Predicting Income Levels

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Part Time Data Science
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How much money does someone make based on if they **exercised** today, have a certain **job**, or where they buy **groceries**?

Bureau of Labor Statistics
American Time Use Survey (ATUS)

ATUS: Eating & Health Module

Intro to Data

- **Kaggle**
  Data set originally found on Kaggle.
- **BLS - ATUS**
  Yearly survey of how Americans spend their time during daily activities.
- **ATUS - Eating & Health Module**
  Additional questions about eating, meal preparation and health.

Shape
(11212, 43)

Data Subset

Reduced the rows to focus on the following subset of respondents:

- ➔ **Single-Person Household**
- ➔ **Employed @ Work**
- ➔ **Eating & Health Respondent**
- ➔ **2014 Poverty Threshold**

Shape
(1158, 43)

Response Vars.

- **Monthly Income Level** (Categorical)
  Income levels based on poverty threshold set by US Census Bureau.
- **Weekly Income** (Continuous)
  Calculated based on respondent answers.

Shape
(1150, 43)

Monthly Income Level

Above 185% of Poverty Threshold

Income > $1,900

(869/1150)

Between 130% and 185% of Poverty Threshold

$1,300 < Income < $1,900

(145/1150)

Below 130% of Poverty Threshold

Income < $1,300

(136/1150)

Features

- ➔ Body Mass Index
- ➔ Primary Eating Time
- ➔ Secondary Eating Time
- ➔ Exercise
- ➔ Fast Food Purchases
- ➔ Food Amount
- ➔ Stores
- ➔ Occupation
- ➔ Occupation Industry

Shape
(1150, 11)

Histogram
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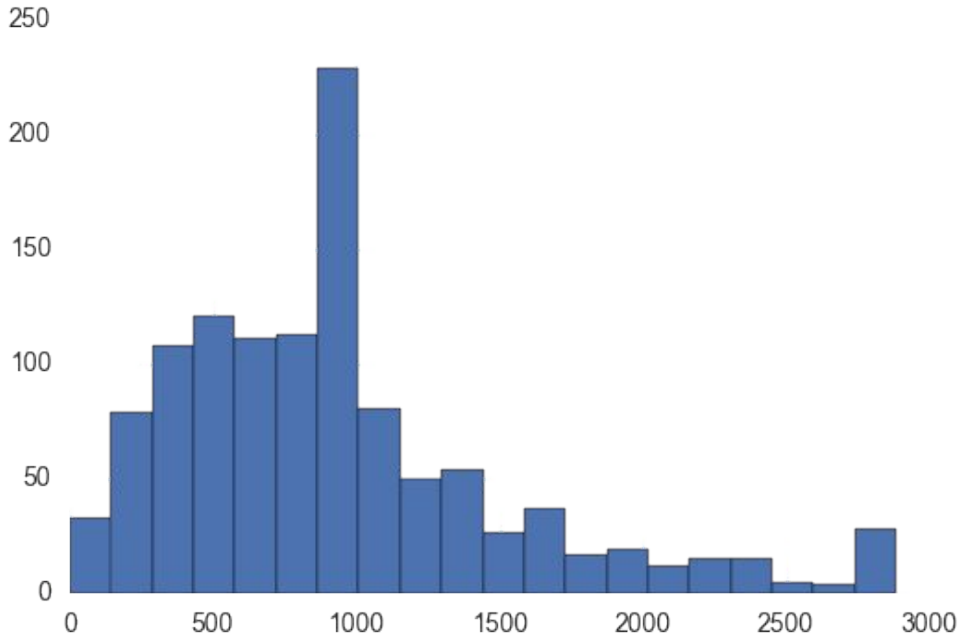
Weekly Income



Bar Chart

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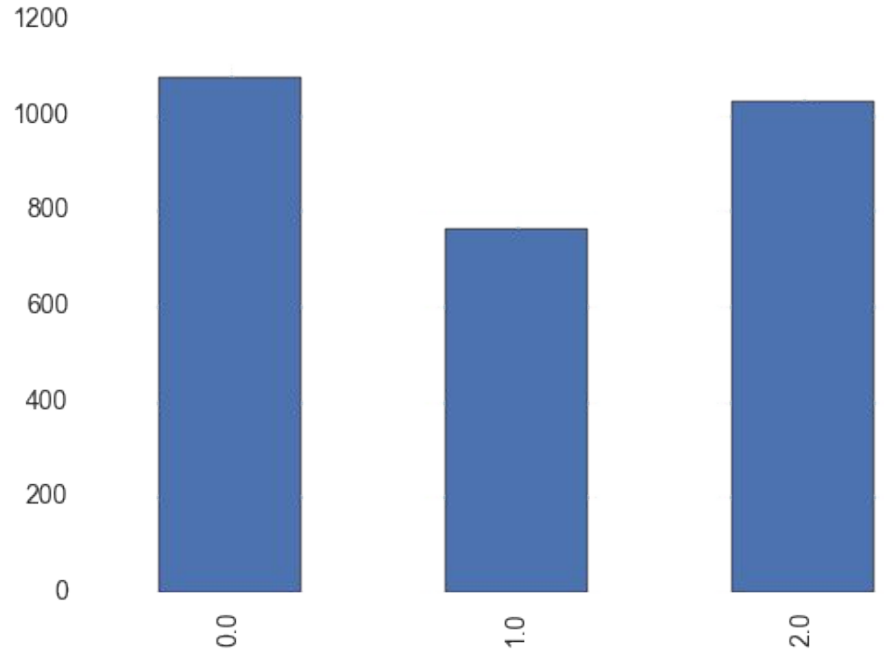
X = Exercise

Y = Weekly Income



0 = Did not answer (5/1150)
1 = Did not exercise (378/1150)
2 = Did exercise (775/1150)

Bar Chart

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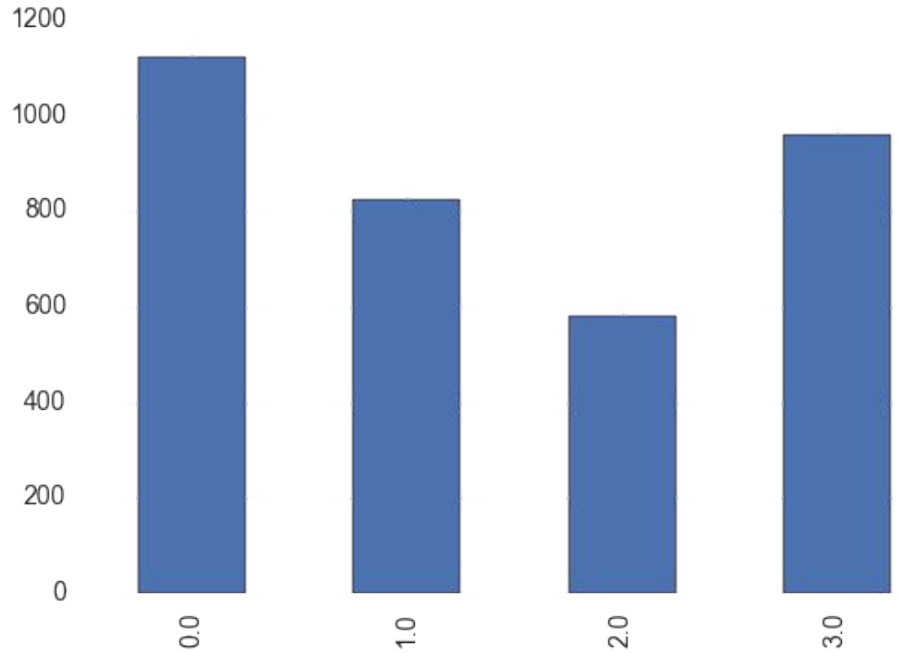
X = Food Amount

Y = Weekly Income



0 = Did not answer	(6/1150)
1 = Often not enough to eat	(17/1150)
2 = Sometimes not enough to eat	(46/1150)
3 = Enough to eat	(1089/1150)

Bar Chart

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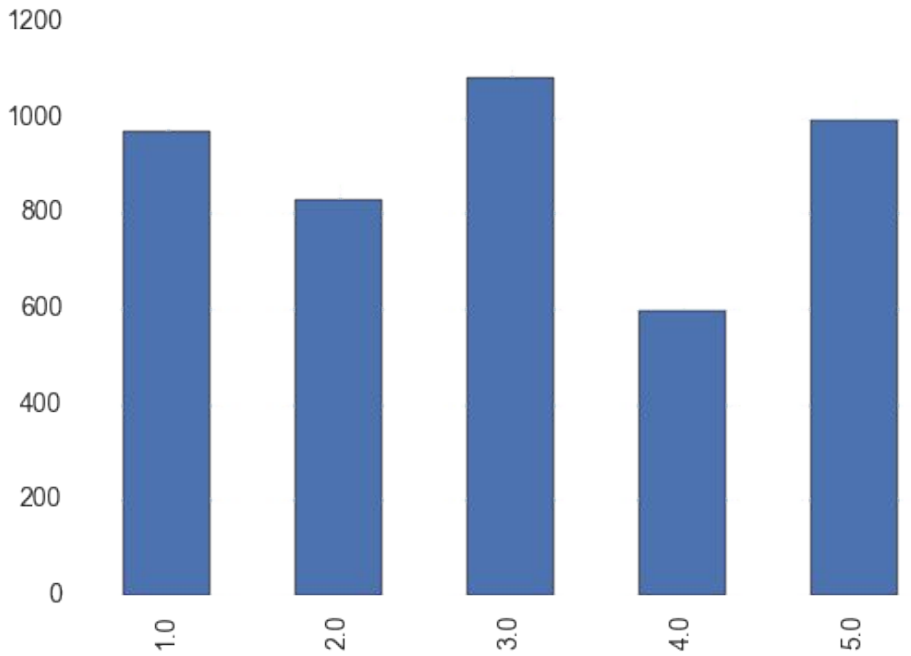
X = Stores

Y = Weekly Income



1 = Grocery store	(832/1150)
2 = Supercenter	(251/1150)
3 = Warehouse club	(51/1150)
4 = Drugstore or convenience store	(19/1150)
5 = Some other place	(5/1150)

Bar Chart

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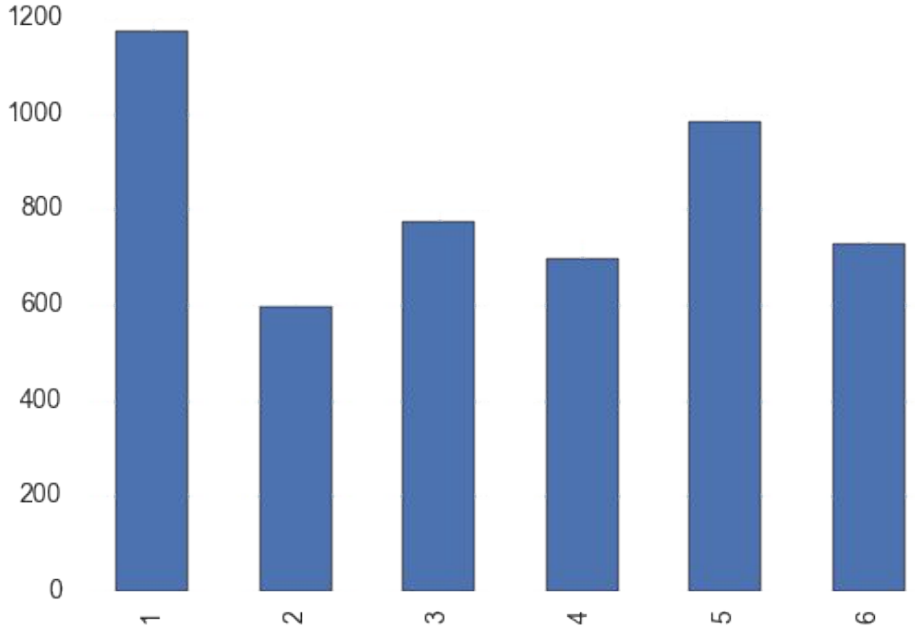
X = Occupation Category

Y = Weekly Income



1 = Management and professional (543/1150)
2 = Service (238/1150)
3 = Sales and office (172/1150)
4 = Farming, fishing, and forestry (126/1150)
5 = Construction and maintenance (72/1150)
6 = Production, transportation, and material moving (7/1150)

Categorical Modeling

Select Features

Exercise
Food Amount
Stores
Occupation Cat.

Dummies

OneHotEncoder

Testing

5-Fold
Cross-Validation

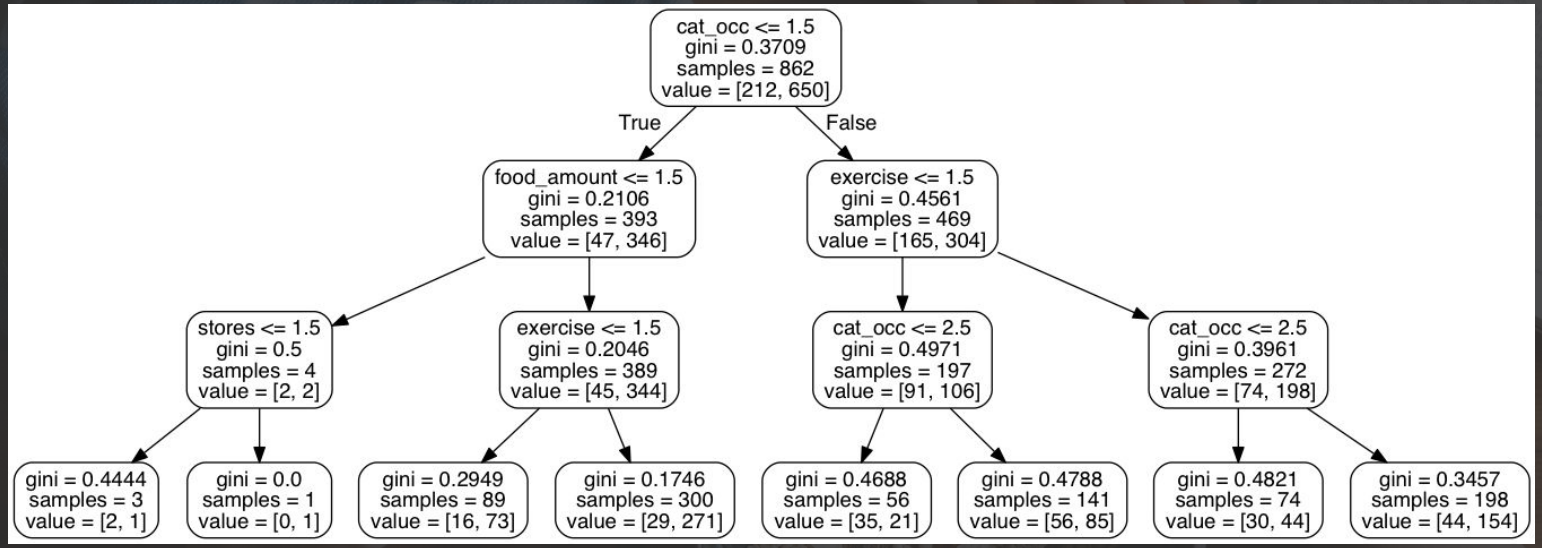
Null Accuracy

.75565

Models: INCOME LEVEL

Model	Accuracy
KNN	.79224
Logistic Regression	.77783
Decision Tree	.78534
Random Forest	.75714

Model: **DECISION TREE**



Model: **DECISION TREE**

Feature	Importance
Occupation Category	.73669
Exercise	.21944
Food Amount	.02794
Stores	.01593

Clustering
WEEKLY INCOME

K-Means Clustering
Silhouette Coeff. = .57529

Clustering
WEEKLY INCOME

	Exercise	Food Amount	Store	Occupation Category	Weekly Income
0	2.000000	3.000000	1.228477	1.587748	1067.92363
1	1.572254	3.000000	1.358382	5.595376	826.925137
2	1.641509	2.981132	4.905660	2.566038	971.883505
3	0.992157	3.000000	1.258824	1.890196	782.221912
4	1.523077	1.646154	1.461538	2.707692	654.718915

Next Steps

- **Improved Feature Selection**
- **Parameter Tuning**
- **Data Subset**
  Multi-Person Household
  2015 Poverty Threshold
- **Other Features Beyond Income**
  Many unused categories:
    - Health predictions
    - Welfare insights
    - Year-over-year trends
- **Explore Weekly Income**

So…

To make more money…

- Exercise on the week the BLS calls for the ATUS
- Consider not shopping at convenience stores
- Work in management

Thank you