

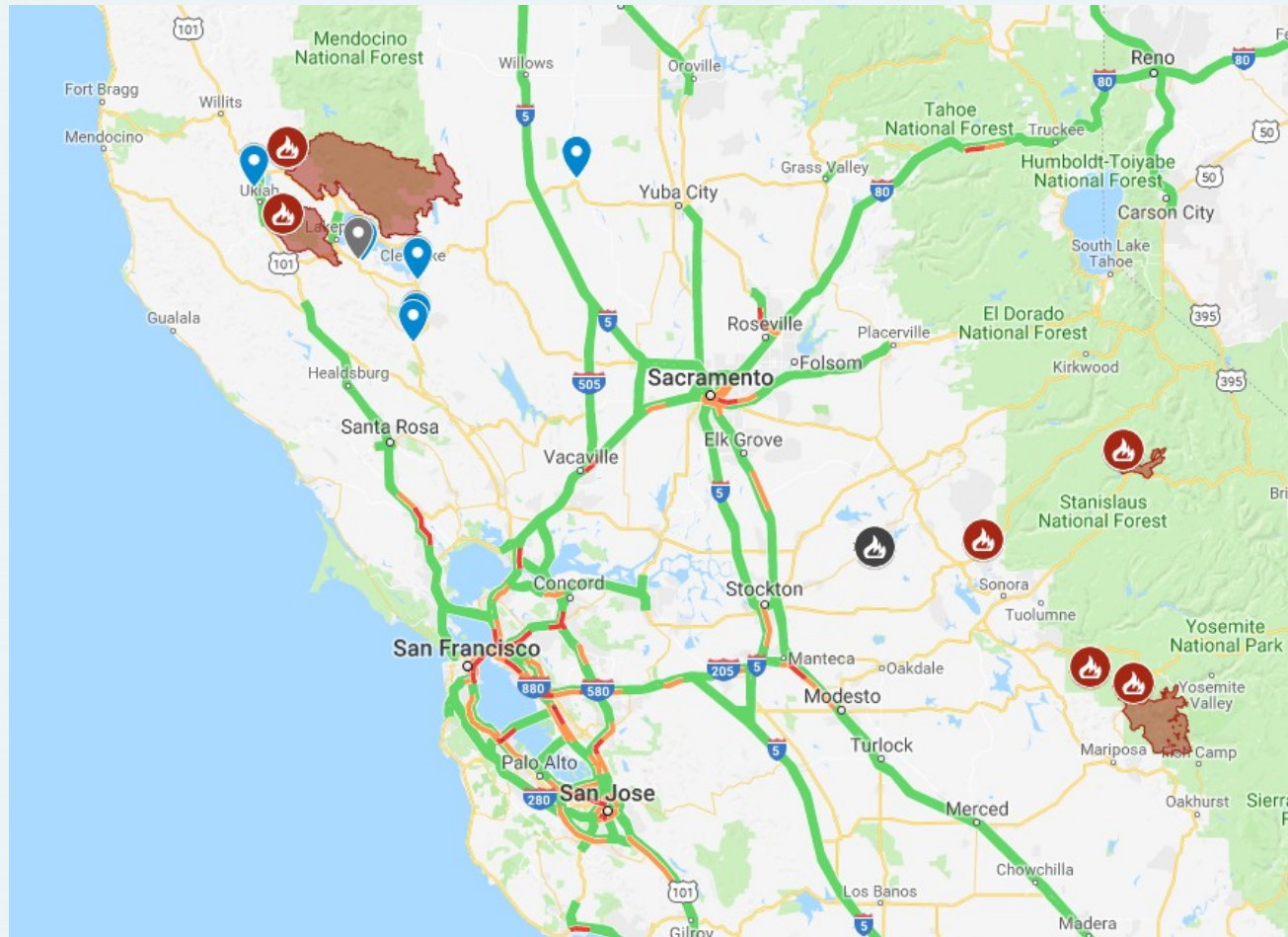


The Forest Buddy

Your friend for the hard times and even after



Wildfires happen all the time!



Everywhere!!

Authorities release new details on wildfires still burning across western, central Colorado



BY: Stephanie Butzer

POSTED: 11:41 AM, Aug 7, 2018

UPDATED: 4 hours ago

TAG: colorado wildfires | colorado wildfire update | wildfires in colorado | fires in colorado | cabin lake fire



Wildfires are scary!!!

Authorities release new details on wildfires still burning across western, central Colorado

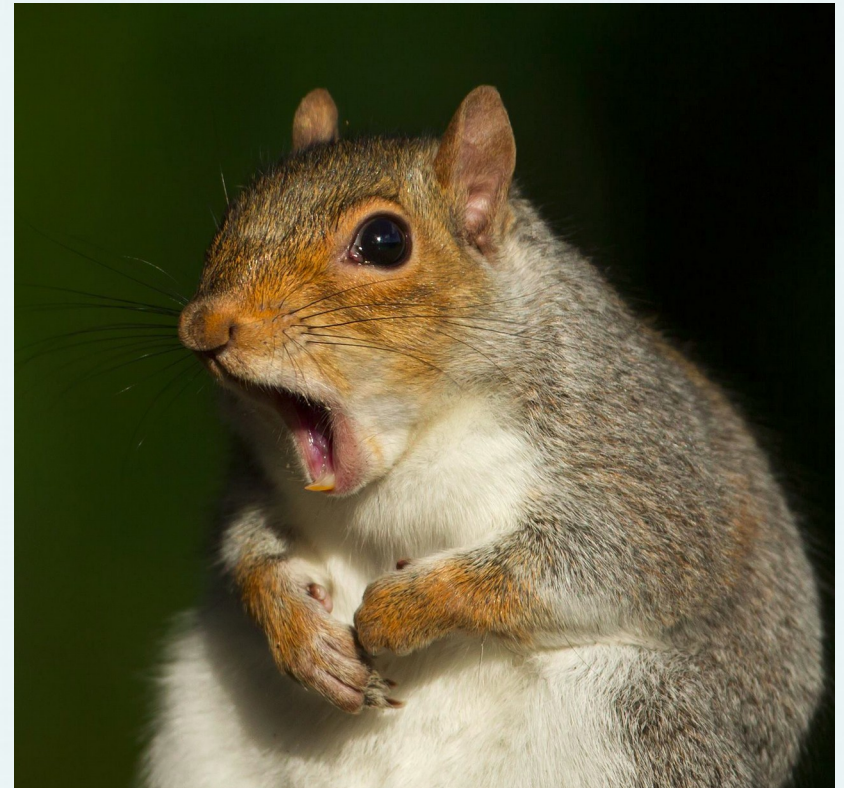


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Very scary!!!!

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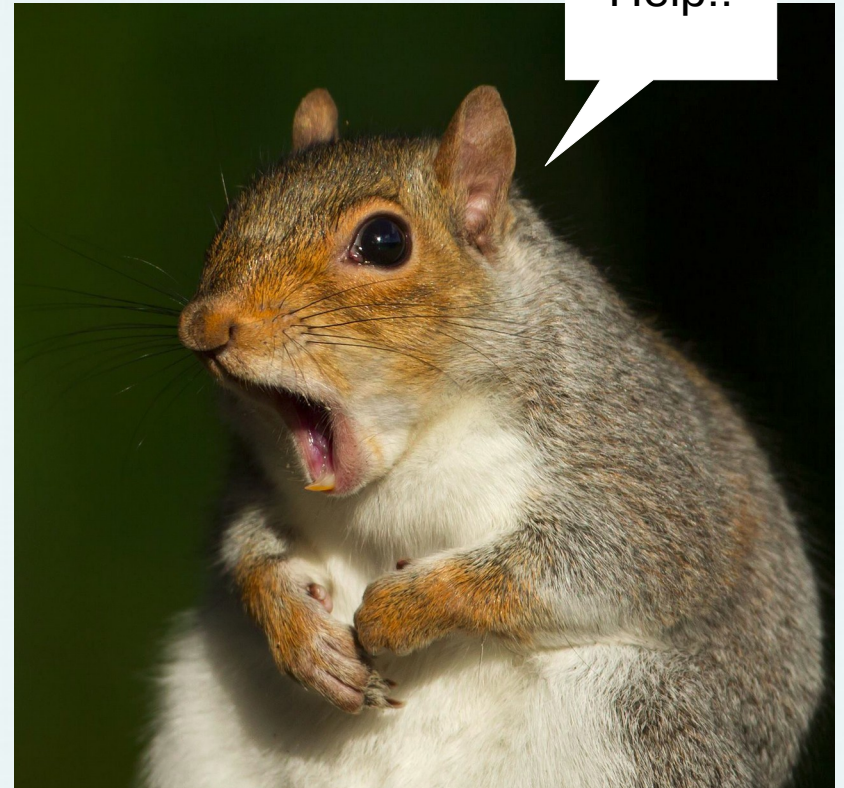
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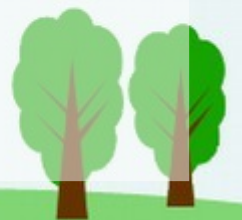


Help!!



The Forest Buddy

- Predict high risk areas in mountain forests



The Forest Buddy

- Predict high risk areas in mountain forests



- Also: predict the vegetation cover type after disaster



Data set

- Roosevelt National Forest (CO)



Data set

- Roosevelt National Forest (CO)
 - Only cartographic data is used (>0.5 million obs.)

Elevation (1860-3860 meters)

Aspect

Slope

Distance to roads

Distance to water sources

Soil type

-
-
-
-



Fire risk (Models)

- Three classes : low (0), moderate (1) and high risk (2)



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- 5-fold cross validation with all methods:
 - K nearest-neighbours
 - Naives Bayes
 - Bagging classifier with decision trees
 - SVC
 - Random Forest



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 - SVC
 - **Random Forest (SMOTE): Final acc = 99.9 %**



Fire risk multiclass (Best Model)

Test set

Recall (2): 89.1 %

Precision (2): 84.1 %

actual	0	83592	3256	844
	1	3774	62929	2150
	2	502	1430	15827
		0	1	2
		prediction		



Vegetation cover (Models)

- Three classes : 7 different vegetation cover



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Vegetation cover (Models)

- Three classes : 7 different vegetation cover
- 5-fold cross validation with all methods:
 - K nearest-neighbours
 - Naives Bayes
 - Decision trees
 - Bagging classifier with decision trees
 - SVC
 - **Random Forest. Final acc = 100 %**



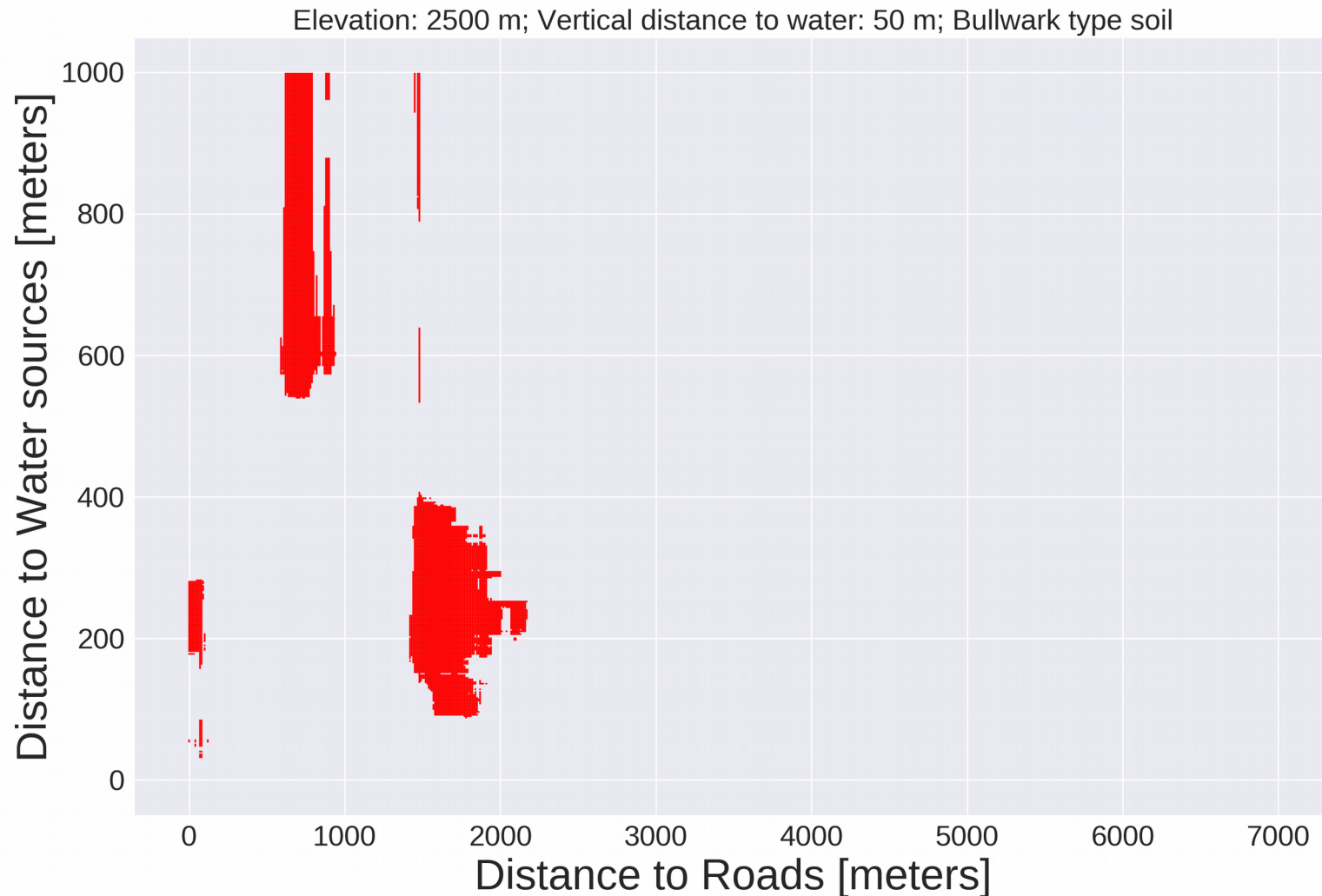
Vegetation cover predictor

Test set

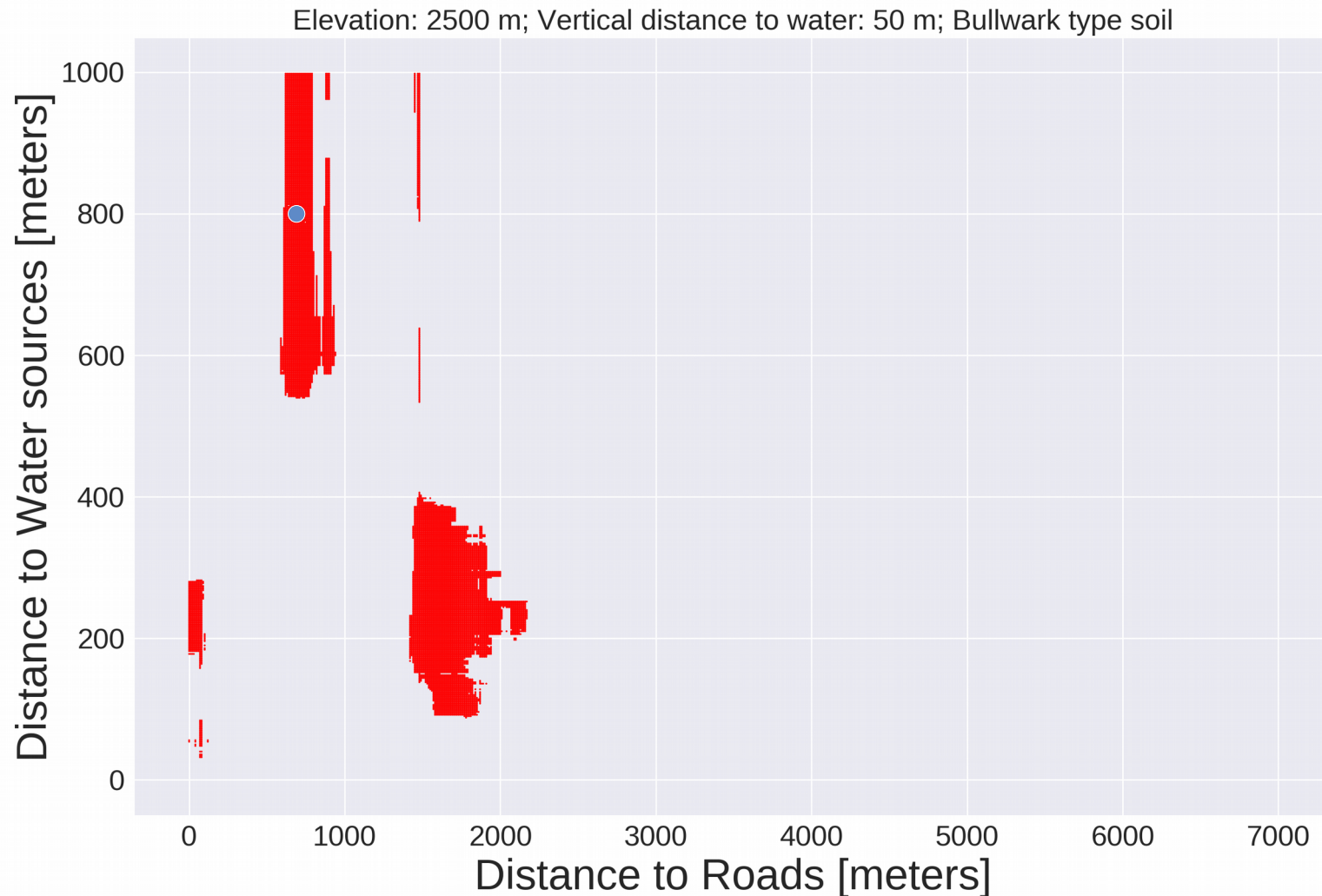
actual	1	61062	2301	1	0	25	3	160
	2	1763	82843	136	1	116	105	27
	3	0	173	10248	76	13	216	0
	4	0	0	113	688	0	23	0
	5	42	413	30	0	2351	11	1
	6	5	187	362	29	6	4621	0
	7	243	43	0	0	2	0	5865
		1	2	3	4	5	6	7
		prediction						



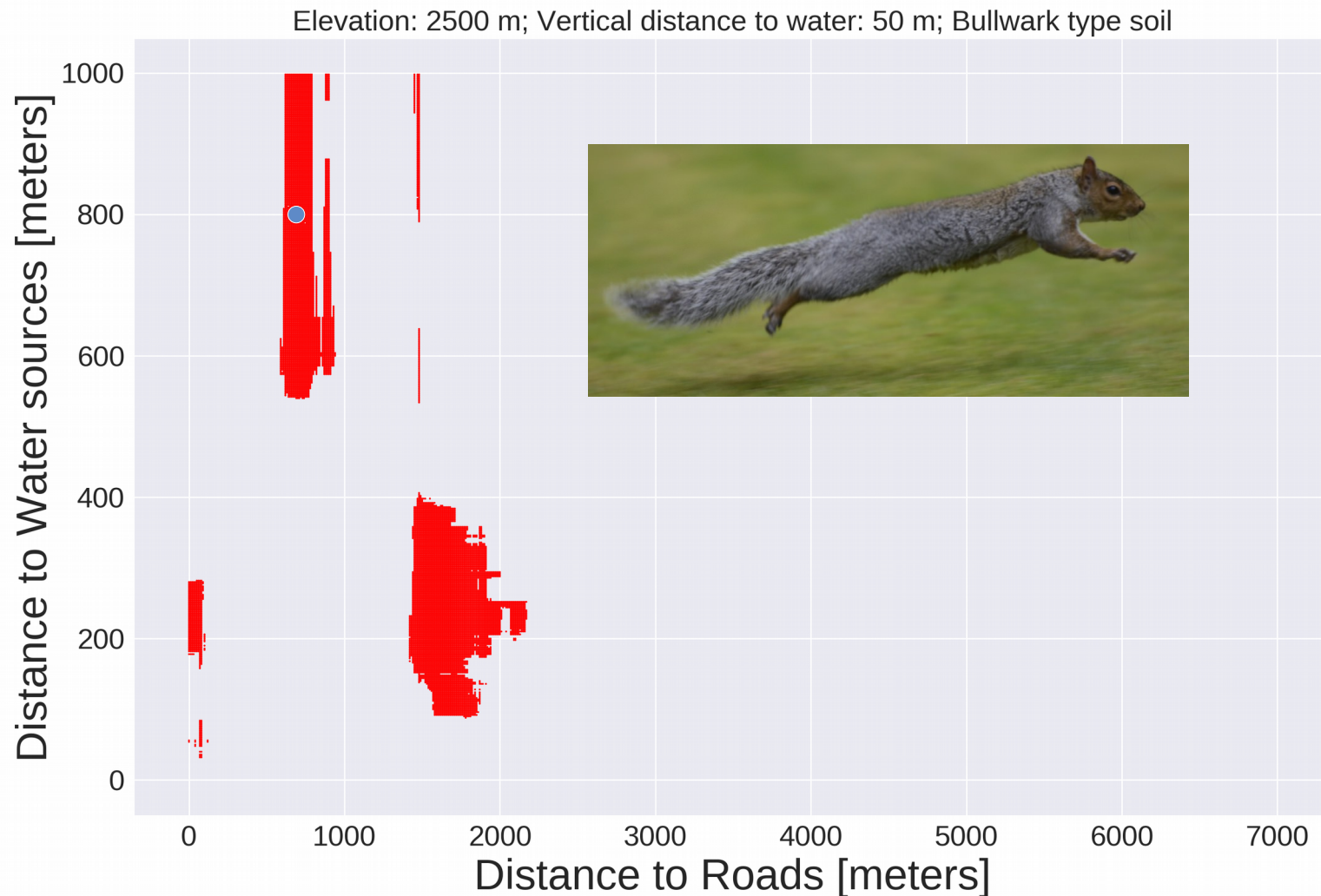
Prediction example (Fire Risk)



Prediction example (Fire Risk)

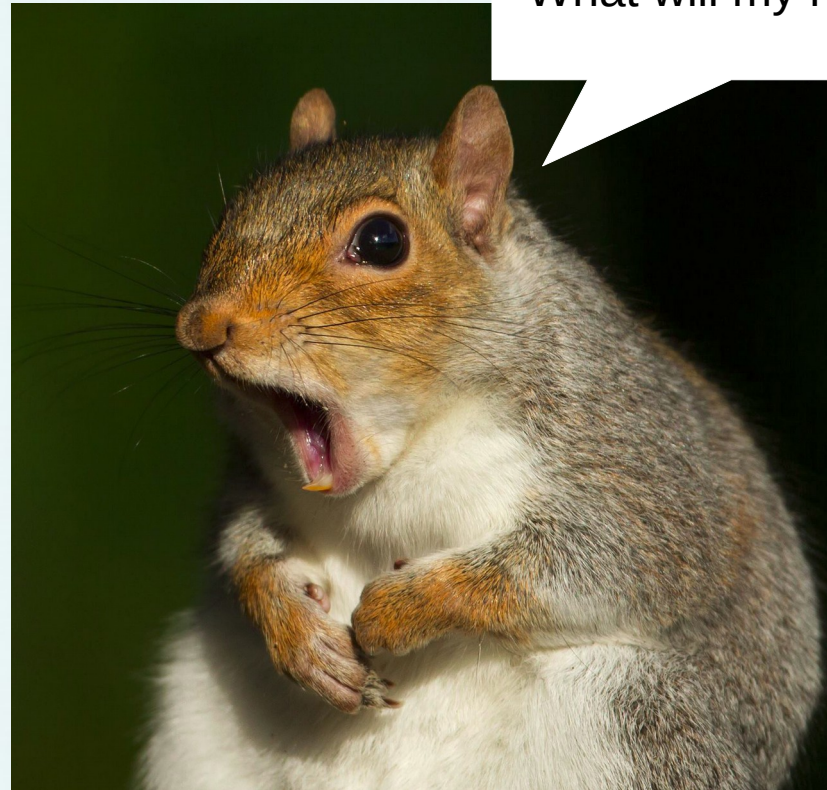


Prediction example (Fire Risk)



Prediction example (Cover)

What will my house be?



Prediction example (Cover)

Ponderosa Pine (3)



What will my house be?



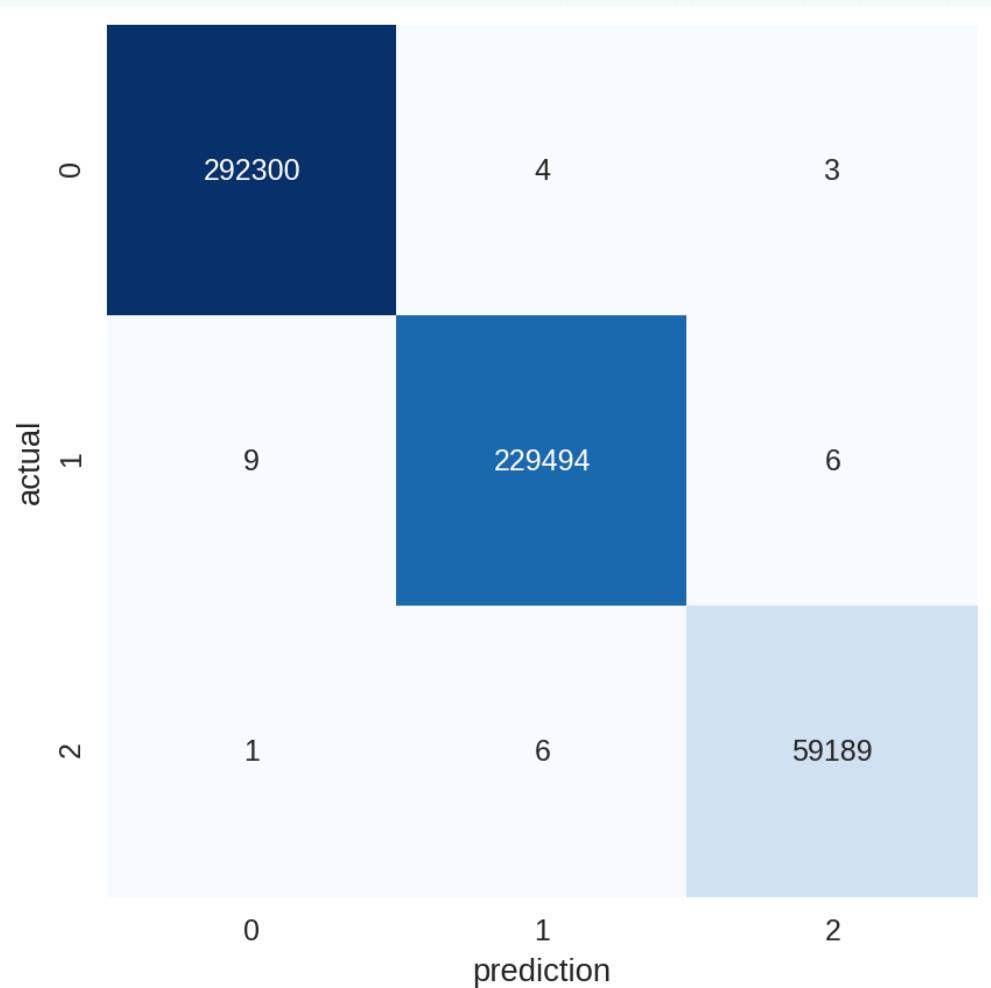
Thank you for your attention!!

Thank you Forest Buddy!!



Fire risk (Best Model)

Global fit



Cover predictor (Best Model)

Global fit

actual	1	211840	0	0	0	0	0	0
	2	0	283301	0	0	0	0	0
	3	0	0	35754	0	0	0	0
	4	0	0	0	2747	0	0	0
	5	0	0	0	0	9493	0	0
	6	0	0	0	0	0	17367	0
	7	0	0	0	0	0	0	20510
		1	2	3	4	5	6	7
		prediction						



Fire risk (Two Classes)

Test set

Recall (2): 91.9 % (+2.8)

Precision (2): 90.7 % (+6.6)

actual	0	128174	3980
	2	3403	38747
		0	2
		prediction	



Cover (Best Model)

Recall

Type 1: 96.1 %

Type 2: 97.5 %

Type 3: 95.5 %

Type 4: 83.5 %

Type 5: 82.6 %

Type 6: 88.7 %

Type 7: 95.3 %

Precision

Type 1: 96.7 %

Type 2: 96.4 %

Type 3: 94.1 %

Type 4: 86.6 %

Type 5: 93.6 %

Type 6: 92.8 %

Type 7: 96.9 %

