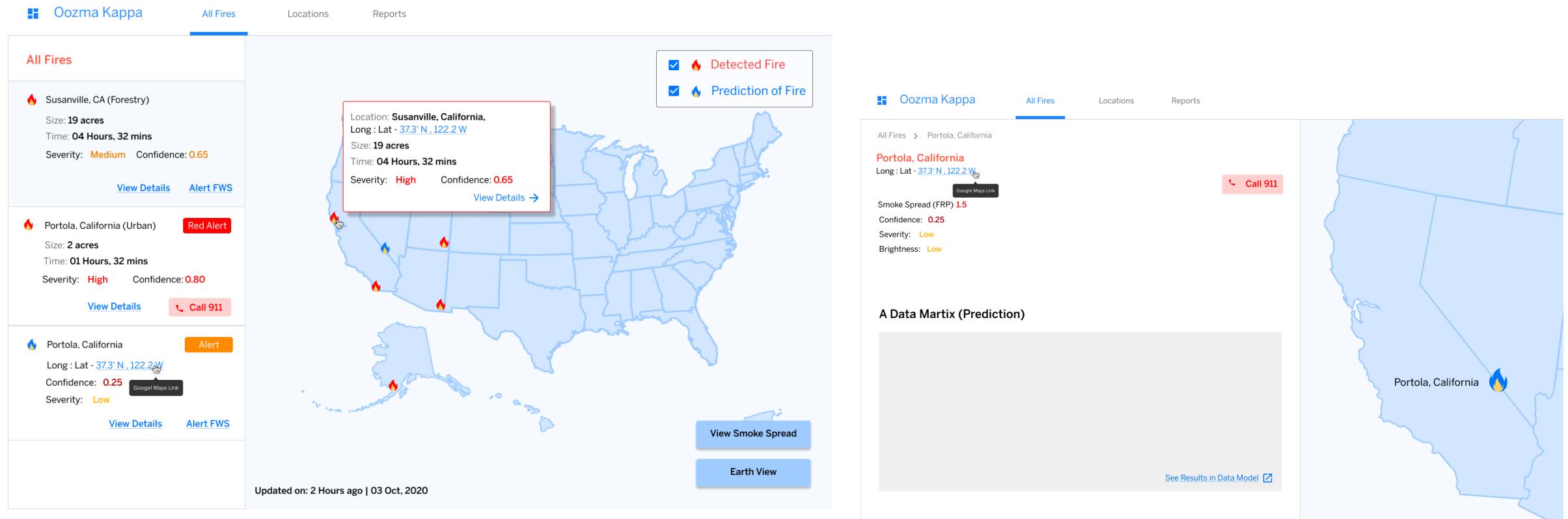
- Our CNN model achieves 94% validation accuracy with only 14.5% validation loss.



- MSE of the RNN model on train set is 0.0206 and on validation set is 0.0211, as we normalized the confidence value from 0 to 1.



Prototype



An interactive [GUI dashboard](#) managed by Team Oozma Kappa to monitor real-time updates from the backend models. Based on the confidence values and severity level, the dashboard administrators decides which action needs to be taken for a predicted geolocation having risk of wildfire occurrence within a specific time-frame.

Data & Resources

- [1] “US year-to-date wildfire statistics from national interagency fire center.” <https://www.nifc.gov/nicc/sitrept.pdf>, 2020. Accessed on October 4, 2020.
- [2] “Fire-smoke dataset from deep quest ai github repository.” <https://github.com/DeepQuestAI>. Accessed on October 4, 2020.
- [3] “Modis c6 active fire data..” <https://firms.modaps.eosdis.nasa.gov/activefire/firms-shapefile>, 2020. Accessed on October 4, 2020.
- [4] K. He, X. Zhang, S. Ren, and J. Sun, “Deep residual learning for image recognition,” in Proceedings of the IEEE conference on computer vision and pattern recognition, pp. 770–778, 2016

Thank You!

