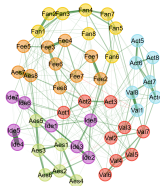
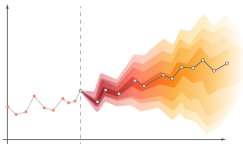


# Introduction

## DS-5740 Advanced Statistics



# Some Introductions

## Instructor

Alexander Christensen

Psychology and Human Development

Peabody College

## Teaching Assistant

Danni Shi

Department of Biostatistics

School of Medicine

# Some Introductions

- 1 Name that you'd like me and other people to use
- 2 Topics you're interested in (e.g., finance, psychology, social media, sports)
- 3 What you'd like to get out of this course
- 4 Career goals (what would you like to do?)





You and your group have just survived the crash of a small plane...

Both the pilot and co-pilot were killed in the crash. It is mid-January, and you are in Northern Canada. The daily temperature is  $-25^{\circ}\text{F}$  (or  $-32^{\circ}\text{C}$ ) and the night time temperature is  $-40^{\circ}\text{F}$  (or  $-40^{\circ}\text{C}$ ). There is snow on the ground, and the countryside is wooded with several creeks criss-crossing the area. The nearest town is 20 miles away. You are all dressed in city clothes appropriate for a business meeting.

Your group of survivors managed to salvage the following items:

- a ball of steel wool
- a small ax
- a loaded .45-caliber pistol
- can of Crisco shortening
- newspapers (one per person)
- cigarette lighter (without fluid)
- extra shirt and pants for each survivor
- 20 × 20 ft. piece of heavy-duty canvas
- a sectional air map made of plastic
- one quart of 100-proof whiskey
- a compass
- family-size chocolate bars (one per person)

### Group A

Rank the items according to their importance to your survival, starting with **1** for the most important item to **12** for the least important. Work quickly, alone, and *don't* discuss the problem with anyone in your group. Record your rankings in the scoring table down column **A** labeled **Individual Ranking**.

### Group B

As a group, discuss what items are most critical for survival. You should try to come to a consensus as the more everyone agrees, the more likely you and your group will survive. Once there is a consensus, record the group rankings in the scoring table down column **B** labeled **Group Ranking**.



### Group A

As a group, discuss what items are most critical for survival. You should try to come to a consensus as the more everyone agrees, the more likely you and your group will survive. Once there is a consensus, record the group rankings in the scoring table down column **B** labeled **Group Ranking**.

### Group B

Rank the items according to their importance to your survival, starting with **1** for the most important item to **12** for the least important. Work quickly, alone, and *don't* discuss the problem with anyone in your group. Record your rankings in the scoring table down column **A** labeled **Individual Ranking**.

- |                                           |                                               |                                        |
|-------------------------------------------|-----------------------------------------------|----------------------------------------|
| 1 cigarette lighter (without fluid)       | 5 20 × 20 ft. piece of heavy-duty canvas      | 9 a loaded .45-caliber pistol          |
| 2 a ball of steel wool                    | 6 a small ax                                  | 10 one quart of 100-proof whiskey      |
| 3 extra shirt and pants for each survivor | 7 family-size chocolate bars (one per person) | 11 a compass                           |
| 4 can of Crisco shortening                | 8 newspapers (one per person)                 | 12 a sectional air map made of plastic |

absolute value

Individual Accuracy :  $|A - C|$

Group Accuracy :  $|B - C|$

Influence :  $|A - B|$

- 0-12: Great survival skills – rescued!
- 13-24: Above average survival skills – rescued!
- 25-36: Frostbit, hungry, and tired – rescued!
- 37-48: Dehydrated and barely alive – it was tough, but rescued!
- 49-60: Rescued, but only just in time! Lost a few toes.
- 61-72: Sorry, only scraps of your clothing were recovered months after the search was called off.

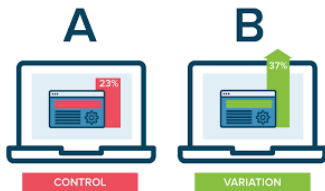
Who did better: you or the group?

- Problem space
- Confirmation bias
- Functional fixedness

- Groupthink
- Social loafing
- Group dominance

Did people in group B perform better *individually* than people in group A?

*You'll answer this question as an assignment later in the course*





Preparing for the Course

[Course Schedule](#)

# Software for the Course



[Download R](#)



[Download Rtools](#) (Windows only)



[Download RStudio](#)

# Download R Packages | CRAN

```
install.packages("package_name")
```

- Replace package\_name with the name of the package
- For example:

```
install.packages("fpp3")
```

## Packages to download

- Forecasting: {fpp2}, {fable}, {prophet}, {tsibble}, {seasonal}, {forecast}, {tidyquant}
- Dimension Reduction/Clustering: {psych}, {cluster}, {factoextra}
- Quasi-experimental Design: {scidesignR}

```
devtools::install_github("user/package_name")
```

- Replace user with the username of package developer
- Replace package\_name with the name of the package
- For example:

```
devtools::install_github("hfgolino/EGAnet")
```



# Load R Packages

- Load the {fpp3} package

```
library(fpp3)
```

- Possible error

```
Error in library(fpp3): there is no package called  
'fpp3'
```

# Got an Error?

Day 1 of Programming



10 Years of Programming



● [Google](#)

● [StackOverflow](#)

● [Cross Validated](#)

**Tip:** copy and paste error output verbatim

# Got an Error?



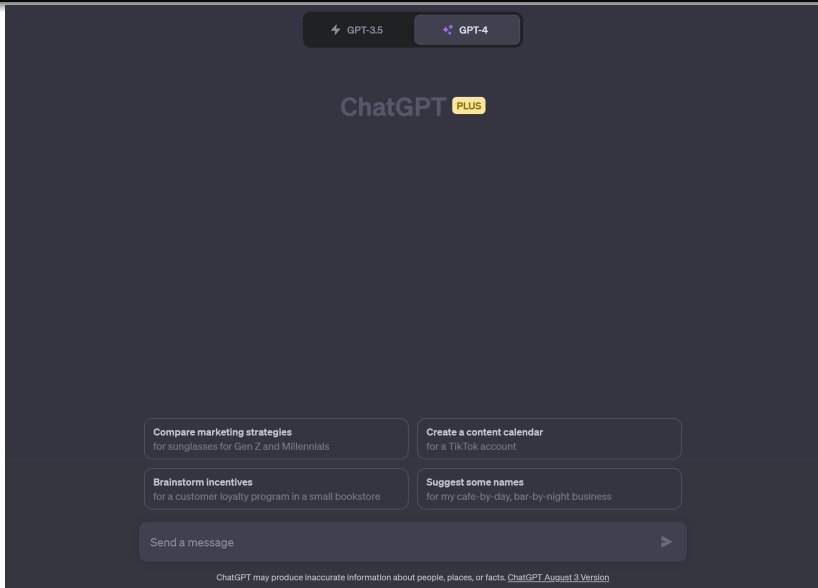
● [Google](#)

● [StackOverflow](#)

● [Cross Validated](#)

**Tip:** copy and paste error output verbatim

# Got an Error?



<https://chat.openai.com/>



## Forecasting Project

# Forecasting Project

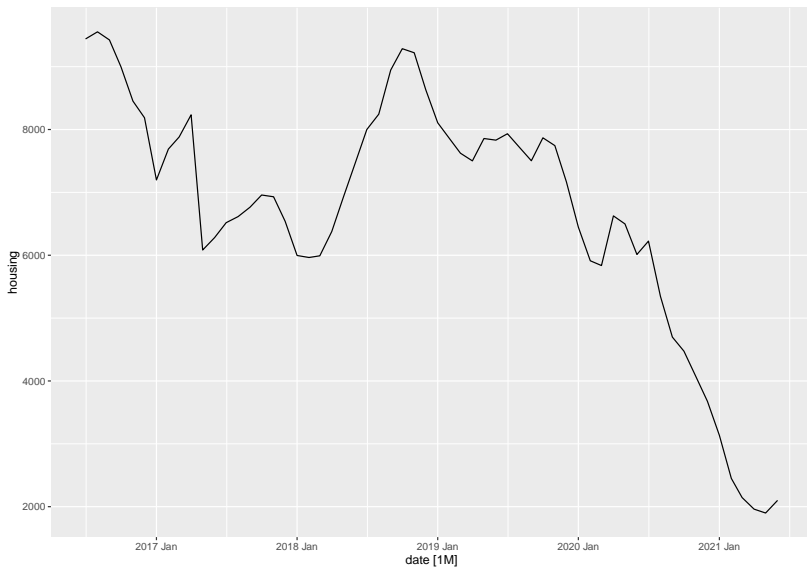
For your first project, you'll identify a time series that you're interested in. It can be any time series but keep in mind additional time series that could be used to help your forecast. You cannot choose the same time series as another person – the time series must be your own and yours only.

[Federal Reserve Economic Data](#)

[Archival FRED](#)

This project will be due on Sunday, October 22nd (weekend of Fall Break)

# Forecasting Project Example | Nashville Housing



# Forecasting Project Example | Nashville Housing

Series: housing

Model: TSML

Residuals:

Min	1Q	Median	3Q	Max
-815.86	-157.10	-26.85	176.54	846.71

Coefficients:

	Estimate	Std. Error	t value	Pr(> t )	
(Intercept)	1.799e+04	2.284e+03	7.877	2.26e-10	***
unemployment	8.189e+01	2.361e+01	3.468	0.00107	**
median_days	2.714e+01	9.068e+00	2.993	0.00425	**
price_increased	-3.786e-01	4.379e-01	-0.865	0.39133	
price_decreased	1.448e+00	1.271e-01	11.389	1.27e-15	***
pending_listing	-2.447e-01	1.203e-01	-2.034	0.04716	*
median_price	-3.857e-02	5.713e-03	-6.752	1.34e-08	***
outlier	2.555e+02	3.740e+02	0.683	0.49761	
pandemic	-5.601e+02	2.206e+02	-2.538	0.01423	*

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 361.4 on 51 degrees of freedom

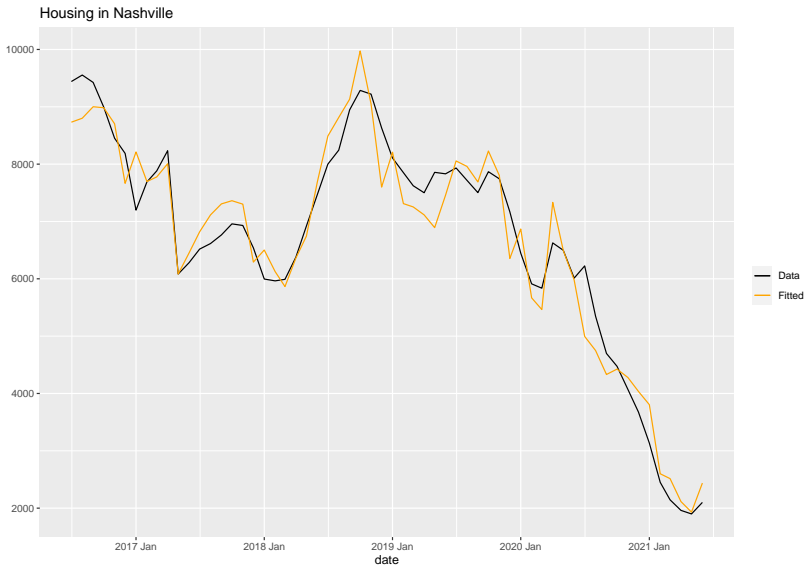
Multiple R-squared: 0.9708, Adjusted R-squared: 0.9662

F-statistic: 211.8 on 8 and 51 DF, p-value: < 2.22e-16

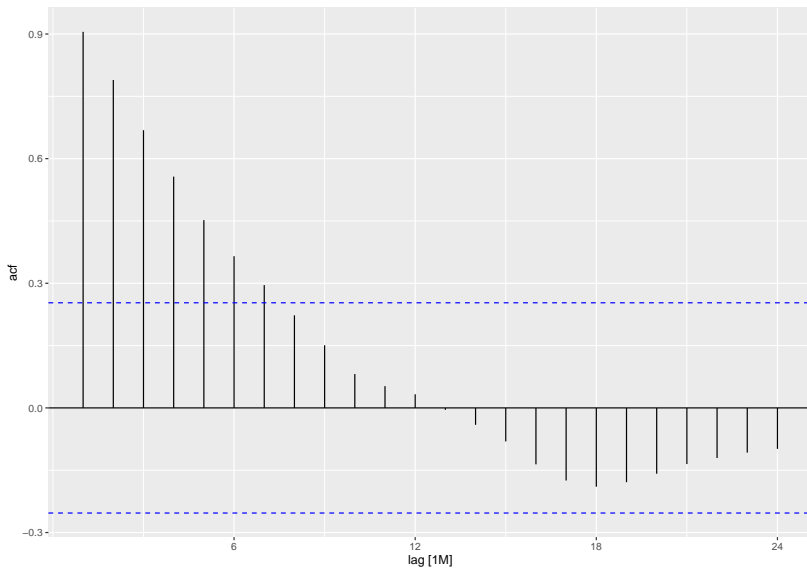
Multicollinearity (VIF)

unemployment	median_days	price_increased	price_decreased	pending_listing
1.525940	2.305740	1.376531	3.829918	7.079573
median_price	outlier	pandemic		
7.815849	1.052619	3.999534		

# Forecasting Project Example | Nashville Housing



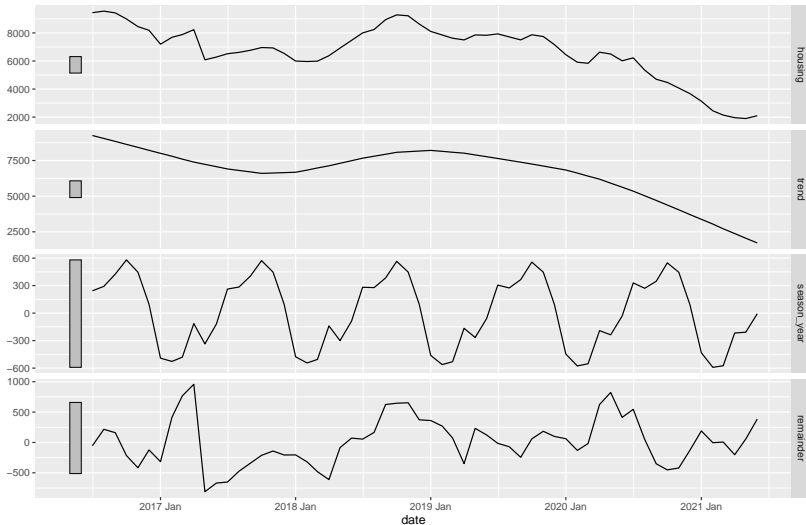
# Forecasting Project Example | Nashville Housing



# Forecasting Project Example | Nashville Housing

STL decomposition

housing = trend + season\_year + remainder



# Forecasting Project Example | Nashville Housing

