UCSAS 2024 USOPC DATA CHALLENGE

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Introduction

When evaluating gymnastic Olympic hopefuls for Paris 2024, it is paramount to create a system that is transparent while also putting the US in the best position to succeed. While we considered more advanced models such as Random Forest and XGBoost, we did not see a gain in mean squared error or coefficient of determination, let alone one significant enough to warrant the lack of transparency we had with our linear regression model.

Similarly, while we decided on a separate model for men and women, we did not create one for each apparatus. This is because when separated by apparatus, we saw worse model evaluation scores (R2 and MSE) than what we got with one model.

Another decision we came to was to introduce Adjusted Scores. Looking at past Olympic data, there seemed to be different medal thresholds for different apparatuses. For example, since 2008, the average medal score for women's Floor Exercise was 15.19, but for the Uneven Bars, it was 15.85. When evaluating the All-Around, this point is moot, but regarding individual events, acknowledging this discrepancy is paramount. This is where Adjusted Scores come into play. Each apparatus is given a multiplier. That multiplier is equal to the average medal score for the given gender divided by the apparatus mean. For women, the average medal score is 15.4. Thus the multiplier for women's Floor Exercise is $\frac{15.42}{15.19}$ (1.02). Thus, a 15.19 raw score for the Floor Exercise is worth 15.42 for the Adjusted Score.

Modeling

To create our linear regression model, we looked at the last seven most recent scores for each apparatus, the most recent being the target variable and the remaining six being the inputs. In Fig. 1-3 and Fig. 6-8, we checked our assumptions to ensure the validity of the linear model and were satisfied with the results. Fig. 4 and Fig. 9 plotted the coefficients for each model and in Fig. 5 and Fig. 10, we have the metrics for our models. With an R2 of 0.44 for Men and 0.52 for Women, we are confident we can predict future results that would allow us to submit a list of 10 total gymnasts for the US teams.

For the women's team, the top three leaders in the predicted score for each apparatus, Fig. 11, are limited to five total names. As a result, we are confident that those five gymnasts; Sunisa Lee, Shilese Jones, Simone Biles, Jade Carey, and Kaliya Lincoln, represent the best combination of American Female gymnasts to help the US succeed in Paris.

For the men's team, more individuals are represented on the leaderboard. As a result, we needed a different approach for choosing our team. Looking at the adjusted scores, the best combination of gymnasts would be Asher Hong, Paul Juda, Brody Malone, Shane Wiskus, and Khoim Young. This pairing also maximizes the projected All-Around score.

Conclusion

Based on the data provided to us, we believe this Olympic lineup will best set America up to succeed in Paris:

Women's Uneven Bars: Sunisa Lee, Shilese Jones, Simone Biles

Women's Floor: Simone Biles, Kaliya Lincoln. Shilese Jones

Women's Vault: Simone Biles, Jade Carey, Shilese Jones

Women's Balance Beam: Simone Biles, Sunisa Lee, Shilese Jones

Men's Floor: Paul Juda, Khoi Young, Shane Wiskus

Men's Vault: Khoi Young, Paul Juda, Asher Hong

Men's Parallel Bars: Shane Wiskus, Asher Hong, Brody Malone

Men's Rings: Asher Hong, Shane Wiskus, Brody Malone

Men's Pummel Horse: Khoi Young, Brody Malone, Paul Juda,

Men's Horionztal Bars: Brody Malone, Paul Juda, Shane Wiskus

Appendix

Fig. 1

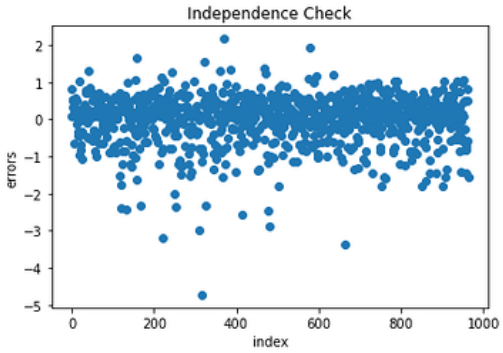

Fig. 2

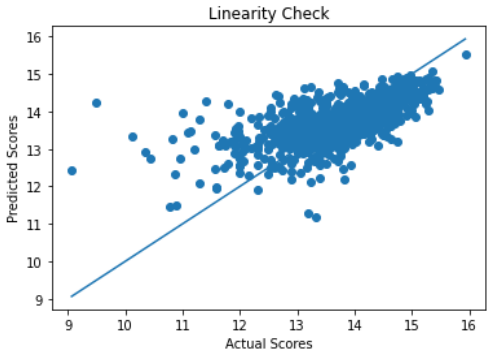

Fig. 3

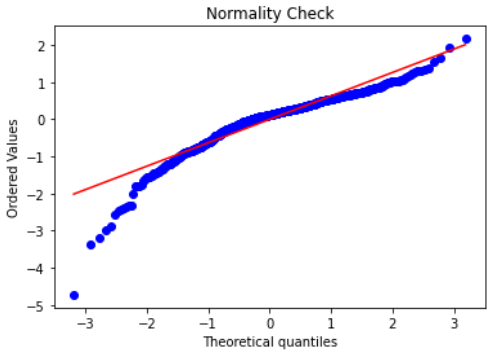

Fig. 4

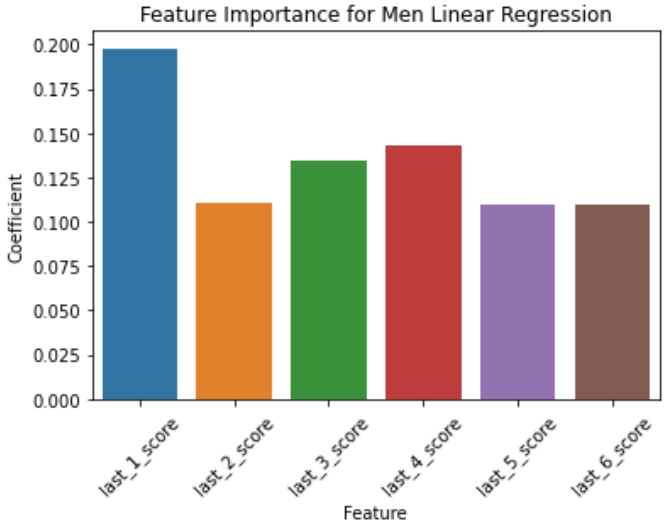

Fig. 5

	Overall	VT	SR	PH	FX	HB	PB
MSE	0.44	0.31	0.18	0.61	0.57	0.64	0.60
R2	0.44	0.29	0.70	0.35	0.22	0.20	0.36

Fig. 6

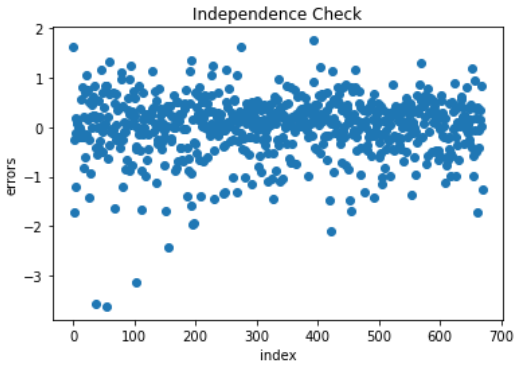

Fig. 7

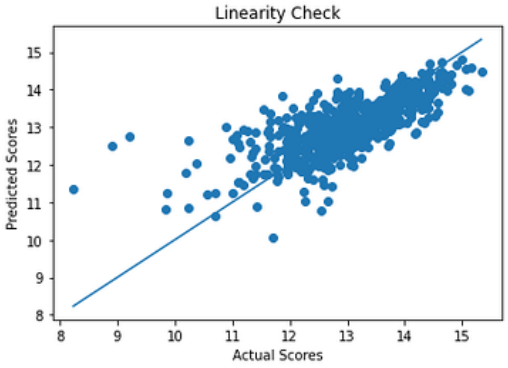

Fig. 8

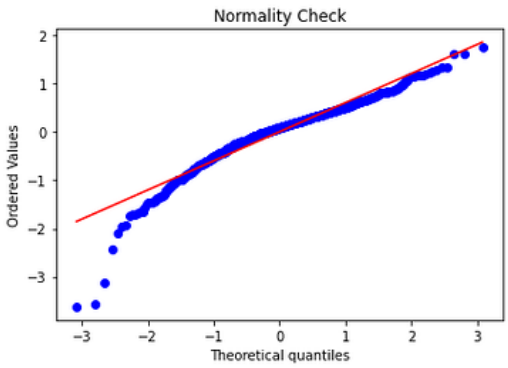

Fig. 9

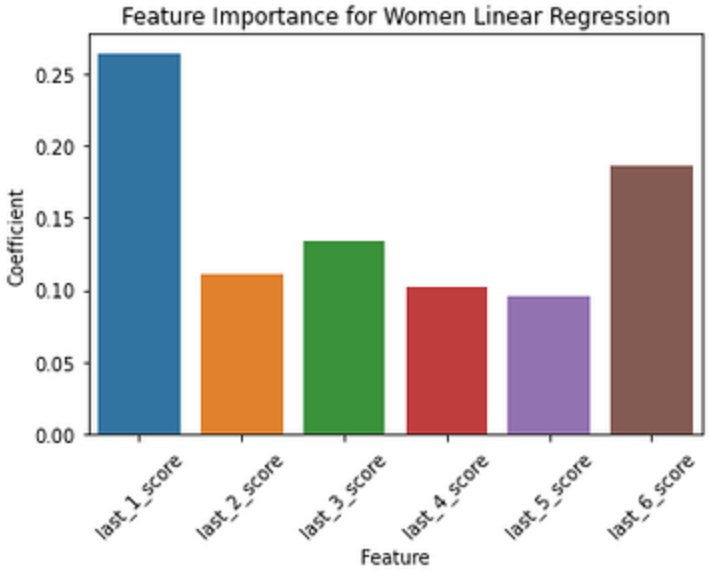

Fig. 10

	Overall	VT	BB	FX	UB
MSE	0.39	0.28	0.52	0.30	0.58
R2	0.56	0.57	0.50	0.59	0.51

Fig. 11

UB	Sunisa Lee	Shilese Jones	Simone Biles	Zoe Miller	Skye Blakely
FX	Simone Biles	Kaliya Lincoln	Shilese Jones	Joscelyn Roberson	Jade Carey
VT	Simone Biles	Jade Carey	Shilese Jones	Joscelyn Roberson	Skye Blakely
BB	Simone Biles	Sunisa Lee	Shilese Jones	Tiana Sumanasekera	Skye Blakely

Fig. 12

VT	Khoi Young	Paul Juda	Phillips Curran	Honga Sher
PB	Curran Phillips	Moldauer Yul	Shane Wiskus	Asher Hong
FX	Paul Juda	Fred Richard	Khoi Young	Connor McCool
PH	Stephen Nedoroscik	Khoi Young	Cameron Bock	Ian Skirkey
SR	Donnell Whittenburg	Alex Diab	Asher Hong	Riley Loos
HB	Brody Malone	Paul Juda	Fred Richard	Cameron Bock