Assessed Task # 2: Climate data from Cambridge

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Analysis

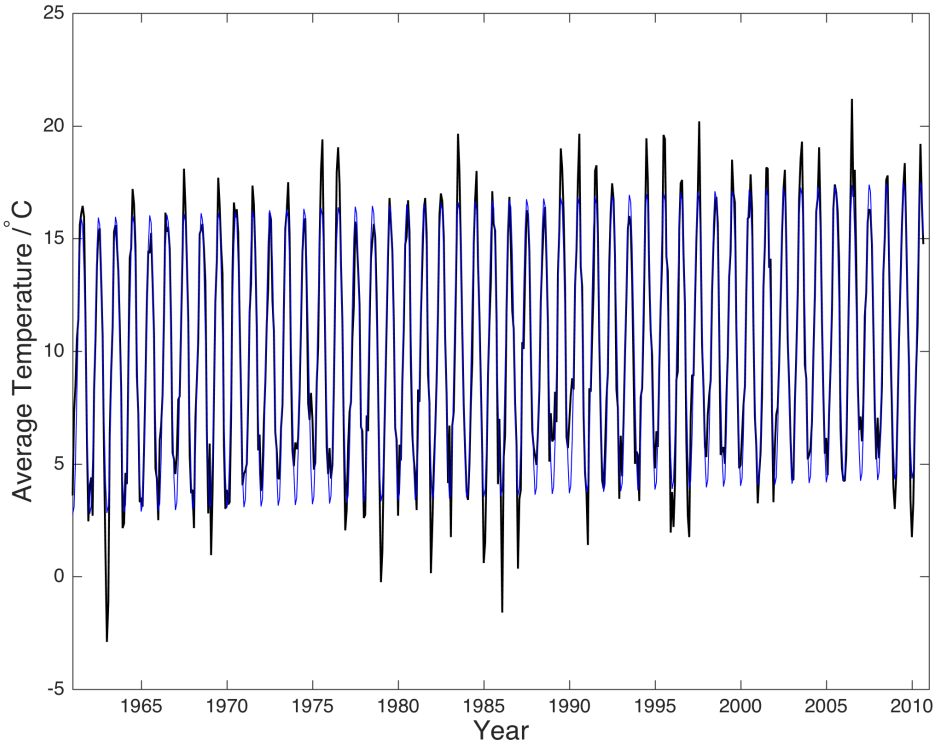

Figure 1: Black line shows the average monthly temperature measured in Cambridge against Time of measurement, computed as the average of max and min monthly values. Blue line indicates the sloping sinusoidal function that has been fitted to the data.

Data fitted by sloping sinusoidal:

$$y = 9.182 + 0.0325(\mathrm{x} - 1961) + \sin(2\pi * (x - 1961) + 13.97)$$

So average gradient of linear coefficient = 0.0325

$$\therefore \textit{overall temp increase} = \ 1.6240℃ \textit{between } 1961 \textit{ and } 2010$$

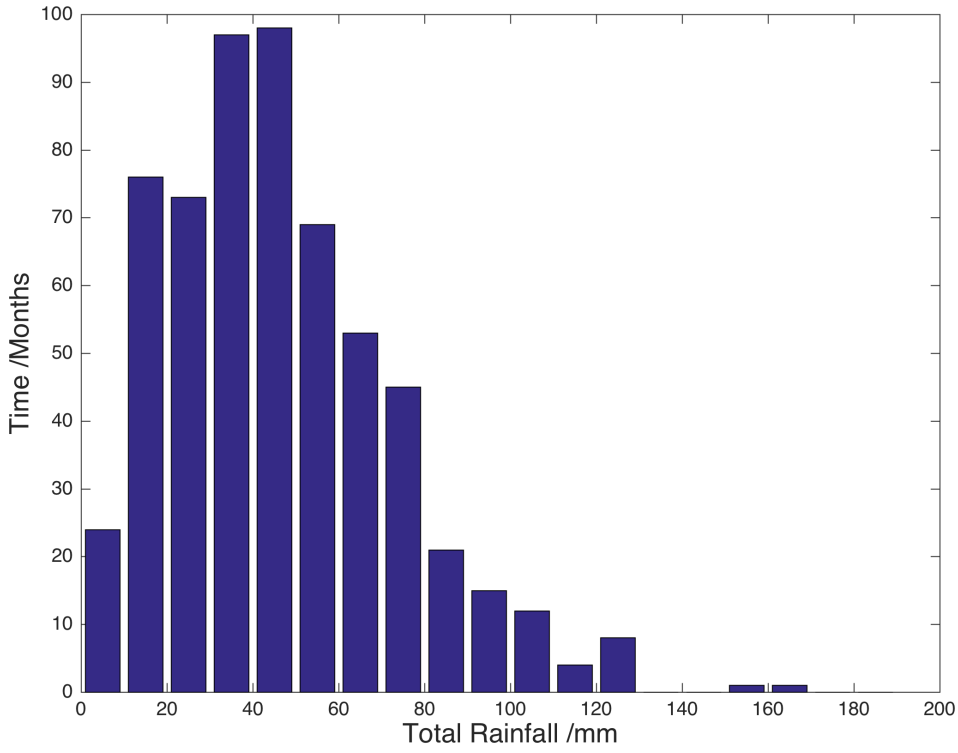

Figure 2: Monthly rainfall in millimeters in Cambridge plotted as a histogram displaying the number of months that occur within any given band of rainfall between 1961 and 2010

Appendix: Matlab Code

```
% Get Temp, Process
cam = dlmread('cambridge.dat','\t',4,0);
x= yyyy + (mm-1)/12;
y = (tmax+tmin)/2;
plot(x,y,'-k','LineWidth',1,'MarkerFaceColor','k');
hold on

% Perform a minimisation including the sine argument and plot
b0 = [10,-0.01,50,10];
b = fminsearch(@(b) slopingsine(b,(x-1961),y), b0);
yfit = b(1) + b(2)*(x-1961) + b(3)*sin((x-1961)*pi*2+b(4));
plot(x,yfit,'-b','LineWidth',0.5)
hold off;

% Create axis properties
xlabel('Year','FontSize',14)
ylabel('Average Temperature /^{\circ}C','FontSize',14)

xlim([1961,2011])
hold off
% Create file
print -dpng -r300 'temperature.png'

% Print the results of the fit
b

% Create histogram
f=hist(rain, [5:10:185]);
bar([5:10:185], f);
```

```
xlabel('Total Rainfall /mm','FontSize',14)
ylabel('Time /Months','FontSize',14)

print -dpng -r300 'rainfall.png'


function chisq = slopingsine(b,x,y)
% Computes the agreement between a set of data points and
% a computed straight line equation

chi = y - (b(1) + b(2)*x + b(3)*sin(x*pi*2+b(4)));
chisq = sum(chi.^2);
```