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APPENDIX

Section A
These were the 20 categories into which the dataset features were categorized. Each category has a name, a short description, and all of the feature names that were part of the category.

Fire metadata - Name of the fire and any associated IDs, such as state fire database IDs
FOD_ID,FPA_ID,SOURCE_SYSTEM_TYPE,SOURCE_SYSTEM,NWCG_REPORTING_AGENCY,NWCG_REPORTING_UNIT_ID,NWCG_REPORTING_UNIT_NAME,SOURCE_REPORTING_UNIT,SOURCE_REPORTING_UNIT_NAME,LOCAL_FIRE_REPORT_ID,LOCAL_INCIDENT_ID,FIRE_NAME,ICS_209_PLUS_INCIDENT_JOIN_ID,ICS_209_PLUS_COMPLEX_JOIN_ID,MTBS_ID,MTBS_FIRE_NAME,COMPLEX_NAME,FIPS_NAME,FIRE_CODE

Fire information - Information pertaining to the discovery time and date, fire classification, and location information
FIRE_YEAR,DISCOVERY_DATE,DISCOVERY_DOY,DISCOVERY_TIME,NWCG_CAUSE_CLASSIFICATION,NWCG_GENERAL_CAUSE,NWCG_CAUSE_AGE_CATEGORY,CONT_DATE,CONT_DOY,CONT_TIME,FIRE_SIZE,FIRE_SIZE_CLASS,LATITUDE,LONGITUDE,OWNER_DESCR,STATE,COUNTY,FIPS_CODE,LatLong_State,LatLong_County,NAME,geometry,Ecoregion_US_L4CODE,Ecoregion_US_L3CODE,Ecoregion_NA_L3CODE,Ecoregion_NA_L2CODE,Ecoregion_NA_L1CODE

Economic percentiles - Percentiles relating to economic factors
DF_PFS,AF_PFS,HDF_PFS,DSF_PFS,EBF_PFS,EALR_PFS,EBLR_PFS,EPLR_PFS,HBF_PFS,LLEF_PFS,LIF_PFS,LMI_PFS,MHVF_PFS,PM25F_PFS,HSEF,P100_PFS,P200_PFS,LPF_PFS,NPL_PFS,RMP_PFS,TSDF_PFS,TPF,TF_PFS,UF_PFS,WF_PFS,M_WTR,M_WKFC,M_CLT,M_ENY,M_TRN,M_HSG,M_PLN,M_HLTH,SM_C,SM_PFS,IALMIL_87,IAPLHS_88,IAULHS_89,RPL_THEMES,RPL_THEME1,EPL_POV,EPL_UNEMP,EPL_PCI,EPL_NOHSDP,RPL_THEME2,EPL_AGE65,EPL_AGE17,EPL_DISABL,EPL_SNGPNT,RPL_THEME3,EPL_MINRTY,EPL_LIMENG,RPL_THEME4,EPL_MUNIT,EPL_MOBILE,EPL_CROWD,EPL_NOVEH,EPL_GROUPQ

Economic factors - Economic information that is not a percentile
TC,CC,LHE,IALHE,IAHSEF,CA,NCA,CA_LT20,M_CLT_EOMI,M_ENY_EOMI,M_TRN_EOMI,M_HSG_EOMI,M_PLN_EOMI,M_WTR_EOMI,M_HLTH_102,M_WKFC_103,FPL200S,M_WKFC_105,M_EBSI,UI_EXP,THRHLD,GDP

Wildfire management - Describe the managers

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NPL,Mang_Type,Mang_Name,Des_Tp,GAP_Sts,GAP_Prity
Vegetation information - Information about the type of vegetation present in an area
EVH,EVT,EVH_1km,EVT_1km,EVC,EVC_1km,Land_Cover,Land_Cover_1km,rpms,rpms_1km

Population information - Population statistics in an area
Population,Popo_1km

Fire preparedness - Information about Geographic Area Coordination Centers
GACCAbbrev,GACC_PL,GACC_New fire,GACC_New LF,GACC_Uncont LF,GACC_Type 1 IMTs,GACC_Type 2 IMTs,GACC_NIMO Teams,GACC_Area Command Teams,GACC_Fire Use Teams

Climate normals - The percentile of weather factors relative to a local area
pr_Normal,tmmn_Normal,tmmx_Normal,rmin_Normal,rmax_Normal,sph_Normal,srad_Normal,fm100_Normal,fm1000_Normal,bi_Normal,vpd_Normal,erc_Normal

Extreme attributes - Whether economic attributes exceed 90th percentile
EPLRLI,EALRLI,EBLRLI,PM25LI,EBLI,DPMLI,TPLI,LPMHVLI,HBLI,RMPLI,SFLI,HWLI,WDLI,DLI,ALI,HDLI,LLELI,LILHSE,PLHSE,LMILHSE,ULHSE,EPL_ET,EAL_ET,EBL_ET,EB_ET,PM25_ET,DS_ET,TP_ET,LPP_ET,HB_ET,RMP_ET,NPL_ET,TSDF_ET,WD_ET,DB_ET,A_ET,HD_ET,LLE_ET,UN_ET,LISO_ET,POV_ET,LMI_ET,IA_LMI_ET,IA_UN_ET,IA_POV_ET,IAULHSE,IAPLHSE,IALMILHSE

Distance to roads - Distance from the fire to the closest road
road_county_dis,road_interstate_dis,road_common_name_dis,road_other_dis,road_state_dis,road_US_dis

Fire station count - The number of fire stations within a certain distance from the fire
No_FireStation_1.0km,No_FireStation_5.0km,No_FireStation_10.0km,No_FireStation_20.0km

Geographical information - Information about the geography near a fire site
FRG_1km,FRG,TRI_1km,TRI,Aspect_1km,Elevation_1km,Elevation,Slope_1km,Aspect,Slope,GHM,TPI,TPI_1km,TRACT

Fire risk information - Information about the potential severity of a fire
SDI,Evacuation
Climate information relative to annual information - Information about the annual climate in an area
Annual_etr,Annual_precipitation,Annual_temperature,Aridity_index
Climate information at fire ignition point - Information about the climate at the fire ignition point

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pr,tmmn,tmmx,rmin,rmax,sph,vs,th,srad,etr,fm100,fm1000,bi,vpd,erc

5-day climate info - Average of 5 days of climate statistics, centered at the fire discovery date
tmmn_5D_mean,tmmx_5D_mean,rmin_5D_mean,rmax_5D_mean,sph_5D_mean,vs_5D_mean,th_5D_mean,srad_5D_mean,etr_5D_mean,fm100_5D_mean,fm1000_5D_mean,bi_5D_mean,vpd_5D_mean,erc_5D_mean,pr_5D_min,pr_5D_max,tmmn_5D_max,tmmx_5D_max,rmin_5D_min,rmax_5D_min,sph_5D_min,vs_5D_max,th_5D_max,srad_5D_max,etr_5D_max,fm100_5D_min,fm1000_5D_min,bi_5D_max,vpd_5D_max,erc_5D_max,pr_5D_mean

Climate percentiles - Percentiles of climate statistics
tmmn_Percentile,tmmx_Percentile,sph_Percentile,vs_Percentile,fm100_Percentile,bi_Percentile,vpd_Percentile,erc_Percentile

NDVI information - Normalized Difference Vegetation Index statistics
NDVI-1day,NDVI_min,NDVI_max,NDVI_mean,MOD_NDVI_12m,MOD_EVI_12m

Kinds of grass present - The percentage of certain grass cover near the fire
CheatGrass,ExoticAnnualGrass,Medusahead,PoaSecunda

Section B

The 29 non-numeric features were converted to numeric features as follows:

- For NWCG_CAUSE_CLASSIFICATION, NWCG_GENERAL_CAUSE, Mang_Type, Mang_Name, Des_Tp, NAME, GACCAbbrev, UI_EXP: one-hot encoded using scikit-learn's OneHotEncoder preprocessor
- For NWCG_CAUSE_AGE_CATEGORY: also uses OneHotEncoder, but missing values are treated as a valid value
- For FIRE_SIZE_CLASS, sph_Percentile, vs_Percentile, fm100_Percentile, bi_Percentile, vpd_Percentile, erc_Percentile: ordinal encoded using scikit-learn's OrdinalEncoder
- For EVH_1km, EVT_1km, EVC_1km, Land_Cover_1km, FRG_1km: each category-percentage pair was encoded as two separate features, with one for the category and the other for the percentage.
- For MOD_NDVI_12m, MOD_EVI_12m, NDVI_min, NDVI_max, NDVI_mean: 12 features for each of the values in the past 12 months
- Ecoregion_US_L4CODE, Ecoregion_NA_L3CODE: Each ecoregion level code encodes its lower ecoregion level code, so all of the ecoregion level codes are extracted and then used as separate features, with the values being passed to OrdinalEncoder

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Section C

The 20 features selected by the SelectFromModel model were DISCOVERY_DOY, DISCOVERY_TIME, LATITUDE, LONGITUDE, EVT, EVC, Population, Popo_1km, GDP, fm100_Normal, fm1000_Normal, erc_Normal, EBLR_PFS, MHVF_PFS, No_FireStation_20.0km, Elevation_1km, Elevation, Ecoregion_US_L3CODE, Annual_etr, and Annual_precipitation.