**Advanced Data Analysis MTH 9797 & STA 9797**

**Robert Kissell, PhD**

**Homework #3**

Due: Friday, 11/17 by 5:30pm

Submit via Blackboard

**Probability Models**

* Dataset: Excel\_HW03\_Data.xlsx
* Estimate Game Results for Week #11
* The model is setup to run in Excel Solver. All you need to do is set the weights for each model.
* The homework assignment is focused on running a model and analyzing the results.

**3.1: Power Function:**

Sheet: “Power Function”

Estimate Home Team Win Probability and Home Team Spread using the Power Function. These formulas are already entered into the Excel file. You will just need to copy the formulas down for week #11.

The spreadsheet currently shows the results for Week #10 in columns “AU through BF.”

Determine an appropriate set of adjustment factor weights to forecast the results in Week #11 shown in columns “BK through BV.”

The weights can be entered as any value such as 1, 2, …, 9, or 0.10, 0.20, …., 0.90. In class we divided the weights by 10 to determine the adjustment factor. This resulted in the most recent games in week #9 having a weight of 0.90.

Please note that weights are either

1. set to be equal across all weeks so the weight column would have a 1 for all values
2. set so that the more recent dates have higher weights.

I will provide the actual game results for week #10, which can be entered into your spreadsheet. You may want to find a set of weights that provides the best results for week#10. It is important that you keep the adjustment factor weights the same for all games in a given week.

After you specify the weights, you will need to solve for the optimal weightings using Excel’s Solver.

The optimization is:

Maximize Cell: AA2

By Changing AP6: AP38.

Constraints: AP6: AP38 >= AQ6:AQ38

AP6: AP38 <= AR6:AR38

**3.2: Logistic Function:**

Sheet: “Logistic Function”

Estimate Home Team Win Probability and Home Team Spread using the Power Function. These formulas are already entered into the Excel file. You will just need to copy the formulas down for week #11.

The spreadsheet currently shows the results for Week #10 in columns “AU through BF.”

Determine an appropriate set of adjustment factor weights to forecast the results in Week #11 shown in columns “BK through BV.”

The weights can be entered as any value such as 1, 2, …, 9, or 0.10, 0.20, …., 0.90. In class we divided the weights by 10 to determine the adjustment factor. This resulted in the most recent games in week #9 having a weight of 0.90.

Please note that weights are either

1. set to be equal across all weeks so the weight column would have a 1 for all values
2. set so that the more recent dates have higher weights.

I will provide the actual game results for week #10, which can be entered into your spreadsheet. You may want to find a set of weights that provides the best results for week#10. It is important that you keep the adjustment factor weights the same for all games in a given week.

After you specify the weights, you will need to solve for the optimal weightings using Excel’s Solver.

The optimization is:

Maximize Cell: AA2

By Changing AP6: AP38.

Constraints: AP6: AP38 >= AQ6:AQ38

AP6: AP38 <= AR6:AR38

**Important Notes:**

The weights are entered as adjustment factors and can be any value such as 1, 2, 3, …., 9, or 0.1, 0.2, …., 0.9. All adjustment factor weights for the same week should be the same value.

This assignment is to show how our probability models from lecture 2 can be used in practice.

We are using Sports Data to apply our models, but our probability models can be used for any probability related question.

**To Hand-In:**

Please submit the table shown in the sheet “HW3 Assignment.”

You can cut and paste these results in a new spreadsheet.