```
c1c
close all
clear all
fprintf('\n');
fprintf('\n');
fprintf('\n'):
fprintf(' This Program Performs: "FUZZY ENVIRONMENTAL RISK ASSESSMENT FERA"');
fprintf('\n');
fprintf('\n');
fprintf(' USER GUIDE: This prgram comprises 3 parts: ');
fprintf('\n');
fprintf('\n');
fprintf('1)Input Data, 2) Fuzzy Assessment, 3)Output Presentation.');
fprintf('\n');
fprintf('\n');
fprintf('\n');
fprintf(' The FERA processes 2 Fields: Air and Wastewater ');
fprintf('\n');
fprintf('\n');
fprintf(' The Field: Air Processes Concentrations of Pollutants:');
fprintf('\n');
fprintf(' CO, NO2, SO2, PM2.5, O3, H2S, Benzene, Toluene, Xylene and Ethyl Benzene. ');
fprintf('\n');
fprintf('\n');
fprintf(' The Field: Watewater Processes Concentrations of Pollutants: COD, BOD, TSS and pH ');
fprintf('\n');
fprintf('\n');
fprintf('\n');
fprintf('\n');
fprintf('\n');
fid1=fopen('data.docs','w');
```

```
AOI=readfis('AOI');
plotfis(AQI);
fprintf(fid1, 'Figure 1 represents the Criteria Air Quality Index FIS \n\n');
CO=xlsread('data','air-criteria','B2');
NO2=xlsread('data', 'air-criteria', 'C2');
SO2=xlsread('data','air-criteria','D2');
03=xlsread('data','air-criteria','E2');
PM=xlsread('data','air-criteria','F2');
outAQI=evalfis([CO NO2 SO2 O3 PM], AQI);
fprintf('The Calculated Fuzzy Criteria AQI = \n');
disp(outAQI);
fprintf(fid1, 'The Calculated Fuzzy Criteria AQI = \n\n');
fprintf(fid1,'%8.2f \n\n',outAQI);
fprintf(fid1, 'Figure 2 illustrates the Membership Functions in Criteria AQI \n\n');
figure;
plotmf(AQI, 'output',1);
%Start of LOOP For: Total Criteria AQI Fuzzy LEVEL
disp(' ');
if (0<=outAQI)&&(outAQI<=50)</pre>
   fprintf(fid1, 'Total level of Criteria AQI in Zone is: \n');
   fprintf(fid1,'GOOD \n\n');
       fprintf('GOOD \n\n');
   sheet=1;
xlRange='K2';
A={'GOOD'};
xlswrite('data', A, sheet, xlRange);
```

```
sheet=1;
xlRange='M7';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
       else if (50<outAQI)&&(outAQI<=100)</pre>
      fprintf(fid1, 'Total level of Criteria AQI in Zone is: \n\n');
      fprintf(fid1, 'MODERATE \n\n');
             fprintf('MODERATE \n\n');
          sheet=1;
xlRange='K2';
A={'MODERATE'};
xlswrite('data', A, sheet, xlRange);
sheet=1;
xlRange='M8';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
   else if (100<outAQI)&&(outAQI<=150)</pre>
         fprintf(fid1, 'Total level of Criteria AQI in Zone is: \n\n');
          fprintf(fid1, 'Unhealthy For Sensetive Group \n\n');
                 fprintf('Unhealthy For Sensetive Group \n\n');
              sheet=1:
xlRange='K2';
A={'SENSETIVE-UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
sheet=1;
xlRange='M9';
A={'*'};
xlswrite('data', A, sheet, xlRange);
              else if (150<outAQI)&&(outAQI<=200)</pre>
          fprintf(fid1, 'Total level of Criteria AQI in Zone is: \n\n');
          fprintf(fid1, 'Unhealthy \n\n');
               fprintf('Unhealthy \n\n');
```

```
sheet=1;
xlRange='K2';
A={'UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
sheet=1;
xlRange='M10';
A={'*'};
xlswrite('data', A, sheet, xlRange);
             else if (200<outAQI)&&(outAQI<=300)</pre>
         fprintf(fid1, 'Total level of Criteria AQI in Zone is: \n\n');
         fprintf(fid1,'Very Unhealthy \n\n');
             sheet=1;
xlRange='K2';
A={'VERY-UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
sheet=1;
xlRange='M11';
A={'*'};
xlswrite('data', A, sheet, xlRange);
      else
         fprintf(fid1, 'Total level of Criteria AQI in Zone is: \n\n');
         fprintf(fid1, 'HAZARDOUS \n\n');
              fprintf('HAZARDOUS \n\n');
             sheet=1;
xlRange='K2';
A={'HAZARDOUS'};
xlswrite('data', A, sheet, xlRange);
sheet=1;
xlRange='M12';
A={'*'};
xlswrite('data', A, sheet, xlRange);
```

```
end:
                  end:
       end;
   end;
end:
disp(' ');
%End of LOOP For: Total Criteria AQI Fuzzy LEVEL
%Dominant Criteria AOI Pollutant Sellector
CO1=CO/50;
NO21=NO2/2040;
S021=S02/1004;
031=03/600;
PM1=PM/500;
AQI1=[CO1, NO21, SO21, O31, PM1];
mainAQI=sort(AQI1);
disp(mainAQI);
[b, AQIIX]=max(AQI1);
if AQIIX==1
    fprintf(fid1,'The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
   fprintf(fid1,'CO \n\n\n');
   fprintf('The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
   fprintf('CO \n\n\n');
else if AOIIX==2
        fprintf(fid1, 'The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
    fprintf(fid1,'NO2 \n\n\n');
     fprintf('The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
    fprintf('NO2 \n\n\n');
   else if AQIIX==3
           fprintf(fid1, 'The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
    fprintf(fid1,'S02\n\n\n');
     fprintf('The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
```

```
fprintf('S02\n\n\n');
           else if AQIIX==4
        fprintf(fid1, 'The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
   fprintf(fid1,'03 \n\n\n');
    fprintf('The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
   fprintf('03 \n\n\n');
             else
        fprintf(fid1, 'The Dominant Pollutant of Criteria AQI in Zone is: \n\n');
   fprintf(fid1,'PM2.5 \n\n\n');
   fprintf('The Dominant Pollutant of Criteria AOI in Zone is: \n\n');
   fprintf('PM2.5 \n\n\n');
             end:
     end:
  end:
end:
%End of Dominant criteria AOI Sellector
fprintf(fid1,'\n\n\n\n');
BTEXHQI=readfis('BTEXHQI');
figure;
plotfis(BTEXHQI);
fprintf(fid1, 'Figure 3 represents the BTEXH Air Quality Index FIS \n\n');
H2S=xlsread('data','BTEXH','B2');
Benzene=xlsread('data','BTEXH','C2');
Toluene=xlsread('data','BTEXH','D2');
EthylBenzene=xlsread('data','BTEXH','E2');
```

```
Xylene=xlsread('data','BTEXH','F2');
outBTEXHQI=evalfis([H2S Benzene Toluene EthylBenzene Xylene], BTEXHQI);
fprintf('The Calculated Fuzzy BTEXHQI = \n');
disp(outBTEXHQI);
figure;
plotmf(BTEXHQI, 'output',1);
fprintf(fid1,'The Calculated Fuzzy BTEXHOI is = \n\n');
fprintf(fid1,'%8.2f \n\n',outBTEXHOI);
fprintf(fid1, 'Figure 4 illustrates the Membership Functions in BTEXHQI \n\n');
fprintf('The Calculated Fuzzy BTEXHQI is = \n\n');
fprintf('%8.2f \n\n',outBTEXHQI);
fprintf('Figure 4 illustrates the Membership Functions in BTEXHOI \n\n');
%Start of LOOP For: Total BTEXHOI Fuzzy LEVEL
disp(' ');
if (0<=outBTEXHQI)&&(outBTEXHQI<=50)</pre>
   fprintf(fid1, 'Total level of outBTEXHQI in Zone is: \n\n');
   fprintf(fid1,'GOOD \n\n\n');
   fprintf('Total level of outBTEXHQI in Zone is: \n\n');
   fprintf('GOOD \n\n\n');
       sheet=2:
xlRange='J2';
A={'GOOD'};
xlswrite('data', A, sheet, xlRange);
sheet=2;
xlRange='M7';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
else if (50<outBTEXHQI)&&(outBTEXHQI<=100)</pre>
        fprintf(fid1, 'Total level of outBTEXHQI in Zone is: \n\n');
       fprintf(fid1,'MODERATE \n\n\n');
       fprintf('Total level of outBTEXHQI in Zone is: \n\n');
```

```
fprintf('MODERATE \n\n\n');
          sheet=2;
xlRange='J2';
A={'MODERATE'};
xlswrite('data', A, sheet, xlRange);
sheet=2;
xlRange='M8';
A={'*'};
xlswrite('data', A, sheet, xlRange);
   else if (100<outBTEXHQI)&&(outBTEXHQI<=150)</pre>
         fprintf(fid1, 'Total level of outBTEXHQI in Zone is: \n\n');
          fprintf(fid1, 'Unhealthy For Sensetive Group \n\n\n');
           fprintf('Total level of outBTEXHQI in Zone is: \n\n');
          fprintf('Unhealthy For Sensetive Group \n\n\n');
             sheet=2;
xlRange='J2';
A={'SENSETIVE-UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
sheet=2;
xlRange='M9';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
             else if (150<outBTEXHQI)&&(outBTEXHQI<=200)</pre>
          fprintf(fid1, 'Total level of outBTEXHQI in Zone is: \n\n');
           fprintf(fid1, 'Unhealthy \n\n');
           fprintf('Total level of outBTEXHQI in Zone is: \n\n');
           fprintf('Unhealthy \n\n');
             sheet=2;
xlRange='J2';
A={'UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
```

```
sheet=2;
xlRange='M10';
A={ '*'};
xlswrite('data', A, sheet, xlRange);
              else if (200<outBTEXHQI)&&(outBTEXHQI<=300)</pre>
           fprintf(fid1, 'Total level of outBTEXHQI in Zone is: \n\n');
          fprintf(fid1,'Very Unhealthy \n\n\n');
           fprintf('Total level of outBTEXHQI in Zone is: \n\n');
          fprintf('Very Unhealthy \n\n');
              sheet=2;
xlRange='J2';
A={'VERY-UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
sheet=2;
xlRange='M11';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
       else
          fprintf(fid1, 'Total level of outBTEXHQI in Zone is: \n\n');
          fprintf(fid1, 'HAZARDOUS \n\n\n');
          fprintf('Total level of outBTEXHQI in Zone is: \n\n');
          fprintf('HAZARDOUS \n\n\n');
              sheet=2;
xlRange='J2';
A={'HAZARDOUS'};
xlswrite('data', A, sheet, xlRange);
sheet=2;
xlRange='M12';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
```

```
end:
       end:
   end;
end;
disp(' ');
%End of LOOP For: Total BTEXHQI Fuzzy LEVEL
% Dominant BTEXHOI Sellector
Benzene1=Benzene/50;
Toluene1=Toluene/7;
EthylBenzene1=EthylBenzene/30;
Xylene1=Xylene/100;
H2S1=H2S/1000;
BTEXHQI1=[Benzene1, Toluene1, EthylBenzene1, Xylene1, H2S1];
[c, BTEXHQIIX]=max(BTEXHQI1);
if BTEXHOIIX==1
  fprintf(fid1, 'The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
   fprintf(fid1, 'Benzene');
fprintf('The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
   fprintf('Benzene');
else if BTEXHOIIX==2
      fprintf(fid1, 'The Dominant Pollutant of BTEXHQI in Zone is: \n\n');
   fprintf(fid1, 'Toluene \n\n');
    fprintf('The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
   fprintf('Toluene \n\n');
   else if BTEXHQIIX==3
           fprintf(fid1, 'The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
   fprintf(fid1, 'EthylBenzene \n\n');
fprintf('The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
   fprintf('EthylBenzene \n\n');
              else if BTEXHQIIX==4
           fprintf(fid1, 'The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
   fprintf(fid1,'Xylene \n\n');
   fprintf('The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
```

```
fprintf('Xylene \n\n');
             else
       fprintf(fid1,'The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
  fprintf(fid1, 'H2S \n\n');
  fprintf('The Dominant Pollutant of BTEXHQI in Zone is: \n\n\n');
  fprintf('H2S \n\n');
             end:
     end;
  end:
end;
%End of Dominant BTEXHOI Sellector
fprintf('\n\n\n\n');
fprintf(fid1,'\n\n\n\n\n');
fprintf('\n\n\n\n');
FAQI=readfis('FAQI');
figure;
plotfis(FAQI);
fprintf(fid1,'Figure 5 represents the Fuzzy Air Quality Index FIS \n\n');
fprintf('Figure 5 represents the Fuzzy Air Quality Index FIS \n\n');
outFAQI=evalfis([outAQI outBTEXHQI], FAQI);
fprintf('The Calculated FAQI = \n');
disp(outFAQI);
figure;
plotmf(FAQI, 'output',1);
figure;
gensurf(FAQI);
```

```
fprintf(fid1,'The Calculated FAOI is= \n\n');
fprintf(fid1,'%8.2f \n\n',outFAQI);
fprintf(fid1, 'Figure 6 illustrates the Membership Functions in FAQI \n\n');
fprintf('The Calculated FAQI is= \n\n');
fprintf('%8.2f \n\n',outFAQI);
fprintf('Figure 6 illustrates the Membership Functions in FAQI \n\n');
%Start of LOOP For: Total FAQI Fuzzy LEVEL
disp(' ');
if (0<=outFAOI)&&(outFAOI<=50)</pre>
   fprintf(fid1, 'Total level of outFAOI in Zone is: \n\n');
   fprintf(fid1,'GOOD \n\n\n');
      fprintf('Total level of outFAQI in Zone is: \n\n');
   fprintf('GOOD \n\n\n');
      sheet=4;
xlRange='J2';
A={'GOOD'};
xlswrite('data', A, sheet, xlRange);
sheet=4;
xlRange='M7';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
else if (50<outFAQI)&&(outFAQI<=100)</pre>
      fprintf(fid1, 'Total level of outFAQI in Zone is: \n\n');
      fprintf(fid1, 'MODERATE \n\n\n');
      fprintf('Total level of outFAQI in Zone is: \n\n');
      fprintf('MODERATE \n\n\n');
          sheet=4;
xlRange='J2';
A={'MODERATE'};
xlswrite('data', A, sheet, xlRange);
sheet=4;
xlRange='M8';
```

```
A={ '*' };
xlswrite('data', A, sheet, xlRange);
   else if (100<outFAQI)&&(outFAQI<=150)</pre>
           fprintf(fid1, 'Total level of outFAQI in Zone is: \n\n');
           fprintf(fid1, 'Unhealthy For Sensetive Group \n\n');
           fprintf('Total level of outFAQI in Zone is: \n\n');
           fprintf('Unhealthy For Sensetive Group \n\n\n');
               sheet=4;
xlRange='J2';
A={'SENSETIVE-UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
sheet=4;
xlRange='M9';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
               else if (150<outFAQI)&&(outFAQI<=200)</pre>
           fprintf(fid1, 'Total level of outFAQI in Zone is: \n\n');
          fprintf(fid1, 'Unhealthy \n\n');
          fprintf('Total level of outFAQI in Zone is: \n\n');
          fprintf('Unhealthy \n\n\n');
               sheet=4;
xlRange='J2';
A={'UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
sheet=4;
xlRange='M10';
A={ '*'};
xlswrite('data', A, sheet, xlRange);
               else if (200<outFAQI)&&(outFAQI<=300)</pre>
           fprintf(fid1, 'Total level of outFAQI in Zone is: \n\n');
           fprintf(fid1,'Very Unhealthy \n\n\n');
            fprintf('Total level of outFAQI in Zone is: \n\n');
```

```
fprintf('Very Unhealthy \n\n\n');
            sheet=4;
xlRange='J2';
A={'VERY-UNHEALTHY'};
xlswrite('data', A, sheet, xlRange);
sheet=4;
xlRange='M11';
A={'*'};
xlswrite('data', A, sheet, xlRange);
      else
         fprintf(fid1, 'Total level of outFAQI in Zone is: \n\n');
         fprintf(fid1, 'HAZARDOUS \n\n\n');
         fprintf('Total level of outFAQI in Zone is: \n\n');
         fprintf('HAZARDOUS \n\n\n');
            sheet=4;
xlRange='J2';
A={'HAZARDOUS'};
xlswrite('data', A, sheet, xlRange);
sheet=4;
xlRange='M12';
A={'*'};
xlswrite('data', A, sheet, xlRange);
               end;
               end;
      end;
   end;
end;
disp(' ');
%End of LOOP For: Total FAQI Fuzzy LEVEL
fprintf(fid1, 'Figure 7 represents the Surface Viewe of FAQI \n\n');
```

```
fprintf('Figure 7 represents the Surface Viewe of FAOI \n\n');
% Dominant FAOI Sellector
outAQI1=outAQI/500;
outBTEXHQI1=outBTEXHQI/500;
FAQI1=[outAQI1, outBTEXHQI1];
[d, FAQIIX]=max(FAQI1);
if FAOIIX==1
  fprintf(fid1,'The Dominant Pollutant of FAOI in Zone is: \n\n');
  fprintf(fid1, 'AQI \n\n\n');
fprintf('The Dominant Pollutant of FAQI in Zone is: \n\n');
  fprintf('AQI \n\n\n');
else
     fprintf(fid1, 'The Dominant Pollutant of FAQI in Zone is: \n\n');
  fprintf(fid1, 'BTEXHQI \n\n\n');
  fprintf('The Dominant Pollutant of FAQI in Zone is: \n\n');
  fprintf('BTEXHQI \n\n\n');
  end:
%End of Dominant FAOI Sellector
fprintf('\n\n\n');
fprintf(fid1,'\n\n\n\n\n');
fprintf('\n\n\n\n');
FWWQI=readfis('WWQI');
figure;
plotfis(FWWQI);
fprintf(fid1, 'Figure 8 represents the Fuzzy WateWater Quality Index FIS \n\n');
fprintf('Figure 8 represents the Fuzzy WateWater Quality Index FIS \n\n');
```

```
fprintf('\n\n');
COD=xlsread('data', 'wastewater', 'B2');
BOD=xlsread('data','wastewater','C2');
TSS=xlsread('data','wastewater','D2');
pH=xlsread('data','wastewater','E2');
PM=xlsread('data','wastewater','F2');
outFWWQI=evalfis([TSS COD BOD pH], FWWQI);
fprintf(fid1, 'The Calculated Fuzzy WWQI = \n\n');
fprintf(fid1,'%8.2f \n\n',outFWWOI);
fprintf('The Calculated Fuzzy WWQI = \n\n');
fprintf('%8.2f \n\n',outFWWQI);
figure;
plotmf(FWWQI, 'output',1);
fprintf(fid1, 'Figure 9 illustrates the Membership Functions in FWWQI \n\n');
fprintf('Figure 9 illustrates the Membership Functions in FWWQI \n\n');
%Start of LOOP For: Total FWWQI Fuzzy LEVEL
disp(' ');
if (0<=outFWWQI)&&(outFWWQI<=50)</pre>
   fprintf(fid1, 'Total level of outFWWQI in Zone is: \n\n');
    fprintf(fid1,'GOOD \n\n\n');
      fprintf('Total level of outFWWQI in Zone is: \n\n');
    fprintf('GOOD \n\n\n');
       sheet=3;
xlRange='J2';
A={'GOOD'};
xlswrite('data', A, sheet, xlRange);
sheet=3;
xlRange='M7';
```

```
A={ '*' };
xlswrite('data', A, sheet, xlRange);
else if (50<outFWWQI)&&(outFWWQI<=100)</pre>
        fprintf(fid1, 'Total level of outFWWQI in Zone is: \n\n');
        fprintf(fid1,'MODERATE \n\n\n');
          fprintf('Total level of outFWWQI in Zone is: \n\n');
        fprintf('MODERATE \n\n\n');
           sheet=3;
xlRange='J2';
A={'MODERATE'};
xlswrite('data', A, sheet, xlRange);
sheet=3;
xlRange='M8';
A={ '*'};
xlswrite('data', A, sheet, xlRange);
              else if (100<outFWWQI)&&(outFWWQI<=200)</pre>
            fprintf(fid1, 'Total level of outFWWQI in Zone is: \n\n');
            fprintf(fid1,'LOW QUALITY \n\n\n');
                fprintf('Total level of outFWWQI in Zone is: \n\n');
            fprintf('LOW QUALITY \n\n\n');
              sheet=3;
xlRange='J2';
A={'LOW-QUALITY'};
xlswrite('data', A, sheet, xlRange);
sheet=3;
xlRange='M9';
A={'*'};
xlswrite('data', A, sheet, xlRange);
              else if (200<outFWWQI)&&(outFWWQI<=300)</pre>
           fprintf(fid1, 'Total level of outFWWQI in Zone is: \n\n');
            fprintf(fid1,'Very LOW QUALITY \n\n\n');
            fprintf('Total level of outFWWQI in Zone is: \n\n');
```

```
fprintf('Very LOW QUALITY \n\n\n');
            sheet=3;
xlRange='J2';
A={'VERY-LOW-QUALITY'};
xlswrite('data', A, sheet, xlRange);
sheet=3;
xlRange='M11';
A={'*'};
xlswrite('data', A, sheet, xlRange);
      else
         fprintf(fid1, 'Total level of outFWWQI in Zone is: \n\n');
         fprintf(fid1, 'HAZARDOUS QUALIY \n\n\n');
         fprintf('Total level of outFWWQI in Zone is: \n\n');
         fprintf('HAZARDOUS QUALIY \n\n\n');
            sheet=3;
xlRange='J2';
A={'HAZARDOUS'};
xlswrite('data', A, sheet, xlRange);
sheet=3;
xlRange='M12';
A={'*'};
xlswrite('data', A, sheet, xlRange);
               end;
               end:
   end:
end;
disp(' ');
%End of LOOP For: Total FWWQI Fuzzy LEVEL
%Dominant FWWQI Pollutant Sellector
COD1=COD/300;
```

```
BOD1=BOD/150;
TSS1=TSS/200;
if pH>=7
    pH1=(pH-7)/7;
else pH1=(7-pH)/7;
end;
FWWQI1=[COD1, BOD1, TSS1, pH1];
[e, FWWQIIX]=max(FWWQI1);
if FWWOIIX==1
   fprintf(fid1, 'The Dominant Pollutant of FWWQI in Zone is: \n\n');
    fprintf(fid1, 'COD \n\n\n');
   fprintf('The Dominant Pollutant of FWWQI in Zone is: \n\n');
    fprintf('COD \n\n\n');
else if FWWOIIX==2
        fprintf(fid1, 'The Dominant Pollutant of FWWQI in Zone is: \n\n');
   fprintf(fid1, 'BOD \n\n\n');
     fprintf('The Dominant Pollutant of FWWQI in Zone is: \n\n');
   fprintf('BOD \n\n\n');
    else if FWWQIIX==3
            fprintf(fid1, 'The Dominant Pollutant of FWWQI in Zone is: \n\n');
    fprintf(fid1,'TSS \n\n\n');
    fprintf('The Dominant Pollutant of FWWQI in Zone is: \n\n');
    fprintf('TSS \n\n\n');
                    else
            fprintf(fid1, 'The Dominant Pollutant of FWWQI in Zone is: \n\n');
    fprintf(fid1,'pH \n\n\n');
    fprintf('The Dominant Pollutant of FWWQI in Zone is: \n\n');
    fprintf('pH \n\n\n');
        end;
    end;
end;
%End of Dominant FWWQI Sellector
```

```
fprintf('\n');
fprintf('\n');
fprintf('\n');
fprintf('\n');
fprintf(' ENVIRONMENTAL RISK = This Part Computes FUZZY ENVIRONMENTAL RISK ASSESSMENT ');
fprintf('\n');
fprintf('\n');
fprintf('\n');
fprintf('\n');
%'------'
fprintf(fid1,'\n\n\n\n');
fprintf('\n');
fprintf('\n');
fprintf('\n');
fprintf('\n');
FERI=readfis('FERI');
figure;
plotfis(FERI);
fprintf(fid1, 'Figure 10 represents the Fuzzy Environmental Risk Index FIS \n\n');
fprintf('Figure 10 represents the Fuzzy Environmental Risk Index FIS \n\n');
fprintf(' FERI= Data for Qualities: FAQI and FWWQI are processed via Fuzzy Environmental Risk Index ');
fprintf('\n');
fprintf('\n');
outFERI=evalfis([outFAQI outFWWQI], FERI);
fprintf(fid1, 'The Calculated FERI = \n');
fprintf(fid1,'%8.2f \n\n',outFERI);
figure;
plotmf(FERI, 'output',1);
```

```
fprintf(fid1,'Figure 11 illustrates the Membership Functions in FERI \n\n');
fprintf('Figure 11 illustrates the Membership Functions in FERI \n\n');
figure;
gensurf(FERI);
%Start of LOOP For: Total outFERI Fuzzy LEVEL
disp(' ');
if (0<=outFERI)&&(outFERI<=50)</pre>
   fprintf(fid1, 'Total level of outFERI in Zone is: \n\n');
   fprintf(fid1,'LOW RISK \n\n\n');
    fprintf('Total level of outFERI in Zone is: \n\n');
   fprintf('LOW RISK \n\n\n');
      sheet=5;
xlRange='J2';
A={'LOW-RISK'};
xlswrite('data', A, sheet, xlRange);
sheet=5;
xlRange='M7';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
else if (50<outFERI)&&(outFERI<=100)</pre>
      fprintf(fid1, 'Total level of outFERI in Zone is: \n\n');
      fprintf(fid1, 'MODERATE RISK \n\n\n');
       fprintf('Total level of outFERI in Zone is: \n\n');
      fprintf('MODERATE RISK \n\n\n');
          sheet=5;
xlRange='J2';
A={'MODERATE-RISK'};
xlswrite('data', A, sheet, xlRange);
sheet=5;
xlRange='M8';
A={'*'};
```

```
xlswrite('data', A, sheet, xlRange);
             else if (100<outFERI)&&(outFERI<=200)</pre>
          fprintf(fid1, 'Total level of outFERI in Zone is: \n\n');
          fprintf(fid1, 'RELATIVELY HIGH RISK \n\n\n');
           fprintf('Total level of outFERI in Zone is: \n\n');
          fprintf('RELATIVELY HIGH RISK \n\n\n');
              sheet=5:
xlRange='J2';
A={'RELEATIVELY-HIGH-RISK'};
xlswrite('data', A, sheet, xlRange);
sheet=5;
xlRange='M9';
A={ '*'};
xlswrite('data', A, sheet, xlRange);
             else if (200<outFERI)&&(outFERI<=300)</pre>
          fprintf(fid1, 'Total level of outFERI in Zone is: \n\n');
          fprintf(fid1,'HIGH RISK \n\n\n');
           fprintf('Total level of outFERI in Zone is: \n\n');
          fprintf('HIGH RISK \n\n\n');
              sheet=5;
xlRange='J2';
A={'HIGH-RISK'};
xlswrite('data', A, sheet, xlRange);
sheet=5;
xlRange='M11';
A={ '*'};
xlswrite('data', A, sheet, xlRange);
       else
          fprintf(fid1, 'Total level of outFERI in Zone is: \n\n');
          fprintf(fid1,'VERY HIGH RISK \n\n\n');
          fprintf('Total level of outFERI in Zone is: \n\n');
          fprintf('VERY HIGH RISK \n\n\n');
```

```
sheet=5;
xlRange='J2';
A={'VERY-HIGH-RISK'};
xlswrite('data', A, sheet, xlRange);
sheet=5;
xlRange='M12';
A={ '*' };
xlswrite('data', A, sheet, xlRange);
                  end;
                  end:
   end:
end:
disp(' ');
%End of LOOP For: Total outFERI Fuzzy LEVEL
fprintf(fid1, 'Figure 12 represents the Surface viewe of Fuzzy Environmental Risk Index \n\n');
fprintf('Figure 12 represents the Surface viewe of Fuzzy Environmental Risk Index \n\n');
% Dominant FERI Sellector
outFAQI1=outFAQI/500;
outFWWQI1=outFWWQI/500;
FERI1=[outFAQI1, outFWWQI1];
[f, FERIIX]=max(FERI1);
if FERIIX==1
   fprintf(fid1, 'The Dominant Pollutant of FERI in Zone is: \n\n');
  fprintf(fid1,'FAQI \n\n\n');
  fprintf('The Dominant Pollutant of FERI in Zone is: \n\n');
  fprintf('FAQI \n\n\n');
else
       fprintf(fid1, 'The Dominant Pollutant of FERI in Zone is: \n\n');
  fprintf(fid1, 'FWWQI \n\n\n');
```

```
fprintf('The Dominant Pollutant of FERI in Zone is: \n\n');
  fprintf('FWWQI \n\n\n');
   end;
%End of Dominant FERI Sellector
sheet=1;
xlRange='I2';
xlswrite('data', outAQI, sheet, xlRange);
sheet=2;
xlRange='I2';
xlswrite('data',outBTEXHQI , sheet, xlRange);
sheet=3;
xlRange='I2';
xlswrite('data', outFWWQI, sheet, xlRange);
sheet=4;
xlRange='I2';
xlswrite('data', outFAQI, sheet, xlRange);
sheet=5;
xlRange='I2';
xlswrite('data', outFERI, sheet, xlRange);
This Program Performs: "FUZZY ENVIRONMENTAL RISK ASSESSMENT FERA"
 USER GUIDE:
             This prgram comprises 3 parts:
1)Input Data, 2) Fuzzy Assessment, 3)Output Presentation.
 The FERA processes 2 Fields: Air and Wastewater
 The Field: Air Processes Concentrations of Pollutants:
 CO, NO2, SO2, PM2.5, O3, H2S, Benzene, Toluene, Xylene and Ethyl Benzene.
 The Field: Watewater Processes Concentrations of Pollutants: COD, BOD, TSS and pH
```

```
141.7004
Unhealthy For Sensetive Group
0.0142
              0.0217
                     0.0480
                           0.4382
        0.0180
The Dominant Pollutant of Criteria AQI in Zone is:
S02
266.2003
The Calculated Fuzzy BTEXHQI is =
 266.20
Figure 4 illustrates the Membership Functions in BTEXHQI
Total level of outBTEXHQI in Zone is:
Very Unhealthy
The Dominant Pollutant of BTEXHQI in Zone is:
Toluene
```

The Calculated Fuzzy Criteria AQI =

++++++++++++++++++++++++++++++++++++++
Figure 5 represents the Fuzzy Air Quality Index FIS
The Calculated FAQI = 200.4942
The Calculated FAQI is=
200.49
Figure 6 illustrates the Membership Functions in FAQI
Total level of outFAQI in Zone is:
Very Unhealthy
NOTES:++++++++++++++++++++++++++++++++++++
Figure 7 represents the Surface Viewe of FAQI
The Dominant Pollutant of FAQI in Zone is:
BTEXHQI
++++++++++++++++++++++++++++++++++++++
Figure 8 represents the Fuzzy WateWater Quality Index FIS

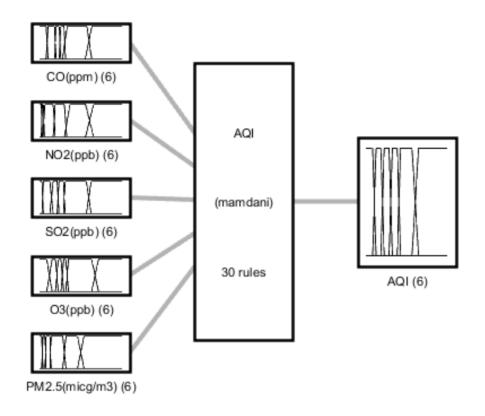
Figure 8 represents the Fuzzy Watewater Quality Index FIS

```
The Calculated Fuzzy WWQI =
  48.85
Figure 9 illustrates the Membership Functions in FWWQI
Total level of outFWWQI in Zone is:
GOOD
The Dominant Pollutant of FWWQI in Zone is:
BOD
ENVIRONMENTAL RISK = This Part Computes FUZZY ENVIRONMENTAL RISK ASSESSMENT
Figure 10 represents the Fuzzy Environmental Risk Index FIS
FERI= Data for Qualities: FAQI and FWWQI are processed via Fuzzy Environmental Risk Index
Figure 11 illustrates the Membership Functions in FERI
Total level of outFERI in Zone is:
RELATIVELY HIGH RISK
```

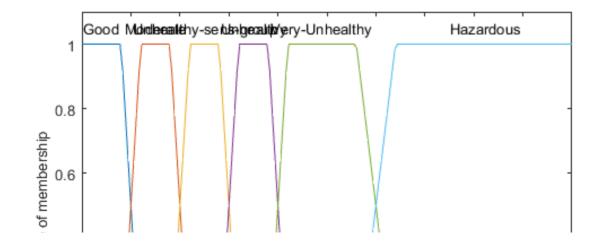
Figure 12 represents the Surface viewe of Fuzzy Environmental Risk Index

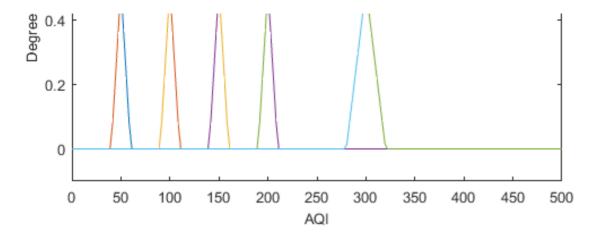
The Dominant Pollutant of FERI in Zone is:

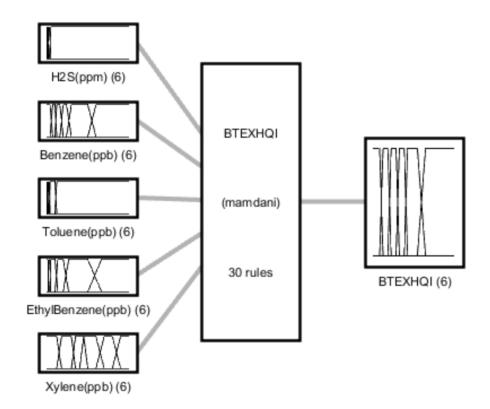
FAQI



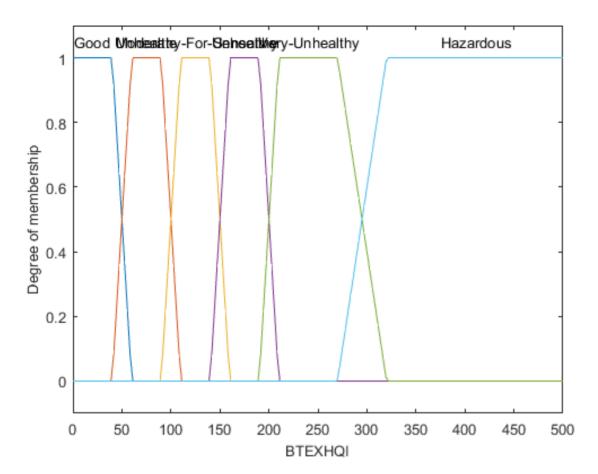
System AQI: 5 inputs, 1 outputs, 30 rules

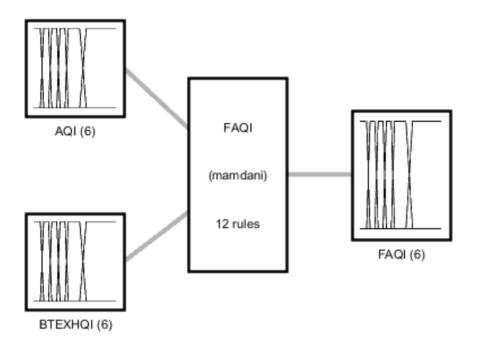




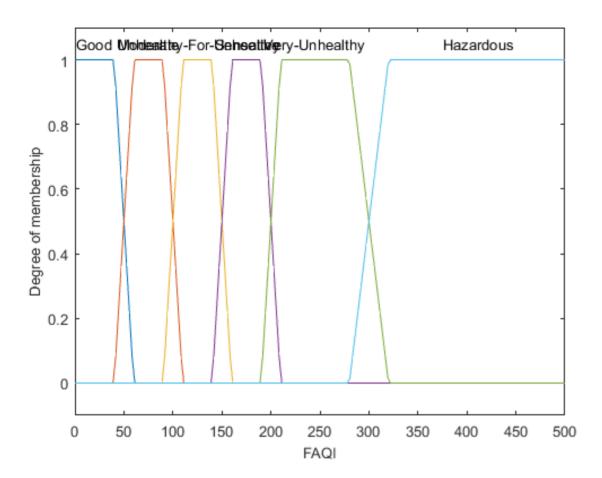


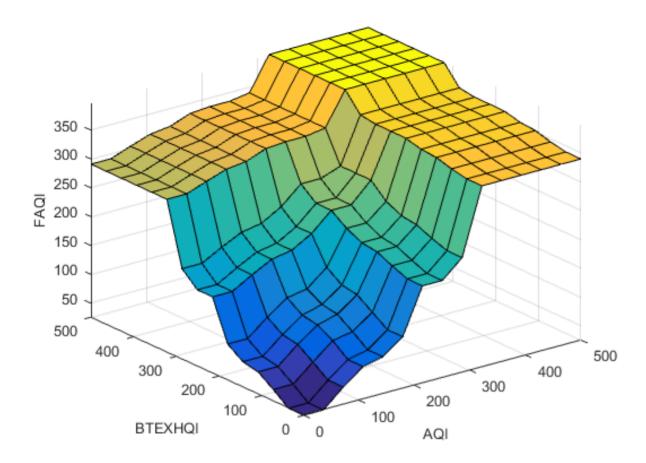
System BTEXHQI: 5 inputs, 1 outputs, 30 rules

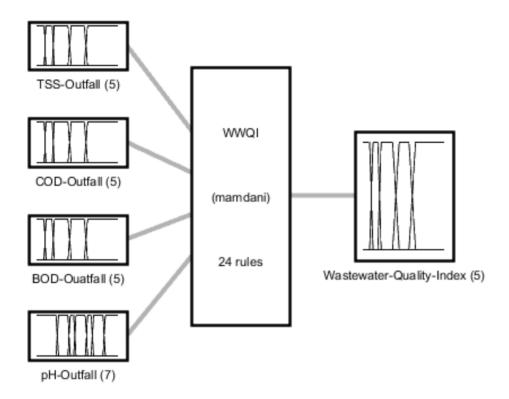




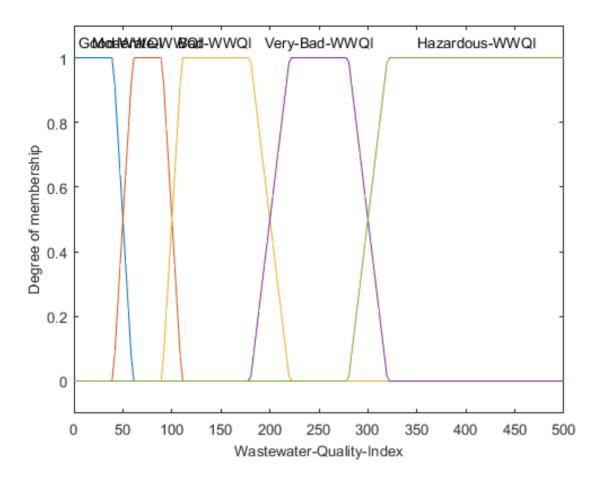
System FAQI: 2 inputs, 1 outputs, 12 rules

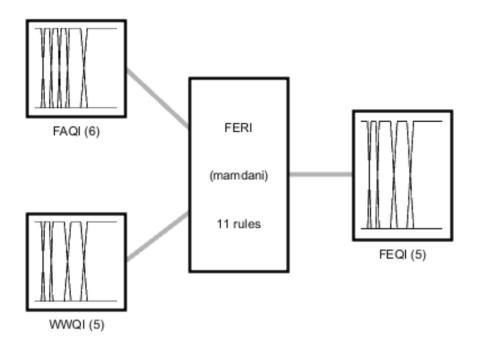




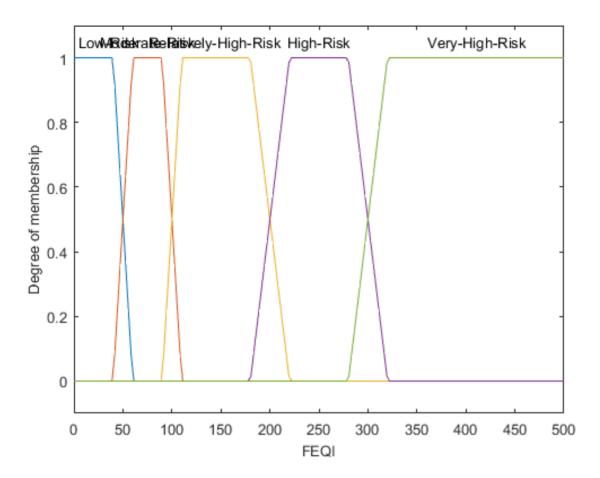


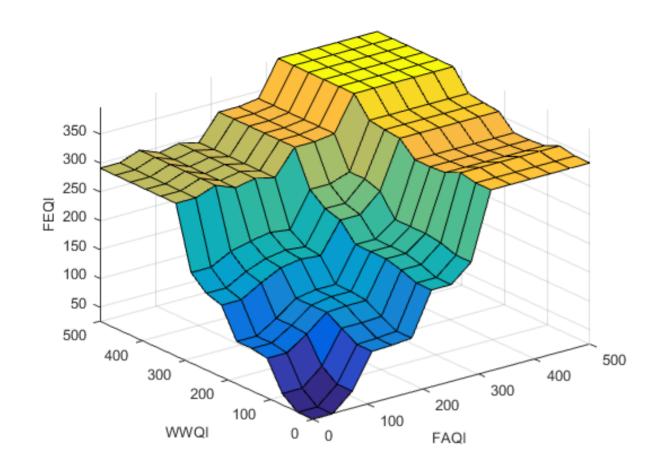
System WWQI: 4 inputs, 1 outputs, 24 rules





System FERI: 2 inputs, 1 outputs, 11 rules





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