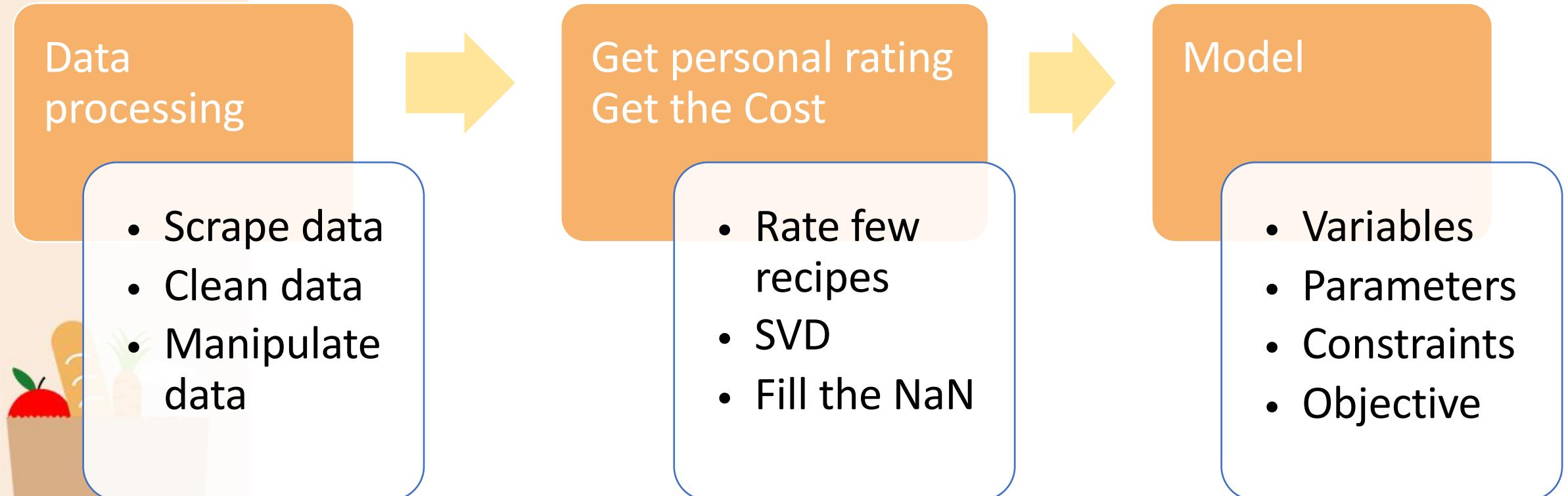


# Workflow of project



# Data processing

Scrape data:

- 1.Rating
- 2.Nutrition
- 3.Time (only number) – less than 10 are all slow cook
- 4.Ingredient – further work

Clean data:

**Delete rows contain NA value; Only consider the recipes with at least four reviews.  
(103 recipes after cleaning)**

Manipulate data:

**Group data by 51 states and others – as 52 typical users**



# Personal rating prediction

1. Construct the final data matrix for **recipes-user-rating**.
2. Add a personal rate row in above matrix
3. Use SVD in R to fill the dataset
4. Get the row of personal rating



# Cost

54 recipes  
62 fields



**YIELD:** 4 servings

**ACTIVE TIME:** 35 minutes

**TOTAL TIME:** 1 hour 45 minutes

## INGREDIENTS

- 2 small or 1 large spaghetti squash (3–3 1/2 pounds), halved lengthwise, seeded
- Kosher salt
- 1 head garlic
- 1 tablespoon olive oil
- 8 ounces cream cheese
- 1 cup whole milk
- Freshly ground black pepper
- 6 ounces salami, preferably Soppressata, sliced into 1/4-inch strips
- 5 ounces baby spinach (about 4 packed cups)
- 1/2 cup marinated sun-dried tomatoes (about 2 ounces), coarsely chopped
- 1/4 cup finely grated Parmesan (about 1/2 ounce)
- 1/2 teaspoon crushed red pepper flakes (optional)
- 1 1/2 cups shredded mozzarella (about 6 ounces), divided

each recipe may have different servings

exclude the ingredients like salt and any other seasoning

Standardized units of measurements for each ingredient in recipes

Get the main ingredient price from amazon fresh

# Variables and Parameters

$x_k$  - the status of recipe k is being chosen or not

$r_k$  - the rating of recipe k

$y_{k,i}$  - Shuting cook recipe k in day i

$z_{k,i}$  - Qian cook recipe k in day i

$T_y, T_z$ , and B - constraints on time and budget

$t_k$  and  $p_{2k}$  - each recipe cooking time and expense

Daily Nutritional Goals - Female 19-30 group - Adjust based on our BMI

```
# nutrients constraints right hand side
c1_bound = [1300,2500]           #calories
c2_bound = [60,180]                #carbohydrates
c3_bound = 500                     #cholesterol upper bound
f1_bound = [84,240]                #fat
f2_bound = [18,35]                 #fiber
p1_bound = [20,200]                #protein
s1_bound = 25                      #saturateFat, upper bound
s2_bound = 2300                    #sodium upper bound

# price constraint right hand side
p2_bound = 30                      #expense per week

# time constraint right hand side
remaintime_y =[70,50,100,100,120]   #time availability each day
remaintime_z=[50,80,50,80,80]        #time availability each day

# penalty constraints
alpha = 0.1
```



# Optimization Model Formulation

- Objective: maximize scores of five meals
- Constraints: nutrients, expense, time and etc.

Max	$\sum_{k=1}^K r_k \cdot x_k - \alpha \cdot W$		
s.t.	$\sum_{k=1}^K x_k = 5,$	5 meals per week	
s.t.	$\sum_{k=1}^K \sum_{i=1}^5 (z_{k,i} + y_{k,i}) - x_k = 0$		
s.t.	$\sum_{i=1}^5 (z_{k,i} + y_{k,i}) - x_k = 0, k \in 1, \dots K$		
s.t.	$\sum_{k=1}^K x_k = 5, k \in 1, \dots K$		
s.t.	$\sum_{k=1}^K (z_{k,i} + y_{k,i}) \leq 1, i \in 1, \dots 5$	one day one recipe	
s.t.	$\sum_{i=1}^5 (z_{k,i} + y_{k,i}) \leq 1, k \in 1, \dots K$	no repeat meal	
s.t.			time difference
s.t.			cooking time constraint
s.t.			expense constraint
s.t.			nutrients constraints



# Result of meal problem

objective: 10.220

x\_2=1

x\_13=1

x\_16=1

x\_19=1

x\_33=1

y\_2\_4=1

y\_19\_0=1

z\_13\_3=1

z\_16\_2=1

z\_33\_1=1

w=3.000



	Monday	Tuesday	Wednesday	Thursday	Friday
 Shuting					
 Qian					

