

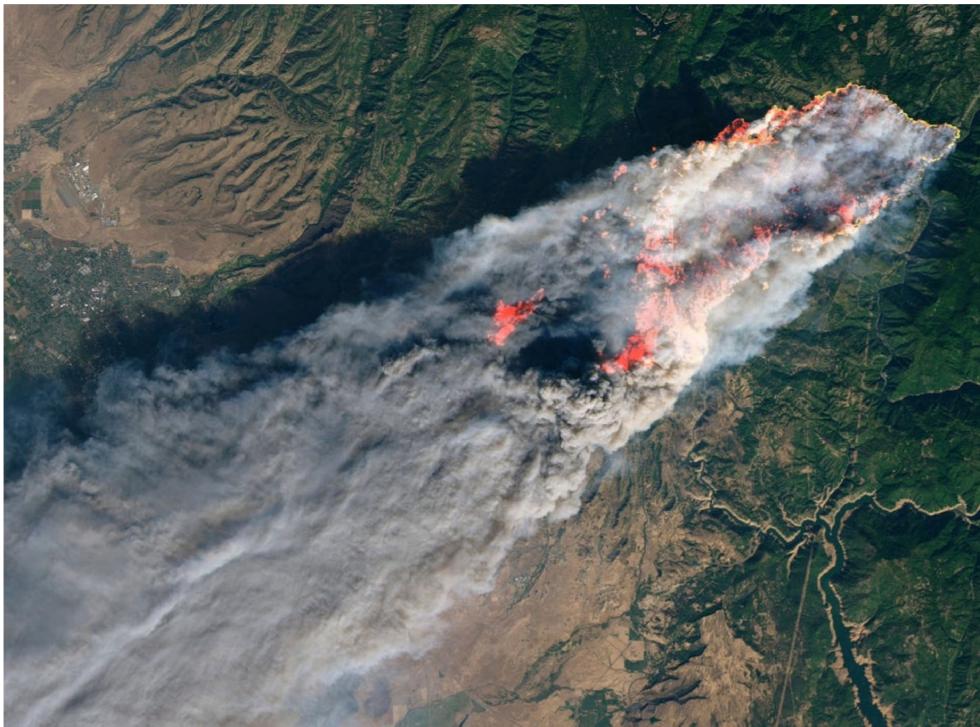
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This program shows an overhead image of a widespread forest fire, then isolates different components and determines their RBG makeup. Using the RBG charts, each component of the image is turned black and measured in acres. Finally each component is changed to a basic color on the final image.

```
clc;clear;close all  
c=datetime;  
fprintf('Last run was %s\n',c)
```

```
Last run was 30-Jan-2022 19:38:46
```

```
m=imread("California-wildfires.jpg");  
imshow(m)
```



This code graphs the RBG values of the fire image snippet to determine a rule for the relationships between red blue and green in order to segment the fire in the image and change it to black.

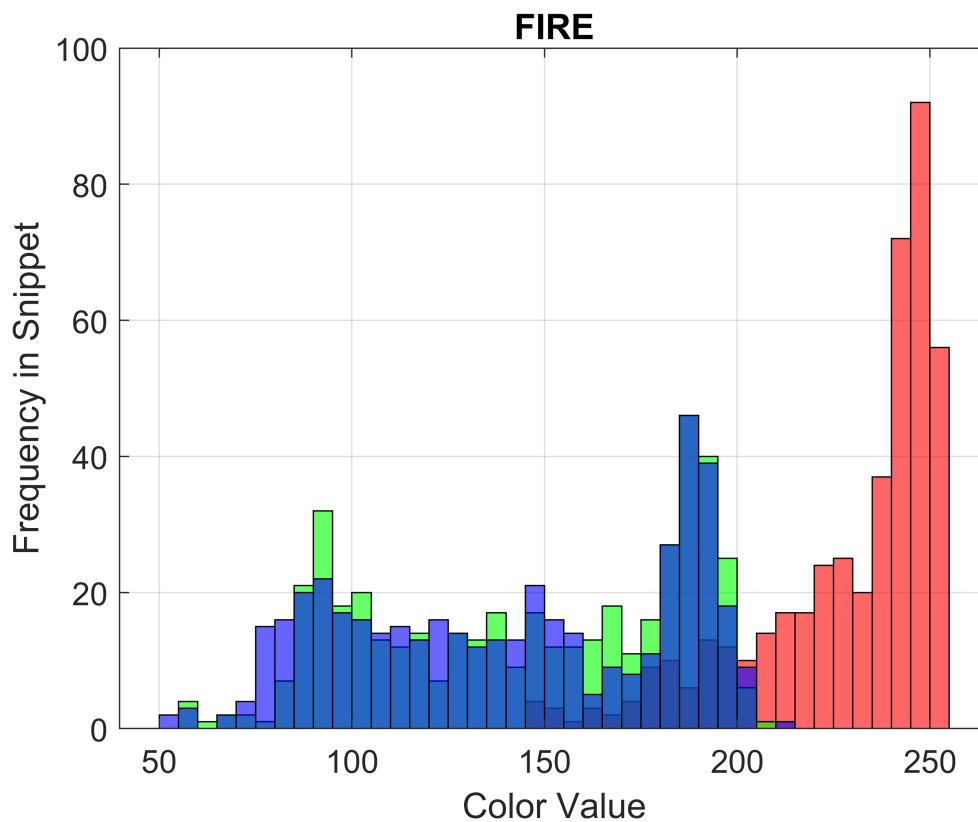
```
fire=m(312:352,636:646,:);  
imshow(fire)
```



```
r=fire(:,:,1);
g=fire(:,:,2);
b=fire(:,:,3);
figure
histogram(r,'facecolor','r','BinWidth',5)
hold
```

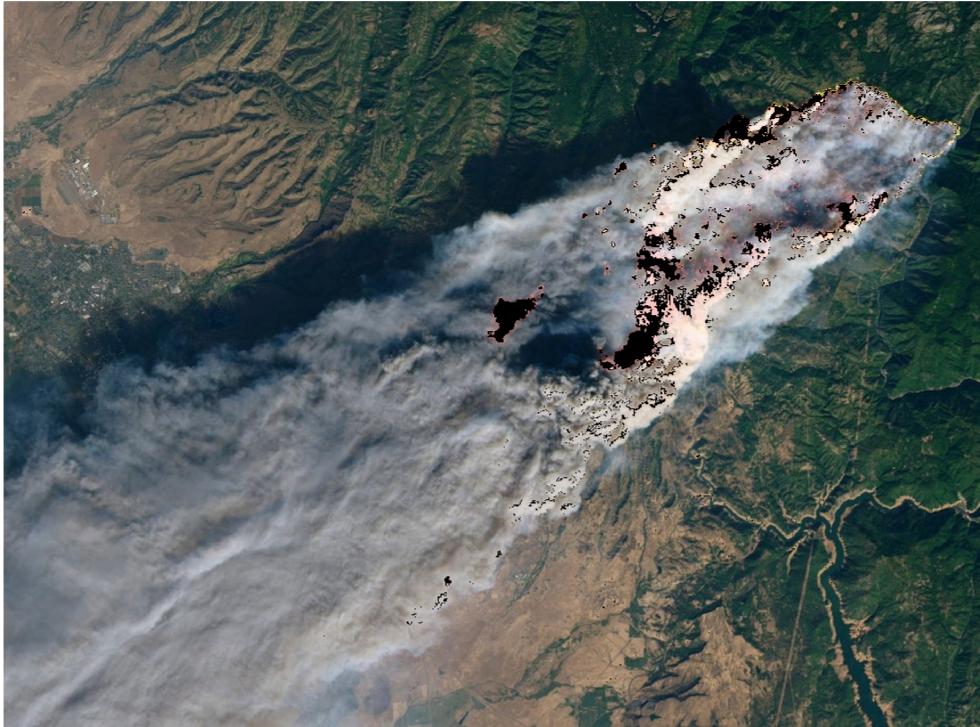
Current plot held

```
histogram(g,'facecolor','g','BinWidth',5)
histogram(b,'facecolor','b','BinWidth',5)
datacursormode on
xlabel('Color Value');
ylabel('Frequency in Snippet');
set(gca,'fontsize',12)
grid
title('FIRE')
```



```
%%segment fire
r=m(:,:,:,1);
g=m(:,:,:,2);
b=m(:,:,:,3);
k=[(g<r & b<r & g<190 & b<190 & r>190)|r>1.5*g];
r(k)=0;
g(k)=0;
b(k)=0;
mf=cat(3,r,g,b);
figure
```

```
imshow(mf)
```



```
firecols=sum(k);
firepix=sum(firecols);
sqkm=firepix/22/22;
sqacres=sqkm*247.1;
```

This code graphs the RBG values of the smoke image snippet to determine a rule for the relationships between red blue and green in order to segment the smoke in the image and change it to black.

```
smoke=m(440:640,170:362,:);
imshow(smoke)
```

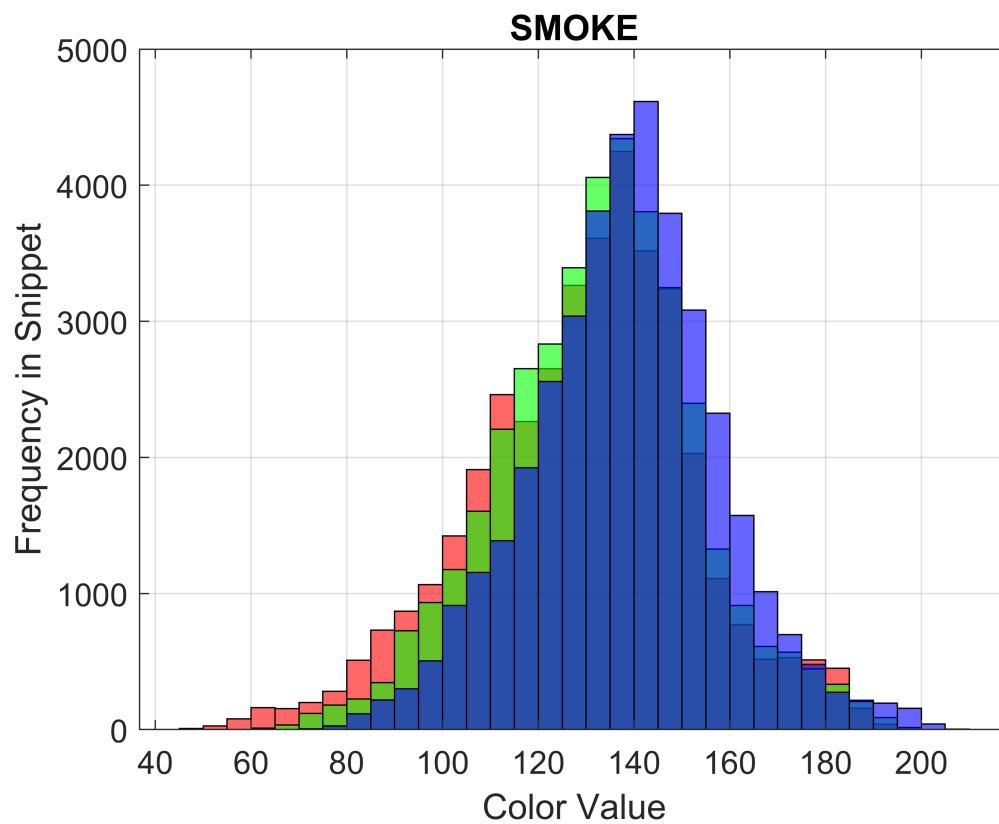


```
r=smoke(:,:,:,1);
g=smoke(:,:,:,:,2);
```

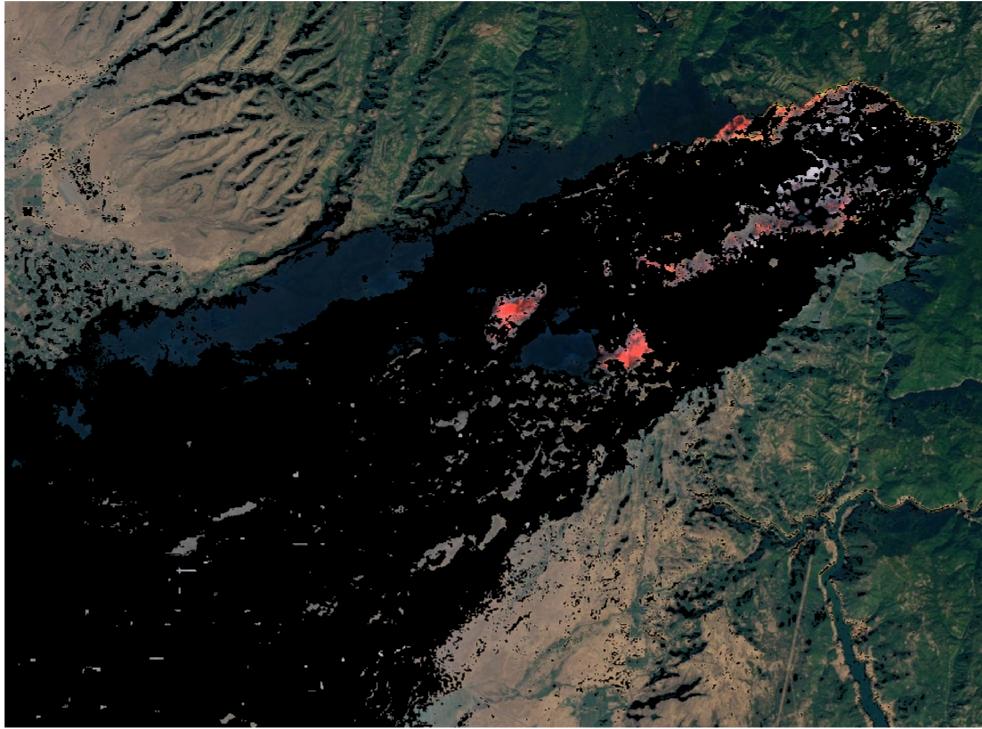
```
b=smoke(:,:,3);
figure
histogram(r,'facecolor','r','BinWidth',5)
hold
```

Current plot held

```
histogram(g,'facecolor','g','BinWidth',5)
histogram(b,'facecolor','b','BinWidth',5)
xlabel('Color Value');
ylabel('Frequency in Snippet');
set(gca,'fontsize',12)
grid
title('SMOKE')
```



```
%%segment smoke
r=m(:,:,1);
g=m(:,:,2);
b=m(:,:,3);
k=[(b>r & b>g & g>r & r>20)|((b-g)<10 & (g-r)<10 & (b-r)<20 & b>120 & r>20)];
r(k)=0;
g(k)=0;
b(k)=0;
ms=cat(3,r,g,b);
figure
imshow(ms)
```



This code graphs the RBG values of the grass image snippet to determine a rule for the relationships between red blue and green in order to segment the grass in the image and change it to black.

```
grass=m(15:105,514:601,:);
imshow(grass)
```



```
r=grass(:,:,:1);
g=grass(:,:,:2);
b=grass(:,:,:3);
figure
histogram(r,'facecolor','r','BinWidth',5)
hold
```

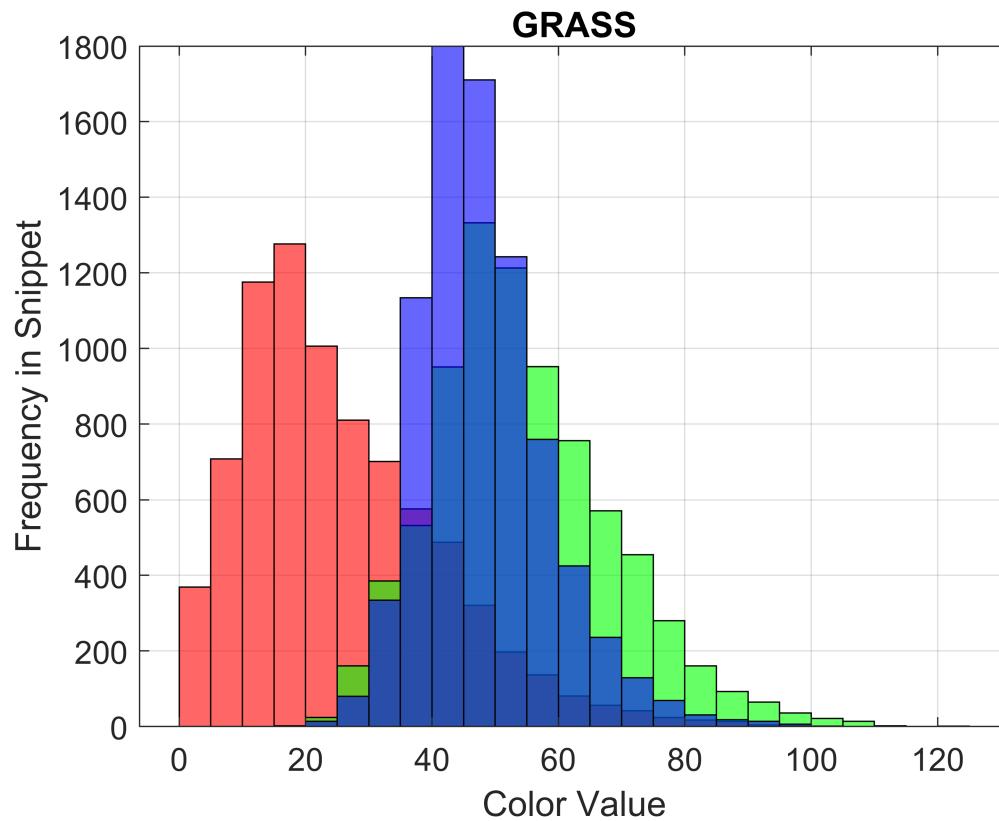
Current plot held

```
histogram(g,'facecolor','g','BinWidth',5)
histogram(b,'facecolor','b','BinWidth',5)
xlabel('Color Value');
```

```

ylabel('Frequency in Snippet');
set(gca,'fontsize',12)
grid
title('GRASS')

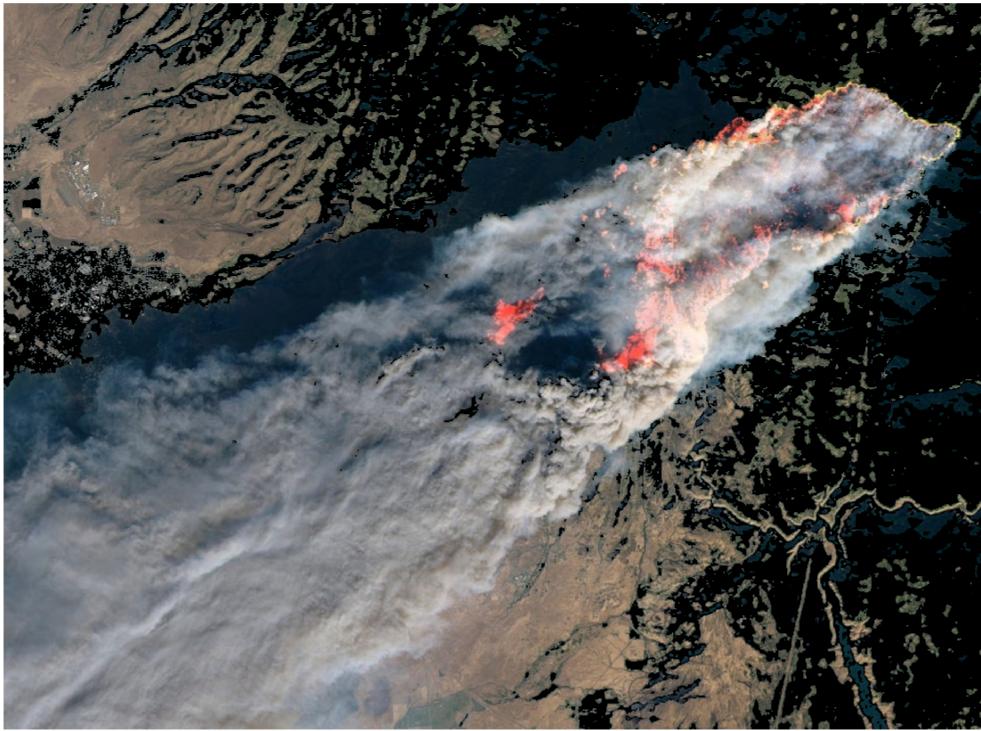
```



```

%%segment grass
r=m(:,:,1);
g=m(:,:,2);
b=m(:,:,3);
k=[b>r & g>r & g+5>b & r<80];
r(k)=0;
g(k)=0;
b(k)=0;
mg=cat(3,r,g,b);
figure
imshow(mg)

```



This code graphs the RBG values of the dirt image snippet to determine a rule for the relationships between red blue and green in order to segment the dirt in the image and change it to black.

```
dirt=m(16:81,22:46,:);  
imshow(dirt)
```



```
r=dirt(:,:,1);  
g=dirt(:,:,2);  
b=dirt(:,:,3);  
figure  
histogram(r,'facecolor','r','BinWidth',5)  
hold
```

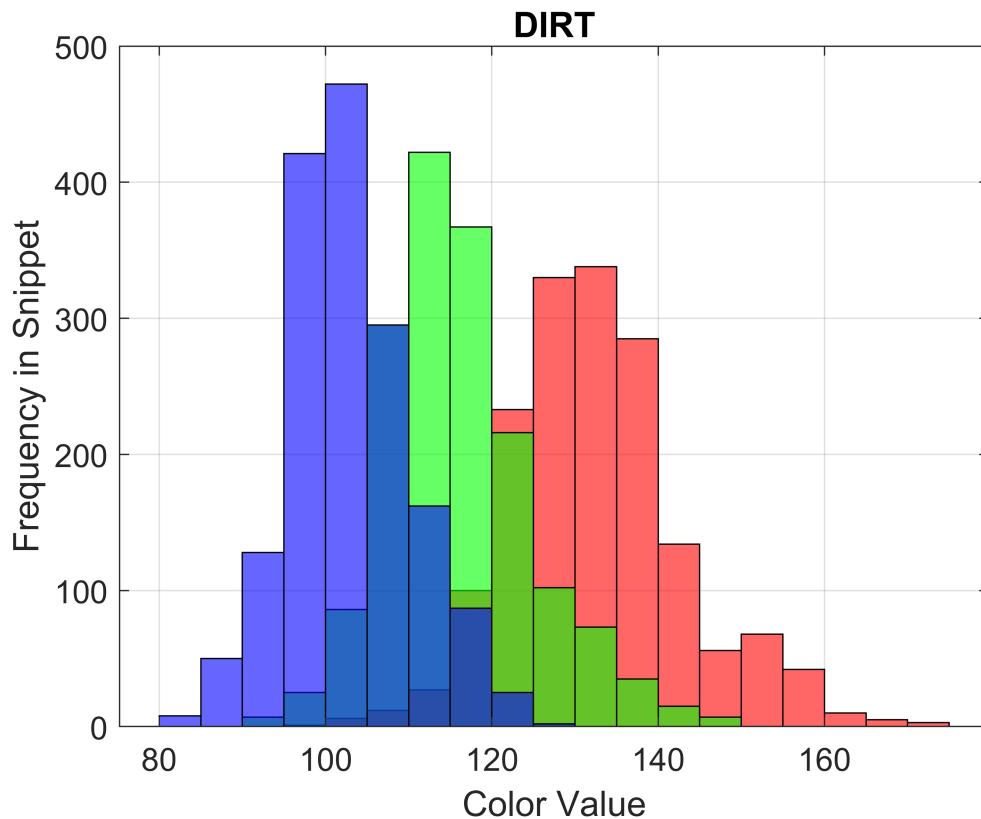
Current plot held

```
histogram(g,'facecolor','g','BinWidth',5)  
histogram(b,'facecolor','b','BinWidth',5)  
xlabel('Color Value');  
ylabel('Frequency in Snippet');
```

```

set(gca, 'fontsize',12)
grid
title('DIRT')

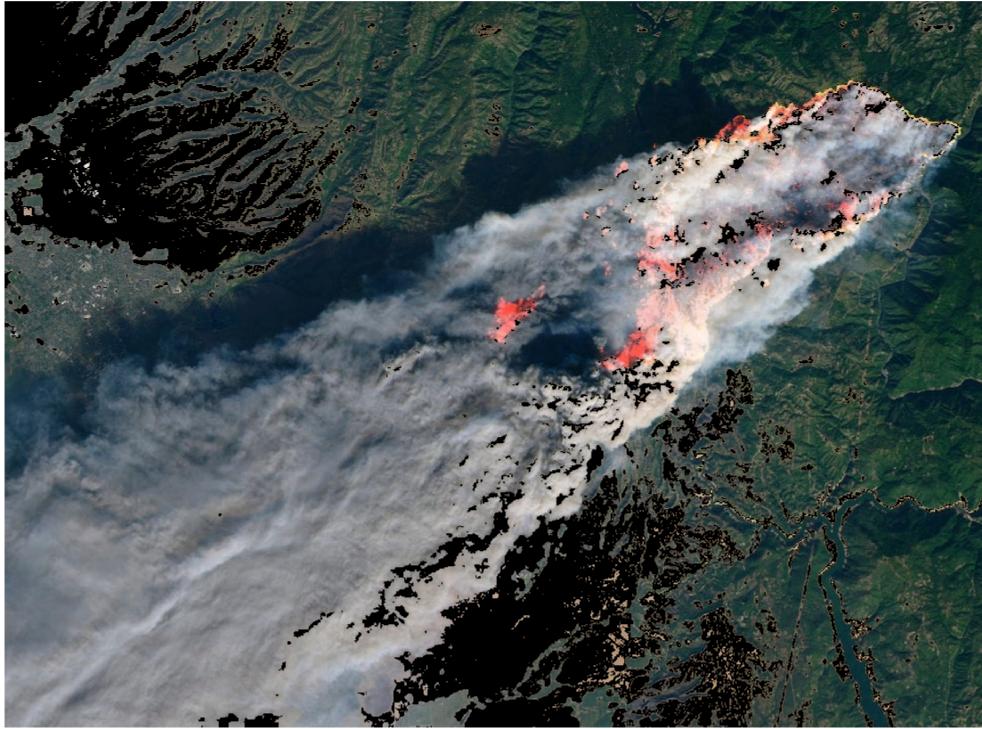
```



```

%%segment dirt
r=m(:,:,1);
g=m(:,:,2);
b=m(:,:,3);
k=[b<g & g<r & b<r & r<170 & b>80 & r>90 & r>b+5 & b<140];
r(k)=0;
g(k)=0;
b(k)=0;
md=cat(3,r,g,b);
figure
imshow(md)

```



This code is copied from the fire segmenting section. It calculates the amount of acres that are on fire based on pixel size and prints.

```
%firecols=sum(k)
%firepix=sum(firecols)
%sqkm=firepix/22/22
%sqacres=sqkm*247.1;
%These lines are repeated from section B) for reference
fprintf("There are %4.2f acres on fire",sqacres)
```

There are 5195.23 acres on fire

This code alters the image to cover each part of the image with a corresponding simple color with no texture.

```
%segment fire
r=m(:,:,1);
g=m(:,:,2);
b=m(:,:,3);
k=[(g<r&b<r&g<190&b<190&r>190)|r>1.5*g];
r(k)=255;
g(k)=0;
b(k)=0;
m=cat(3,r,g,b);

%segment smoke
r=m(:,:,1);
```

```

g=m(:,:,2);
b=m(:,:,3);
k=[(b>r&b>g&g>r&r>20)|((b-g)<10&(g-r)<10&(b-r)<20&b>120&r>20)];
r(k)=192;
g(k)=192;
b(k)=192;
m=cat(3,r,g,b);

%%segment grass
r=m(:,:,1);
g=m(:,:,2);
b=m(:,:,3);
k=[b>r&g>r&g+17>b&r<80&b>25];
r(k)=0;
g(k)=255;
b(k)=0;
m=cat(3,r,g,b);

%%segment dirt
r=m(:,:,1);
g=m(:,:,2);
b=m(:,:,3);
k=[b<g&g<r&b<r&r<180&b>80&r>90&r>b+5&b<140];
r(k)=202;
g(k)=188;
b(k)=145;
m=cat(3,r,g,b);
figure
imshow(m)

```

