**Project Overview**

You're a supply chain analyst that creates and sells video games. our manager has tasked you to forecast monthly sales data in order to help plan out the supply with demand for the company's video games.

**How Do I Complete this Project?**

This project uses skills learned throughout the "Time Series Forecasting ” course. To complete this project:

* Go through the course
* Apply the skills learned in the course to solve the business problem given in the project details section.
* Use our guidelines and rubric to help build your project.
* When you're ready, submit it to us for review using the submission template found in the supporting materials section.

**Skills Required**

In order to complete this project, you must be able to:

* Cleanup, format, and blend a wide range of data sources
* Analyze a time-series and apply ETS and ARIMA models to the time-series

# Project Details

### The Business Problem

You recently started working for a company as a supply chain analyst that creates and sells video games. Many businesses have to be on point when it comes to ordering supplies to meet the demand of its customers. An overestimation of demand leads to bloated inventory and high costs. Underestimating demand means many valued customers won't get the products they want. Your manager has tasked you to forecast monthly sales data in order to synchronize supply with demand, aid in decision making that will help build a competitive infrastructure and measure company performance. You, the supply chain analyst, are assigned to help your manager run the numbers through a time series forecasting model.

You’ve been asked to provide a forecast for the next 4 months of sales and report your findings.

### Steps to Success

#### Step 1: Investigate and Prepare the Data

Look at your data set and determine whether the data is appropriate to use time series models. Determine which records should be held for validation later on.

#### Step 2: Determine Trend, Seasonal and Error components

Graph the data set and decompose the time series into its three main components: trend, seasonality, and error.

#### Step 3: Build your Models

Determine the appropriate measurements to apply to your ARIMA and ETS models and describe the errors for both models.

#### Step 4: Forecast

Compare the in-sample error measurements to both models and compare error measurements for the holdout sample in your forecast. Choose the best fitting model and forecast the next four periods.

**HINT:**

When adding in the ACF and PACF plots, you should put in the original plots in your report and then after each term is added to the model include the resulting ACF and PACF plots. This helps us see the progression of why you are choosing the terms you are. Do not forget to include the plots after the final term that you determine is needed for the model as well. Be careful when plotting that you are selecting the new data you created after doing any differencing.

**Review**

Use the [project rubric](https://review.udacity.com/#!/rubrics/302/view) to review your project. If you are happy with your submission, then you're ready to submit your project. If you see room for improvement, keep working to improve your project.

**Submission Template**

Use the submission template at the bottom of this section to submit your project. After filling it out, save it as a PDF and submit the PDF in the next section. You may also include your Alteryx workflow if you'd like. If your submission does not meet specifications, having the workflow may help the review identify mistakes.

**Data**

*monthly\_sales.xlsx* - This file contains store information for the company's sales by month.

Project List

This is here to make it easier for you to assess if your project is close to passing so you can try debugging your workflow and project before submission. If you do not feel confident in the topics addressed please review the course material or reach out on Knowledge or Study Groups!

Task List

* I have used a holdout sample of 4 to compare the models
* After determining the best model, I built a new model with those terms but passed in all the data to get the final forecast
* I included ACF and PACF plots in my project to justify the model terms I selected
* I set the terms of my model Manually (Selecting Auto may provide a more accurate model but we are testing your understanding of ACF and PACF)
* I checked the rubric <https://review.udacity.com/#!/rubrics/302/view>
* I have gone to the Knowledge or Study Groups before submitting

Since the models are going to be forecasting 4 periods we only need to use a holdout sample of 4 periods. Be sure to bring in all the data after determining which model performs better in your final prediction.

* Forums: <https://knowledge.udacity.com/>
* Study Groups

If you run into errors in Alteryx or unexpected results from a tool we have a guide to help you figure out what is going on.

**Alteryx Debugging Guide:**

Please open the "Resources" tab in the upper left panel of your classroom to download a PDF of the Alteryx Debugging Guide.

**To Download Files below please right click on the link and select "Save Link As"**

Supporting Materials