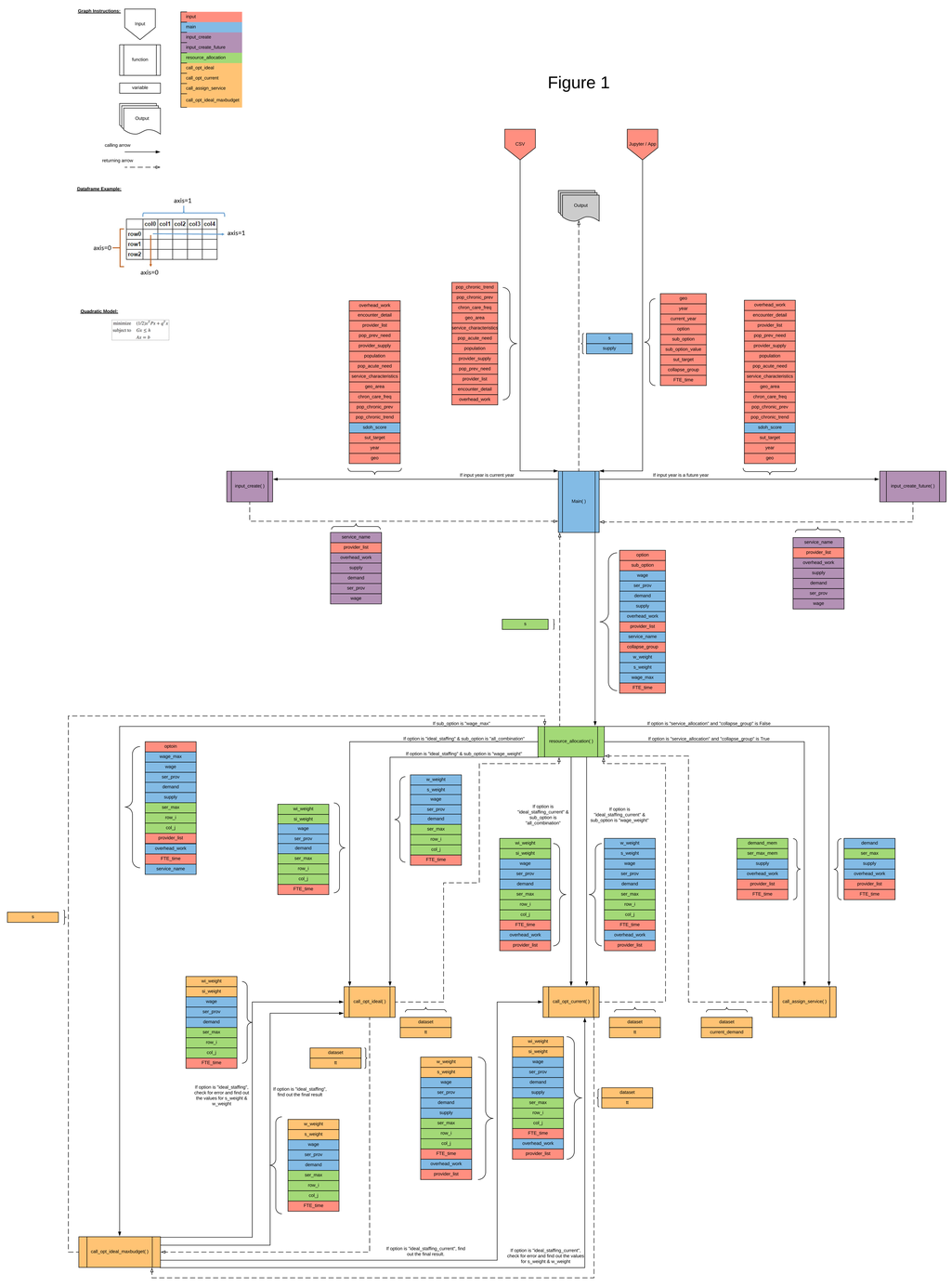
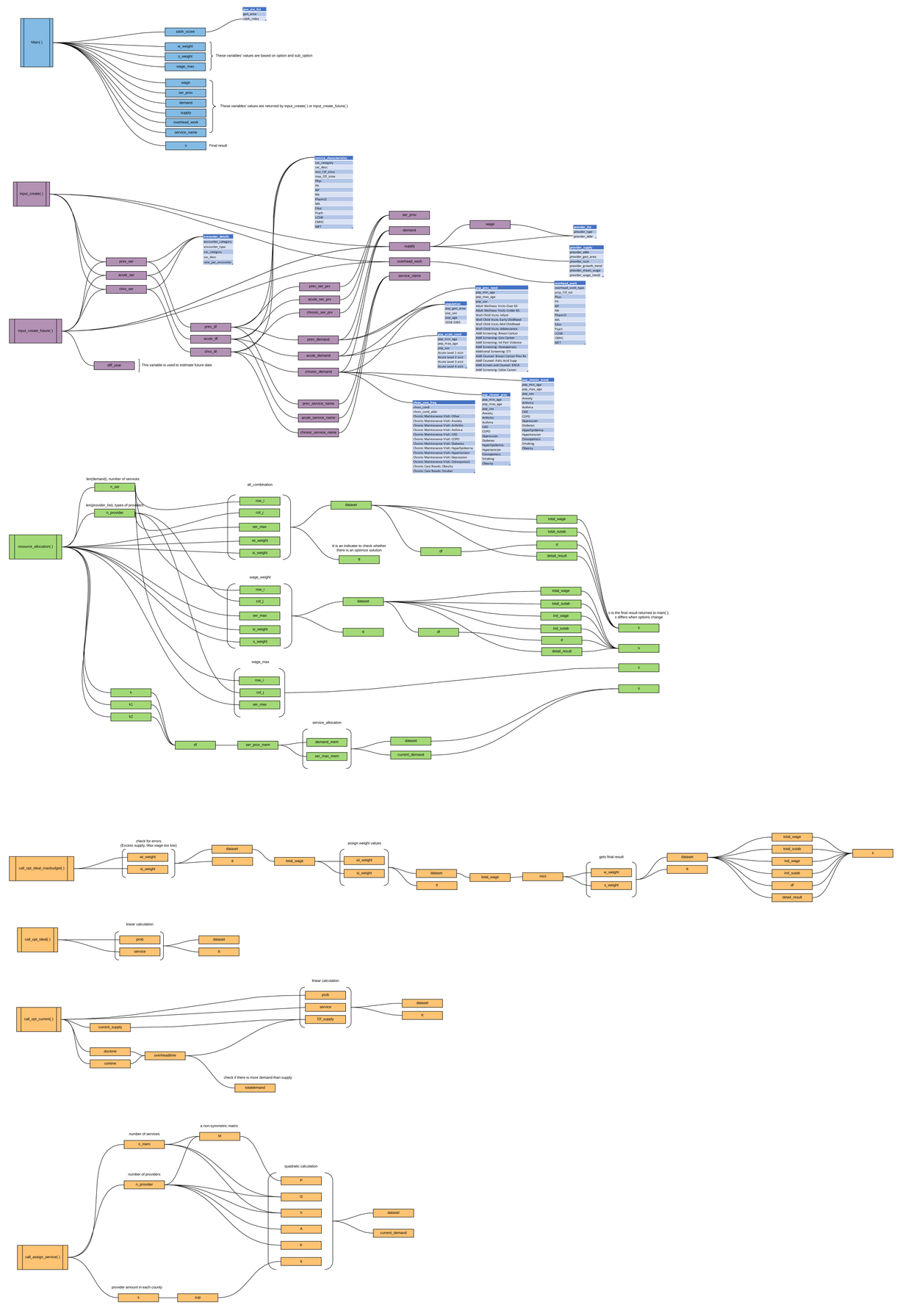

Graph Instructions:
Input
function
variable
Output
calling arrow
returning arrow
input
main
input_create
input_create_future
resource_allocation
call_opt_ideal
call_opt_current
call_assign_service
call_opt_ideal_maxbudget
Dataframe Example:
axis=1
col0 col1 col2 col3 col4
row0
row1
row2
axis=0
Quadratic Model:
minimize (1/2)x^T Px + q^T x
subject to Gx ≤ h
Ax = b
Figure 1
CSV
Jupyter / App
Output
overhead_work
encounter_detail
provider_list
pop_prev_need
provider_supply
population
pop_acute_need
service_characteristics
geo_area
chron_care_freq
pop_chronic_prev
pop_chronic_trend
sdoh_score
sut_target
year
geo
pop_chronic_trend
pop_chronic_prev
chron_care_freq
geo_area
service_characteristics
pop_acute_need
population
provider_supply
pop_prev_need
provider_list
encounter_detail
overhead_work
s
supply
geo
year
current_year
option
sub_option
sub_option_value
sut_target
collapse_group
FTE_time
overhead_work
encounter_detail
provider_list
pop_prev_need
provider_supply
population
pop_acute_need
service_characteristics
geo_area
chron_care_freq
pop_chronic_prev
pop_chronic_trend
sdoh_score
sut_target
year
geo
If input year is current year
If input year is a future year
input_create( )
Main( )
input_create_future( )
service_name
provider_list
overhead_work
supply
demand
ser_prov
wage
s
option
sub_option
wage
ser_prov
demand
supply
overhead_work
provider_list
service_name
collapse_group
w_weight
s_weight
wage_max
FTE_time
service_name
provider_list
overhead_work
supply
demand
ser_prov
wage
If sub_option is "wage_max"
If option is "ideal_staffing" & sub_option is "all_combination"
resource_allocation( )
If option is "service_allocation" and "collapse_group" is False
If option is "service_allocation" and "collapse_group" is True
If option is "ideal_staffing" & sub_option is "wage_weight"
s
option
wage_max
wage
ser_prov
demand
supply
ser_max
row_j
col_j
provider_list
overhead_work
FTE_time
service_name
wl_weight
sl_weight
wage
ser_prov
demand
ser_max
row_j
col_j
FTE_time
w_weight
s_weight
wage
ser_prov
demand
ser_max
row_j
col_j
FTE_time
If option is "ideal_staffing_current" & sub_option is "all_combination"
wl_weight
sl_weight
wage
ser_prov
demand
ser_max
row_j
col_j
FTE_time
overhead_work
provider_list
If option is "ideal_staffing_current" & sub_option is "wage_weight"
w_weight
s_weight
wage
ser_prov
demand
ser_max
row_j
col_j
FTE_time
overhead_work
provider_list
demand_mem
ser_max_mem
supply
overhead_work
provider_list
FTE_time
demand
ser_max
supply
overhead_work
provider_list
FTE_time
call_opt_ideal( )
call_opt_current( )
call_assign_service( )
dataset
tt
dataset
current_demand
wl_weight
sl_weight
wage
ser_prov
demand
ser_max
row_j
col_j
FTE_time
If option is "ideal_staffing", check for error and find out the values for s_weight & w_weight
If option is "ideal_staffing", find out the final result
w_weight
s_weight
wage
ser_prov
demand
ser_max
row_j
col_j
FTE_time
call_opt_ideal_maxbudget( )
If option is "ideal_staffing_current", find out the final result.
If option is "ideal_staffing_current", check for error and find out the values for s_weight & w_weight

Figure 2


Main( )
sdoh_score
geo_area
sdoh_index
w_weight
s_weight
wage_max
These variables' values are based on option and sub_option
wage
ser_prov
demand
supply
overhead_work
service_name
These variables' values are returned by input_create( ) or input_create_future( )
s
Final result
input_create( )
input_create_future( )
dlt_year
This variable is used to estimate future data
prev_ser
acute_ser
chro_ser
prev_df
acute_df
chro_df
service_characteristics
sar_category
sar_desc
max_EF_time
Phys
PA
MT
RN
Physio2
MA
Educ
Psych
LCSW
CMHC
MFT
encounter_details
encounter_category
encounter_type
sar_category
sar_desc
sdoh_per_encounter
ser_prov
demand
supply
overhead_work
service_name
wage
provider_list
provider_type
provider_sdoh
prev_ser_prv
acute_ser_prv
chronic_ser_prv
prev_demand
acute_demand
chronic_demand
prev_service_name
acute_service_name
chronic_service_name
population
pop_gen_area
pop_sex
pop_age
2019-2065
pop_prev_need
pop_mcc_age
pop_max_age
Adults
Adult Wellness Visits Over 65
Adult Wellness Visits Under 65
Well-Child Visits Infant
Well-Child Visits Early Childhood
Well Child Visits-Mid Childhood
Well-Child Visits Adolescence
Adl Screening: Breast Cancer
Adl Screening: Cervicalcancer
Adl Screening: Colon Cancer Screening
Adl Screening: Hiv Screening
Adl Screening: Mammogram
Additional Screening: STI
Adl Counsel: Breast Cancer Prev Rx
Adl Counsel: Folic Acid Supp
Adl Screen and Counsel: BRCA
Adl Screening: Colon Cancer
pop_acute_need
pop_mcc_age
pop_max_age
Acute
Acute Level 1 visit
Acute Level 2 visit
Acute Level 3 visit
Acute Level 4 visit
overhead_work
overhead_work_type
prop_OP_tot
Phys
PA
MT
RN
MA
Educ
Psych
LCSW
CMHC
MFT
chron_care_freq
chronic_cond
chron_cond_adv
Chronic Maintenance Visit: Other
Chronic Maintenance Visit: Anxiety
Chronic Maintenance Visit: Arthritis
Chronic Maintenance Visit: Asthma
Chronic Maintenance Visit: CAD
Chronic Maintenance Visit: COPD
Chronic Maintenance Visit: Diabetes
Chronic Maintenance Visit: Hyperlipidemia
Chronic Maintenance Visit: Hypertension
Chronic Maintenance Visit: Depression
Chronic Maintenance Visit: Osteoporosis
Chronic Care Needs: Obesity
Chronic Care Needs: Smoker
ser_chronic_prev
pop_mcc_age
pop_max_age
Anxiety
Arthritis
Asthma
CAD
COPD
Depression
Diabetes
Hyperlipidemia
Hypertension
Osteoporosis
Smoking
Obesity
pop_chronic_trend
pop_mcc_age
pop_max_age
Anxiety
Arthritis
Asthma
CAD
COPD
Depression
Diabetes
Hyperlipidemia
Hypertension
Osteoporosis
Smoking
Obesity
len(demand), number of services
n_ser
len(provider_list), types of providers
n_provider
resource_allocation( )
all_combination
row_j
col_j
ser_max
wl_weight
sl_weight
dataset
It is an indicator to check whether there is an optimize solution
tt
df
total_wage
total_sutab
d
detail_result
wage_weight
row_j
col_j
ser_max
w_weight
s_weight
dataset
tt
df
total_wage
total_sutab
ind_wage
ind_sutab
d
detail_result
It is the final result returned to main( ); s differs when options change
s
s
wage_max
row_j
col_j
ser_max
s
s
k
k1
k2
df
ser_prov_mem
service_allocation
demand_mem
ser_max_mem
dataset
current_demand
call_opt_ideal_maxbudget( )
check for errors
(Excess supply, Max wage too low)
wl_weight
sl_weight
dataset
tt
total_wage
assign weight values
wl_weight
sl_weight
dataset
tt
total_wage
mrs
gets final result
w_weight
s_weight
dataset
tt
total_wage
total_sutab
ind_wage
ind_sutab
df
detail_result
s
call_opt_ideal( )
linear calculation
prob
service
dataset
tt
call_opt_current( )
linear calculation
prob
service
IDT_supply
dataset
tt
current_supply
doctime
cortime
overheadtime
check if there is more demand than supply
totaldemand
call_assign_service( )
number of services
n_mem
a non-symmetric matrix
M
number of providers
n_provider
quadratic calculation
P
G
h
A
b
q
dataset
current_demand
provider amount in each county
n
trap