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function varargout = pv_loss_module_v1(varargin)
% Code Compiled by Roshan R Rao

% PV_LOSS_MODULE_V1 MATLAB code for pv_loss_module_v1.fig
% PV_LOSS_MODULE_V1, by itself, creates a new PV_LOSS_MODULE_V1 or raises the existing
% singleton*.
%
% H = PV_LOSS_MODULE_V1 returns the handle to a new PV_LOSS_MODULE_V1 or the handle to
% the existing singleton*.
%
% PV_LOSS_MODULE_V1('CALLBACK',hObject,eventData,handles,...) calls the local
% function named CALLBACK in PV_LOSS_MODULE_V1.M with the given input arguments.
%
% PV_LOSS_MODULE_V1('Property','Value',...) creates a new PV_LOSS_MODULE_V1 or raises the
% existing singleton*. Starting from the left, property value pairs are
% applied to the GUI before pv_loss_module_v1_OpeningFcn gets called. An
% unrecognized property name or invalid value makes property application
% stop. All inputs are passed to pv_loss_module_v1_OpeningFcn via varargin.
%
% *See GUI Options on GUIDE's Tools menu. Choose "GUI allows only one
% instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help pv_loss_module_v1

% Last Modified by GUIDE v2.5 29-Apr-2020 13:59:29

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                  'gui_Singleton',   gui_Singleton, ...
                  'gui_OpeningFcn', @pv_loss_module_v1_OpeningFcn, ...
                  'gui_OutputFcn',  @pv_loss_module_v1_OutputFcn, ...
                  'gui_LayoutFcn',  [] , ...
                  'gui_Callback',    []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT

% --- Executes just before pv_loss_module_v1 is made visible.
function pv_loss_module_v1_OpeningFcn(hObject, eventdata, handles, varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to pv_loss_module_v1 (see VARARGIN)

% Choose default command line output for pv_loss_module_v1
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes pv_loss_module_v1 wait for user response (see UIRESUME)
% uiwait(handles.figure1);

% --- Outputs from this function are returned to the command line.
function varargout = pv_loss_module_v1_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;

% --- Executes on selection change in selectstates.
function selectstates_Callback(hObject, eventdata, handles)
global stno
global panelnos

contents=cellstr(get(hObject,'String'));
pop_choice=contents(get(hObject,'Value'));

if(strcmp(pop_choice,'Andhra Pradesh'))
    stno=1
    panelnos=0
elseif(strcmp(pop_choice,'Arunachal Pradesh'))
    stno=2
    panelnos=0

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elseif(strcmp(pop_choice, 'Assam'))
    stno=3
    panelnos=0
elseif(strcmp(pop_choice, 'Bihar'))
    stno=4
    panelnos=0
elseif(strcmp(pop_choice, 'Chattisgarh'))
    stno=5
    panelnos=0
elseif(strcmp(pop_choice, 'Goa'))
    stno=6
    panelnos=0
elseif(strcmp(pop_choice, 'Gujarat'))
    stno=7
    panelnos=0
elseif(strcmp(pop_choice, 'Haryana'))
    stno=8
    panelnos=0
elseif(strcmp(pop_choice, 'Himachal Pradesh'))
    stno=9
    panelnos=0
elseif(strcmp(pop_choice, 'Jammu & Kashmir'))
    stno=10
    panelnos=0
elseif(strcmp(pop_choice, 'Jharkhand'))
    stno=11
    panelnos=0
elseif(strcmp(pop_choice, 'Karnataka'))
    stno=12
    panelnos=0
elseif(strcmp(pop_choice, 'Kerala'))
    stno=13
    panelnos=0
elseif(strcmp(pop_choice, 'Madhya Pradesh'))
    stno=14
    panelnos=0
elseif(strcmp(pop_choice, 'Maharashtra'))
    stno=15
    panelnos=0
elseif(strcmp(pop_choice, 'Manipur'))
    stno=16
    panelnos=0
elseif(strcmp(pop_choice, 'Meghalaya'))
    stno=17
    panelnos=0
elseif(strcmp(pop_choice, 'Mizoram'))
    stno=18
    panelnos=0
elseif(strcmp(pop_choice, 'Nagaland'))
    stno=19
    panelnos=0
elseif(strcmp(pop_choice, 'Odisha'))
    stno=20
    panelnos=0
elseif(strcmp(pop_choice, 'Punjab'))
    stno=21
    panelnos=0
elseif(strcmp(pop_choice, 'Rajasthan'))
    stno=22
    panelnos=0
elseif(strcmp(pop_choice, 'Sikkim'))
    stno=23
    panelnos=0
elseif(strcmp(pop_choice, 'Tamil Nadu'))
    stno=24
    panelnos=0
elseif(strcmp(pop_choice, 'Telangana'))
    stno=25
    panelnos=0
elseif(strcmp(pop_choice, 'Tripura'))
    stno=26
    panelnos=0
elseif(strcmp(pop_choice, 'Uttar Pradesh'))
    stno=27
    panelnos=0
elseif(strcmp(pop_choice, 'Uttarakhand'))
    stno=28
    panelnos=0
elseif(strcmp(pop_choice, 'West Bengal'))
    stno=29
    panelnos=0
elseif(strcmp(pop_choice, 'Andaman & Nicobar'))
    stno=30
    panelnos=0
elseif(strcmp(pop_choice, 'Chandigarh'))
    stno=31
    panelnos=0
elseif(strcmp(pop_choice, 'Dadar & Nagar Haveli'))
    stno=32
    panelnos=0
elseif(strcmp(pop_choice, 'Daman & Diu'))
    stno=33
    panelnos=0
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elseif(strcmp(pop_choice,'Delhi'))
    stno=34
    panelnos=0
elseif(strcmp(pop_choice,'Lakshadweep'))
    stno=35
    panelnos=0
elseif(strcmp(pop_choice,'Pondicherry'))
    stno=36
    panelnos=0
elseif(strcmp(pop_choice,'India'))
    stno=38
    panelnos=0
elseif(strcmp(pop_choice,'Select State/UT'))
end

% --- Executes during object creation, after setting all properties.
function selectstates_CreateFcn(hObject, eventdata, handles)
% hObject    handle to selectstates (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: popmenu controls usually have a white background on Windows.
% See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'), get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in cum_cap.
function cum_cap_Callback(hObject, eventdata, handles)
% hObject    handle to cum_cap (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global stno
global cum_inst
global txt

if stno==0
    pause(1)
    set(handles.startstat,'string','Select a State/UT !');
end

yrs=2007:2020;          %%% changed while writing Prospective paper

axes(handles.plotplace);
if max(cum_inst(stno,:))>999

set(gca,'FontSize',14)
bar(yrs,cum_inst(stno,:)/1000);
title(txt{stno});
xlabel('As of March month');
ylabel('Cumulative capacity (GW)');
pause(1)
set(handles.startstat,'string','Done');

elseif max(cum_inst(stno,:))<999
    set(gca,'FontSize',14)
bar(yrs,cum_inst(stno,:));
title(txt{stno});
xlabel('As of March month');
ylabel('Cumulative capacity (MW)');
pause(1)
set(handles.startstat,'string','Done');

end

% --- Executes on button press in pvmass.
function pvmass_Callback(hObject, eventdata, handles)
% hObject    handle to pvmass (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global stno
global cum_inst
global txt
global panelnos
global yrr
global agemat

if stno==0
    pause(1)
    set(handles.startstat,'string','Select a State/UT !');
end

pm_cc=str2double(get(handles.pm_cc,'string'));
p_we=str2double(get(handles.edit2,'string'));

fact=(pm_cc.*1000)./p_we; % one tonne is 1000 kg and each panel avg weight is divided to get num of panels
panelnos=cum_inst(stno,:).*fact % number of panels of a location in sries oftime

yrs=2007:2020;          %%% changed while writing Prospective paper

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axes(handles.plotplace);
    if max(cum_inst(stno,:).*fact)<999
set(gca,'FontSize',14)
bar(yrs,cum_inst(stno,:).*fact);
title(txt{stno});
xlabel('As of March month');
ylabel('Cumulative No. of PV panels installed');
pause(1)
set(handles.startstat,'string','Done');

    elseif max(cum_inst(stno,:).*fact)>=1000 && max(cum_inst(stno,:).*fact)<1000000
set(gca,'FontSize',14)
bar(yrs,cum_inst(stno,:).*fact./1000);
title(txt{stno});
xlabel('As of March month');
ylabel('Cumulative No. of PV panels (x 1000) installed');
pause(1)
set(handles.startstat,'string','Done');

    elseif max(cum_inst(stno,:).*fact)>=1000000
set(gca,'FontSize',14)
bar(yrs,cum_inst(stno,:).*fact./1000000);
title(txt{stno});
xlabel('As of March month');
ylabel('Cumulative No. of PV panels (millions) installed');
pause(1)
set(handles.startstat,'string','Done');
    end

if panelnos==0
pause(1)
set(handles.startstat,'string','calculate pv mass !');
return
end

if stno==0
pause(1)
set(handles.startstat,'string','Select a State/UT !');
return
end

npa=(panelnos)';

yrs=2007:2020;          %%% changed while writing Prospective paper

[m p]=size(npa);
[k r]=size(yrs);
agemat=zeros(m,r);

for hg=1:m
if hg==1;
npad(hg,1)=npa(hg,1)-0;
end

if hg>1
npad(hg,1)=npa(hg,1)-npa(hg-1,1);
end

end

for kh=1:14

    for nzx=kh:m;
    agemat(nzx-kh+1,nzx)=npad(kh,1);
    end

end

agemat(agemat<0)=0;

function pm_cc_Callback(hObject, eventdata, handles)
% hObject    handle to pm_cc (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of pm_cc as text
%        str2double(get(hObject,'String')) returns contents of pm_cc as a double

% --- Executes during object creation, after setting all properties.
function pm_cc_CreateFcn(hObject, eventdata, handles)
% hObject    handle to pm_cc (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%        See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'), get(0,'defaultUicontrolBackgroundColor'))
set(hObject,'BackgroundColor','white');
end

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end

% --- Executes on selection change in year.
function year_Callback(hObject, eventdata, handles)
global yrr

contents=cellstr(get(hObject, 'String'));
pop_choice=contents(get(hObject, 'Value'));

if(strcmp(pop_choice, '2007'))
    yrr=1
elseif(strcmp(pop_choice, '2008'))
    yrr=2
elseif(strcmp(pop_choice, '2009'))
    yrr=3
elseif(strcmp(pop_choice, '2010'))
    yrr=4
elseif(strcmp(pop_choice, '2011'))
    yrr=5
elseif(strcmp(pop_choice, '2012'))
    yrr=6
elseif(strcmp(pop_choice, '2013'))
    yrr=7
elseif(strcmp(pop_choice, '2014'))
    yrr=8
elseif(strcmp(pop_choice, '2015'))
    yrr=9
elseif(strcmp(pop_choice, '2016'))
    yrr=10
elseif(strcmp(pop_choice, '2017'))
    yrr=11
elseif(strcmp(pop_choice, '2018'))
    yrr=12
elseif(strcmp(pop_choice, '2019'))
    yrr=13
elseif(strcmp(pop_choice, '2020'))
    yrr=14
elseif(strcmp(pop_choice, '2021')) yrr=15
elseif(strcmp(pop_choice, '2022')) yrr=16
elseif(strcmp(pop_choice, '2023')) yrr=17
elseif(strcmp(pop_choice, '2024')) yrr=18
elseif(strcmp(pop_choice, '2025')) yrr=19
elseif(strcmp(pop_choice, '2026')) yrr=20
elseif(strcmp(pop_choice, '2027')) yrr=21
elseif(strcmp(pop_choice, '2028')) yrr=22
elseif(strcmp(pop_choice, '2029')) yrr=23
elseif(strcmp(pop_choice, '2030')) yrr=24
elseif(strcmp(pop_choice, '2031')) yrr=25
elseif(strcmp(pop_choice, '2032')) yrr=26
elseif(strcmp(pop_choice, '2033')) yrr=27
elseif(strcmp(pop_choice, '2034')) yrr=28
elseif(strcmp(pop_choice, '2035')) yrr=29
elseif(strcmp(pop_choice, '2036')) yrr=30
elseif(strcmp(pop_choice, '2037')) yrr=31
elseif(strcmp(pop_choice, '2038')) yrr=32
elseif(strcmp(pop_choice, '2039')) yrr=33
elseif(strcmp(pop_choice, '2040')) yrr=34
elseif(strcmp(pop_choice, '2041')) yrr=35
elseif(strcmp(pop_choice, '2042')) yrr=36
elseif(strcmp(pop_choice, '2043')) yrr=37
elseif(strcmp(pop_choice, '2044')) yrr=38
elseif(strcmp(pop_choice, '2045')) yrr=39
elseif(strcmp(pop_choice, '2046')) yrr=40
elseif(strcmp(pop_choice, '2047')) yrr=41
elseif(strcmp(pop_choice, '2048')) yrr=42
elseif(strcmp(pop_choice, '2049')) yrr=43
elseif(strcmp(pop_choice, '2050')) yrr=44
elseif(strcmp(pop_choice, '2051')) yrr=45
elseif(strcmp(pop_choice, '2052')) yrr=46
elseif(strcmp(pop_choice, '2053')) yrr=47
elseif(strcmp(pop_choice, '2054')) yrr=48
elseif(strcmp(pop_choice, '2055')) yrr=49
elseif(strcmp(pop_choice, '2056')) yrr=50
elseif(strcmp(pop_choice, '2057')) yrr=51
elseif(strcmp(pop_choice, '2058')) yrr=52
elseif(strcmp(pop_choice, '2059')) yrr=53
elseif(strcmp(pop_choice, '2060')) yrr=54
elseif(strcmp(pop_choice, '2061')) yrr=55
elseif(strcmp(pop_choice, '2062')) yrr=56
elseif(strcmp(pop_choice, '2063')) yrr=57
elseif(strcmp(pop_choice, '2064')) yrr=58
elseif(strcmp(pop_choice, '2065')) yrr=59
elseif(strcmp(pop_choice, '2066')) yrr=60
elseif(strcmp(pop_choice, '2067')) yrr=61
elseif(strcmp(pop_choice, '2068')) yrr=62
elseif(strcmp(pop_choice, '2069')) yrr=63
elseif(strcmp(pop_choice, '2070')) yrr=64
elseif(strcmp(pop_choice, '2071')) yrr=65
elseif(strcmp(pop_choice, '2072')) yrr=66
elseif(strcmp(pop_choice, '2073')) yrr=67
elseif(strcmp(pop_choice, '2074')) yrr=68
elseif(strcmp(pop_choice, '2075')) yrr=69

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elseif(strcmp(pop_choice,'2076')) yrr=70
elseif(strcmp(pop_choice,'2077')) yrr=71
elseif(strcmp(pop_choice,'2078')) yrr=72
elseif(strcmp(pop_choice,'2079')) yrr=73
elseif(strcmp(pop_choice,'2080')) yrr=74
elseif(strcmp(pop_choice,'2081')) yrr=75
elseif(strcmp(pop_choice,'2082')) yrr=76
elseif(strcmp(pop_choice,'2083')) yrr=77
elseif(strcmp(pop_choice,'2084')) yrr=78
elseif(strcmp(pop_choice,'2085')) yrr=79
elseif(strcmp(pop_choice,'2086')) yrr=80
elseif(strcmp(pop_choice,'2087')) yrr=81
elseif(strcmp(pop_choice,'2088')) yrr=82
elseif(strcmp(pop_choice,'2089')) yrr=83
elseif(strcmp(pop_choice,'2090')) yrr=84
elseif(strcmp(pop_choice,'2091')) yrr=85
elseif(strcmp(pop_choice,'2092')) yrr=86
elseif(strcmp(pop_choice,'2093')) yrr=87
elseif(strcmp(pop_choice,'2094')) yrr=88
elseif(strcmp(pop_choice,'2095')) yrr=89
elseif(strcmp(pop_choice,'2096')) yrr=90
elseif(strcmp(pop_choice,'2097')) yrr=91
elseif(strcmp(pop_choice,'2098')) yrr=92
elseif(strcmp(pop_choice,'2099')) yrr=93
elseif(strcmp(pop_choice,'2100')) yrr=94

elseif(strcmp(pop_choice,'select year'))
yrr=0
end

% --- Executes during object creation, after setting all properties.
function year_CreateFcn(hObject, eventdata, handles)
% hObject handle to year (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles empty - handles not created until after all CreateFcns called

% Hint: popmenu controls usually have a white background on Windows.
% See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'), get(0,'defaultUicontrolBackgroundColor'))
set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in pvagehist.
function pvagehist_Callback(hObject, eventdata, handles)
% hObject handle to pvagehist (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)

% --- Executes on button press in pa_hist_tren.
function pa_hist_tren_Callback(hObject, eventdata, handles)
% hObject handle to pa_hist_tren (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)

% --- Executes on button press in pushbutton6.
function pushbutton6_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton6 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)

% START LOAD DATA >>>>>>>

clc
set(handles.startstat,'string','Loading..');
pause(1)
global cum_inst
global txt
global yrr
global agemat
global kval
global proj_cap
global proj_cap_no
global stno

stno=0;
proj_cap=0;
proj_cap_no=0;
kval=9999;
yrr=0;
agemat=0;
[-, txt]=xlsread('COLLATED_work_v2.xlsx','Sheet1','B3:B40'); %%% changed while writing Prospective paper

cum_inst=xlsread('COLLATED_work_v2.xlsx','only_numbers'); %%% changed while writing Prospective paper
cum_inst(isnan(cum_inst))=0;
pause(2)
set(handles.startstat,'string','Done..Proceed');

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function edit2_Callback(hObject, eventdata, handles)
% hObject    handle to edit2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit2 as text
%         str2double(get(hObject,'String')) returns contents of edit2 as a double

% --- Executes during object creation, after setting all properties.
function edit2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%         See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'), get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

function startstat_Callback(hObject, eventdata, handles)
% hObject    handle to startstat (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of startstat as text
%         str2double(get(hObject,'String')) returns contents of startstat as a double

% --- Executes during object creation, after setting all properties.
function startstat_CreateFcn(hObject, eventdata, handles)
% hObject    handle to startstat (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%         See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'), get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in prob_wast.
function prob_wast_Callback(hObject, eventdata, handles)
% hObject    handle to prob_wast (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global agemat
global txt
global stno
global yrr
global kval

if agemat==0
    pause(1)
    set(handles.startstat,'string','calculate number of pv panels again!');
    return
end

if kval==9999
    pause(1)
    set(handles.startstat,'string','select k-value!');
    return
end

t=1:length(agemat);

T=30;
eft=(1-exp(-((t/T).^kval)))';
prob_loss=agemat.*(repmat(eft,1,length(agemat)));
yrss=2007:2020;      %%% changed while writing Prospective paper

axes(handles.plotplace);
bar(yrss,sum(prob_loss))
xlabel('As of March month')
ylabel('Probable Number of waste panels (Cumulative)')
title([txt{stno}]);
pause(1)
set(handles.startstat,'string','Done');
agemat=0;

% --- Executes on selection change in kval.
function kval_Callback(hObject, eventdata, handles)
global kval

contents=cellstr(get(hObject,'String'));
pop_choice=contents(get(hObject,'Value'));

if(strcmp(pop_choice,'9.982 (Kumar & Sarkan, 2013)')
    kval=9.982

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elseif(strcmp(pop_choice,'14.41 (Kumar & Sarkan, 2013)'))
    kval=14.41
elseif(strcmp(pop_choice,'3.3 (Kuitsche, 2010)'))
    kval=3.3
elseif(strcmp(pop_choice,'8.7484 (Kuitsche, 2010)'))
    kval=8.7484
elseif(strcmp(pop_choice,'8.2 (Marwede, 2013)'))
    kval=8.2
elseif(strcmp(pop_choice,'12.8 (Marwede, 2013)'))
    kval=12.8
elseif(strcmp(pop_choice,'2.4928 (early-loss, IRENA IEAPVPS, 2016)'))
    kval=2.4928
elseif(strcmp(pop_choice,'5.3759 (Kuitsche, 2010)'))
    kval=5.3759
elseif(strcmp(pop_choice,'2.6 (Laronde et al, 2010)'))
    kval=2.6
elseif(strcmp(pop_choice,'5.03 (Laronde et al, 2010)'))
    kval=5.03
elseif(strcmp(pop_choice,'7.56 (Laronde et al, 2010)'))
    kval=7.56

end

% --- Executes during object creation, after setting all properties.
function kvalue_CreateFcn(hObject, eventdata, handles)
% hObject    handle to kvalue (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: popupmenu controls usually have a white background on Windows.
%         See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'), get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

function cap_grow_Callback(hObject, eventdata, handles)
% hObject    handle to cap_grow (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of cap_grow as text
%         str2double(get(hObject,'String')) returns contents of cap_grow as a double

% --- Executes during object creation, after setting all properties.
function cap_grow_CreateFcn(hObject, eventdata, handles)
% hObject    handle to cap_grow (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%         See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'), get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

function proj_yr_Callback(hObject, eventdata, handles)
% hObject    handle to proj_yr (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of proj_yr as text
%         str2double(get(hObject,'String')) returns contents of proj_yr as a double

% --- Executes during object creation, after setting all properties.
function proj_yr_CreateFcn(hObject, eventdata, handles)
% hObject    handle to proj_yr (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%         See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'), get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in projectn.
function projectn_Callback(hObject, eventdata, handles)
% hObject    handle to projectn (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB

```



```

% handles    structure with handles and user data (see GUIDATA)
global stno
global cum_inst
global txt
global panelnos
global kval
global yrr
global proj_cap
global proj_cap_no
global prob_loss
global yrssprj
global agematp

proj_yar=str2double(get(handles.proj_yr,'string'));
cap_gro=str2double(get(handles.cap_grow,'string'));

yro=proj_yar-2020;

proj_ca=cum_inst(stno,end);

proj_cum_inst=0; % so as to reset it incase of running from a higher year projection to lower year projection and matrix size isnt a problem

for py=1:(proj_yar-2020)

    proj_ca=proj_ca+(cap_gro./100).*proj_ca;

    proj_cap(py,1)=proj_ca;
end

proj_cum_inst=[cum_inst(stno,:);proj_cap];
years=2007:proj_yar;

% projection of cumulative capacity installed (ABOVE lines).....
proj_cum_inst_no=0; % so as to reset it incase of running from a higher year projection to lower year projection and matrix size isnt a problem

proj_ca_no=panelnos(end);
for py=1:(proj_yar-2020)

    proj_ca_no=proj_ca_no+(cap_gro./100).*proj_ca_no;

    proj_cap_no(py,1)=proj_ca_no ;
end

proj_cum_inst_no=[panelnos';proj_cap_no]
years=2007:proj_yar;

% projection of cumulative panels installed (ABOVE lines).....

if panelnos==0
pause(1)
set(handles.startstat,'string','calculate pv mass !');
return
end

if stno==0
pause(1)
set(handles.startstat,'string','Select a State/UT !');
return
end

npa=proj_cum_inst_no;

yrs=2007:proj_yar;

[m p]=size(npa);
[k r]=size(yrs);
agematp=zeros(m,r);

for hg=1:m
if hg==1;
npad(hg,1)=npa(hg,1)-0;
end

if hg>1
npad(hg,1)=npa(hg,1)-npa(hg-1,1);
end

end

for kh=1:(proj_yar-2006)

    for nzx=kh:m;
    agematp(nzx-kh+1,nzx)=npad(kh,1);
    end

end

```

```

agematp(agematp<0)=0;

% projection of AGE MATRIx (ABOVE lines).....

if agematp==0
pause(1)
set(handles.startstat,'string','calculate pv age histogram!');
return
end

if kval==9999
pause(1)
set(handles.startstat,'string','select k-value!');
return
end

t=1:length(agematp);

T=30;
eft=(1-exp(-(t/T).^kval));
prob_loss=agematp.*(repmat(eft,1,length(agematp)));
yrssprj=2007:proj_yar;

%probable waste (ABOVE lines....
pause(1)
set(handles.startstat,'string','...Projection complete!');

% --- Executes on button press in show_proj_pvnum.
function show_proj_pvnum_Callback(hObject, eventdata, handles)
% hObject    handle to show_proj_pvnum (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

global stno
global panelnos
global proj_cap_no
global txt
global bothbar
global next

if panelnos==0
pause(1)
set(handles.startstat,'string','calculate pv mass !');
return
end

if stno==0
pause(1)
set(handles.startstat,'string','Select a State/UT !');
return
end

if proj_cap_no==0
pause(1)
set(handles.startstat,'string','Run projection !');
return
end

prev=panelnos';
next=proj_cap_no;
proj_yar=str2double(get(handles.proj_yr,'string'));

years1=2007:2020;
years2=2021:proj_yar;

bothbar=zeros(proj_yar+1-2007,2);
bothbar(years1-2006,1)=prev;
bothbar(years2-2006,2)=next;
years3=[years1,years2];

bar(years3,bothbar)
legend('Existing database (number of pv panels)','Projected number of pv panels');
xlabel('As of March month');
ylabel('Number of PV panels');
title([txt{stno}]);

pause(1)
set(handles.startstat,'string','Done');

% --- Executes on button press in show_proj_capac.
function show_proj_capac_Callback(hObject, eventdata, handles)
% hObject    handle to show_proj_capac (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

global stno

```

```

global panelnos
global proj_cap
global txt
global cum_inst
global next2
global bothbar2

if panelnos==0
pause(1)
set(handles.startstat,'string','calculate pv mass !');
return
end

if stno==0
pause(1)
set(handles.startstat,'string','Select a State/UT !');
return
end

if proj_cap==0
pause(1)
set(handles.startstat,'string','Run projection !');
return
end

if bothbar2==0
pause(1)
set(handles.startstat,'string','Run projection !');
return
end

if next2==0
pause(1)
set(handles.startstat,'string','Run projection !');
return
end

prev2=cum_inst(stno,:);
next2=proj_cap;
proj_yr=str2double(get(handles.proj_yr,'string'));

years1=2007:2020;
years2=2021:proj_yr;

bothbar2=zeros(proj_yr+1-2007,2);
bothbar2(years1-2006,1)=prev2;
bothbar2(years2-2006,2)=next2;
years3=[years1,years2];

bar(years3,bothbar2)
legend('Existing data (Capacity)','Projected data (Capacity)')
xlabel('As of March month')
ylabel('PV Capacity (MW)')
title([txt{stno}]);

pause(1)
set(handles.startstat,'string','Done');

% --- Executes on button press in show_proj_waste.
function show_proj_waste_Callback(hObject, eventdata, handles)
% hObject    handle to show_proj_waste (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global prob_loss
global yrssprj
global txt
global stno

bar(yrssprj,sum(prob_loss))
xlabel('As of March month')
ylabel('Projection of number of PV panels waste')
title([txt{stno}]);

pause(1)
set(handles.startstat,'string','Done');

% --- Executes on button press in show_age_hist.
function show_age_hist_Callback(hObject, eventdata, handles)
% hObject    handle to show_age_hist (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
global agematp
global yrr
global txt
global stno

if yrr==0
pause(1)
set(handles.startstat,'string','Select year!!');
return
end

```

```

end

proj_yar=str2double(get(handles.proj_yr, 'string'));

if yrr>(proj_yar-2006)
pause(1)
set(handles.startstat, 'string', 'Select year before projected year!!');
return
end

axes(handles.plotplace);
bar(agematp(:,yrr))
xlabel('Age of panels (years)')
ylabel('Number of pv panels of that age')
title([txt{stno} ' ,as of year- ' num2str(yrr+2006)]);
pause(1)
set(handles.startstat, 'string', 'Done');

```

