
Wildfire Integrated Modeling, Prediction, and Learning Environment (WIMPLE)

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California Department of Forestry and Fire Protection



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Wildfire Risk Modeling Domain

- **Problem:** The threat of wildfire causes stress to homeowners, who are faced with potential loss of property and life as well as difficulty in obtaining insurance and increased insurance premiums
- **Solution:** Personalized risk assessment and mitigation recommendation considering both regional- and property-level risk
- **Our Approach:** WIMPLE provides homeowners with tools to map and model the wildfire risk on their property



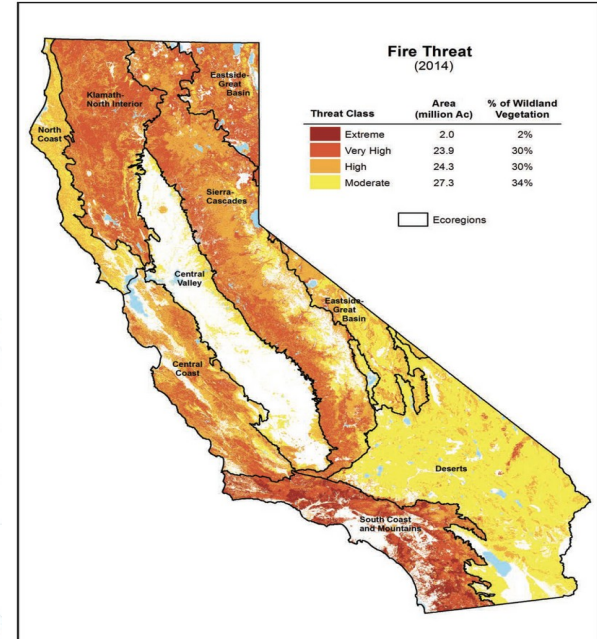
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Current Approaches

- National Wildfire Risk Assessment for Forest Service
- Firewise USA
- First Street Foundation
- FireScore by Jupiter Intelligence
- State-level Fire Resource Assessment Program (FRAP) maps
- Verisk's FIRELINE



Fire threat map from 2017 California FRAP Assessment

Our Approach

- Informs homeowners about their wildfire risk through regional- and property-level risk assessment
- Combines climate, fire incidence, and regional and local fire spread models in an understandable manner



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Technical Approach

- Uses Hybrid AI (HAI) to build integrated, multiparadigm, multiscale wildfire models
- Provides an explainable user interface that communicates risks and mitigations
- Builds on Charles River Analytics' HAI framework: Scruff™



SCRUFF

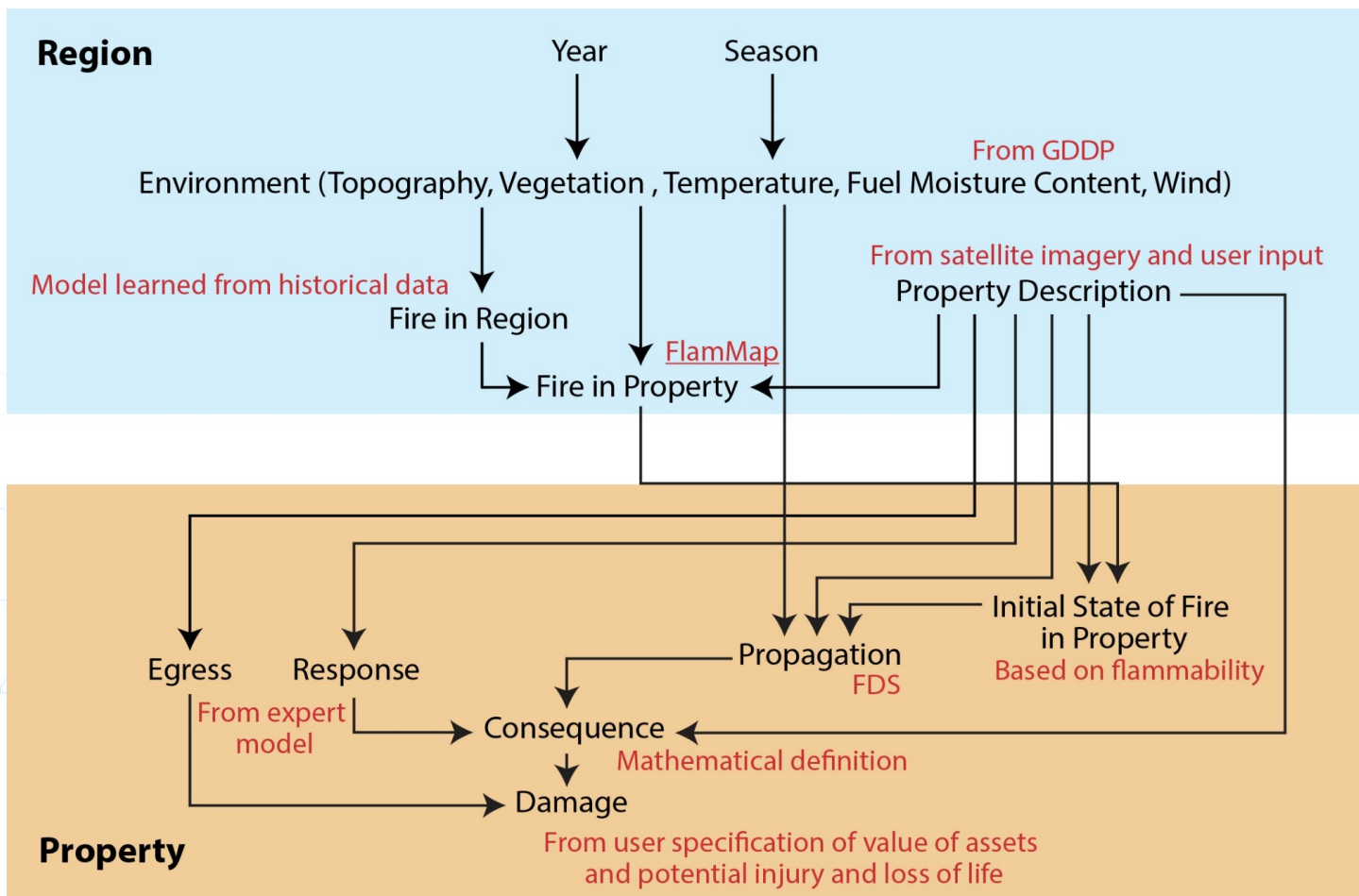
github.com/charles-river-analytics/Scruff.jl



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Integrated Model Design



Technical Approach

WIMPLE

CA Location 2, Sonoma County, CA , 95407

Season: Fall

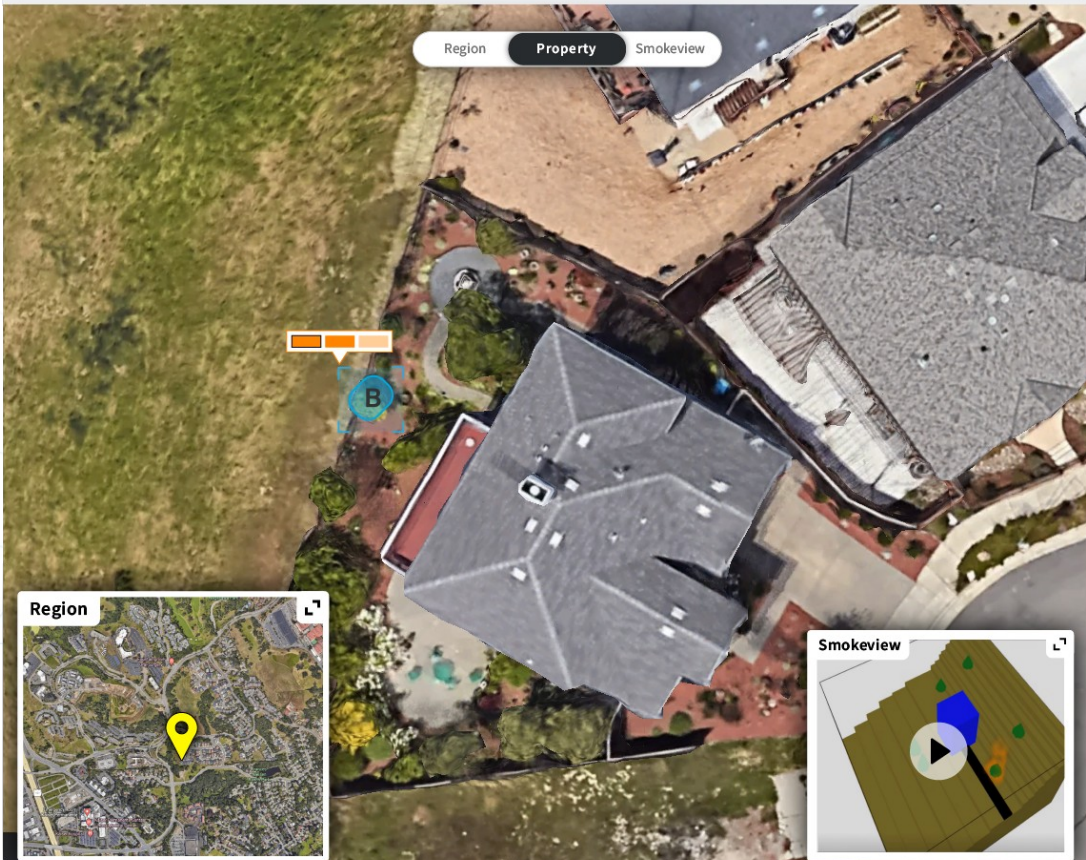
Year: 2030

SET CRITERIA

Region

Property

Smokeview



SCENARIO SUMMARY

Reg Fire Probability: **8.23%**

Property Fire Probability: **2.81%**

Total Est. Damage: **\$68,521.18**

Risk Results & Case Exploration

Sort by: P(Fire) ▾

Case Name	Property Layout	Est. Damage (\$)
Case 1	Townhouse	70,110
Case 2	Townhouse	25,194
Case 3	Townhouse	25,127
Case 4	Townhouse	25,003
Case 5	Townhouse	24,292
Case 6	Townhouse	8,883
Case 7	Townhouse	5,146

Case 2 Details

Temperature 65°F
Wind 4 m/s
Humidity 72%
Precipitation .07 m/day
Ignition Location on Property [Tree A](#)

Property Element	Value	Damage (%)	Est. Cost of Damage (\$)
House	High	57	200,000
Tree A	Low	100	5000
Tree B	Med	67	5000
Shrub A	Low	15	1000
Shrub B	Low	2	0

Demonstration Video

WIMPLE

Address: CA Loc 2 Season: Fall Year: 2020 Property Layout: Type 2 **SET CRITERIA**

SCENARIO SUMMARY: Reg Fire Prob. 8.23% Property Fire Prob. 2.81% Overall Est. \$48,521.18 Damage

Risk Results & Case Exploration

Case Name	Estimated Damage (\$)
Case 544	3,980,000
Case 545	118.72
Case 546	4,930,000

Case 546 Details

Temperature	40°F
Wind	4 m/s
Humidity	72%
Precipitation	0 midday
Ignition Location on Property	treeC

Property Element	Value (\$)	Damage (%)	Est.Damage (\$)
treeE	200	0.27	0.54
treeD	200	0.44	0.88
treeA	200	99.83	199.66

The interface includes a main aerial map with a yellow location pin, a 'Pose Fire Outline' checkbox, a 'Property' inset showing a 3D smoke simulation, and a 'Smokeview' inset showing a 3D property model with a blue cube.

Future Work

- Improve predictive Fuel Moisture Content Modeling
- Design property layout builder for homeowners
- Refine property-level model implementation
- Coordinate with insurers to use this as a tool to reduce premiums



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Questions and Discussion



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