



# Figure Skating at the 2018 Olympics

Analysis of the scores of the top 10 men singles competitors for the past two figure skating seasons

# Background information

- Skaters compete in four disciplines at the Olympic games: ladies singles, men singles, pairs and ice dancing
- All disciplines have progressed technically since the start of the current Olympic cycle but the men's event promises to be the most exciting due to the difficulty of technical elements performed
- A crop of very talented men is going to compete for a place on the podium by means of a quadruple jump contest: 5 out of the 6 possible figure skating jumps are now attempted as quadruple jumps

# Goals of the project

- To observe each of the competitors ranked top 10 in the world's scoring trends and potential
- To predict the medal winners in the men's event at the 2018 Olympics in Pyeongchang
- Through an analysis of figure skating scores over the last two (2016/2017 and 2017/2018) figure skating seasons, published by the International Skating Union

# Data sources

- The competition protocols published by the ISU

## ISU World Figure Skating Championships 2017 MEN SHORT PROGRAM JUDGES DETAILS PER SKATER

Rank	Name	Nation	Starting Number	Total Segment Score	Total Element Score	Program Score (factored)	Total Component Score (factored)	Total Deductions
1	Javier FERNANDEZ	ESP	34	109.05	60.79		48.26	0.00

#	Executed Elements	Info	Base Value	GOE	J1	J2	J3	J4	J5	J6	J7	J8	J9	Ref	Scores of Panel
1	4T+3T		14.60	2.86	3	3	2	3	3	3	3	3	2		17.46
2	4S		10.50	2.86	3	3	3	3	3	2	3	2	3		13.36
3	FUSp4		2.90	0.36	2	0	1	1	-1	0	1	0	2		3.26
4	3A	x	9.35	3.00	3	3	3	3	3	3	3	3	2		12.35
5	CCoSp4		3.50	1.00	2	2	3	2	1	2	2	2	2		4.50
6	CSSp4		3.00	0.86	1	1	2	1	2	2	2	2	2		3.86
7	StSq4		3.90	2.10	3	3	3	3	3	3	3	3	3		6.00
			47.75												60.79
	Program Components			Factor											
	Skating Skills			1.00	9.25	9.25	9.50	9.50	9.50	9.25	9.50	9.50	9.75		9.43
	Transitions			1.00	9.25	9.25	9.50	9.25	9.25	9.25	9.50	9.75	9.50		9.36
	Performance			1.00	9.75	9.50	9.75	10.00	9.75	9.50	10.00	10.00	9.75		9.79
	Composition			1.00	9.75	9.75	9.75	10.00	9.50	9.25	9.75	10.00	9.75		9.75
	Interpretation of the Music			1.00	10.00	9.75	10.00	10.00	9.75	10.00	10.00	10.00	9.75		9.93
	Judges Total Program Component Score (factored)														48.26

Deductions	0.00
------------	------

x Credit for highlight distribution, base value multiplied by 1.1

# Data Sources

- Scraping-friendly ISU protocols data on: <http://skatingscores.com/>

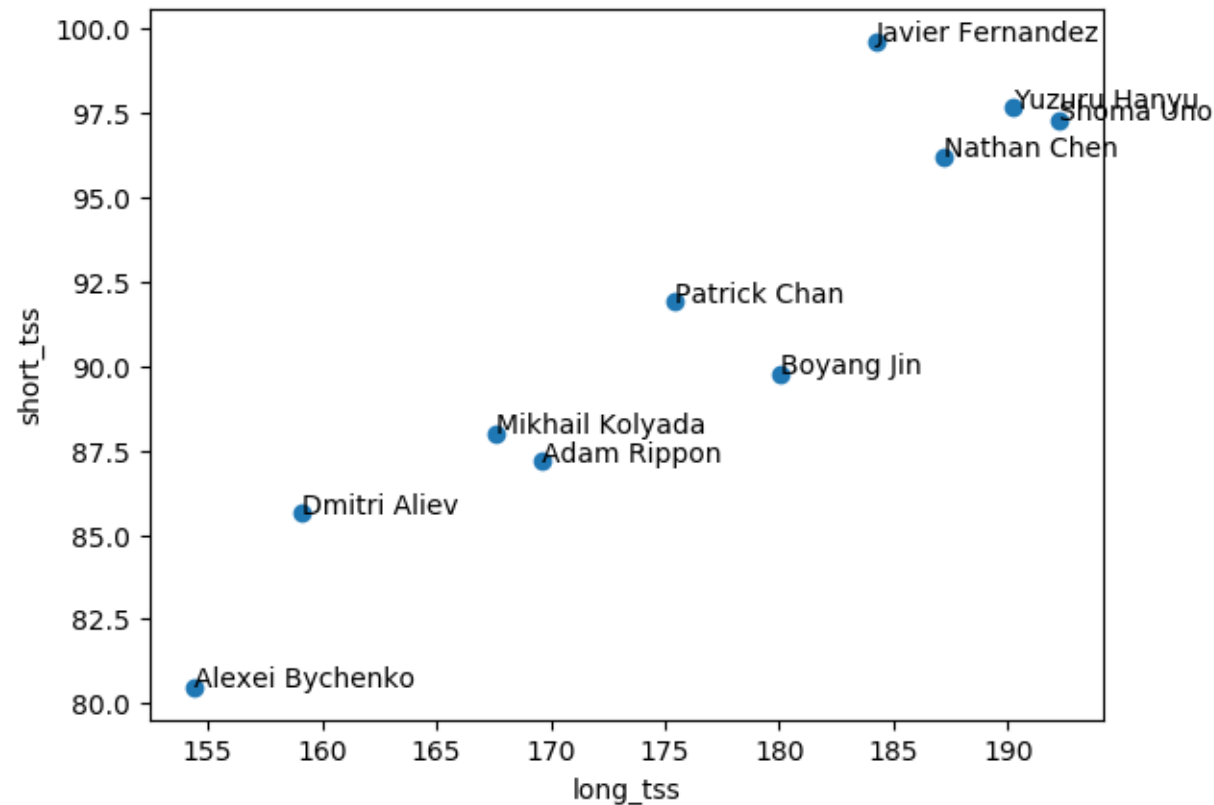


# Figure skating scoring in the men's event

- A competition consists of two segments: short (technical) program and long (free) program
- TES - Technical element score: points awarded for the execution of figure skating elements (jumps, spins, step sequences)
  - BV – base value (point value of elements according to ISU rulebook)
  - GOE – grade of execution: bonus or deduction awarded by the judges based on how well the element was performed and on added difficulty
- PCS – Program component scores: 1 to 10 mark in 5 categories: Skating skills, transitions, performance, composition, interpretation of the music
- TSS – TES + PCS combined for one segment

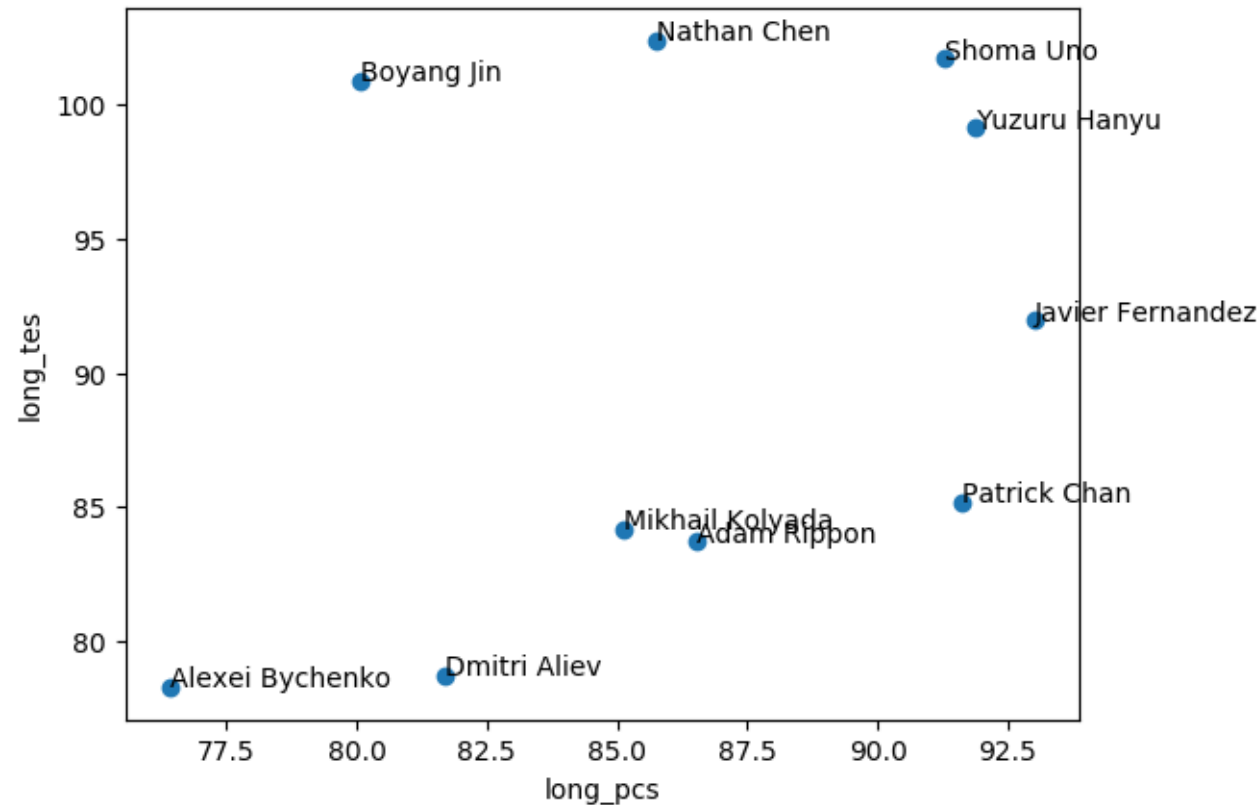
# Methods: Plotting Strengths and Weaknesses

- Short program vs long program score



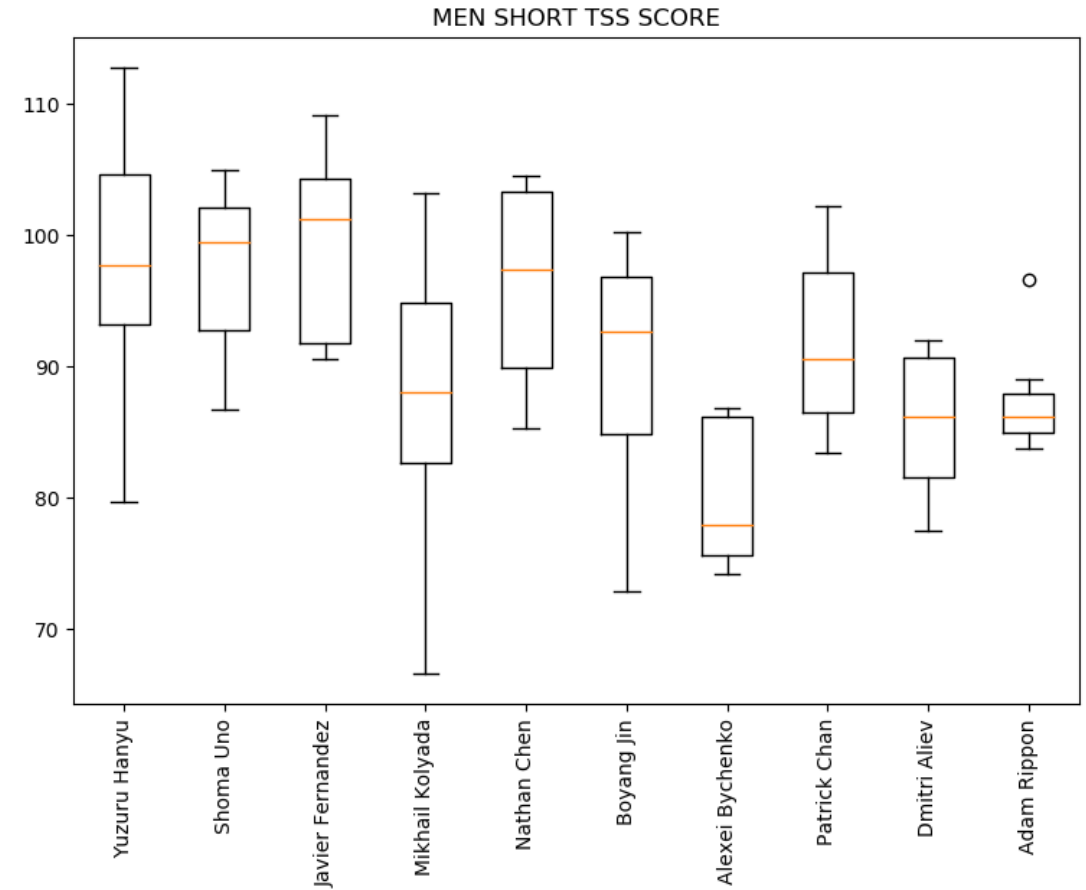
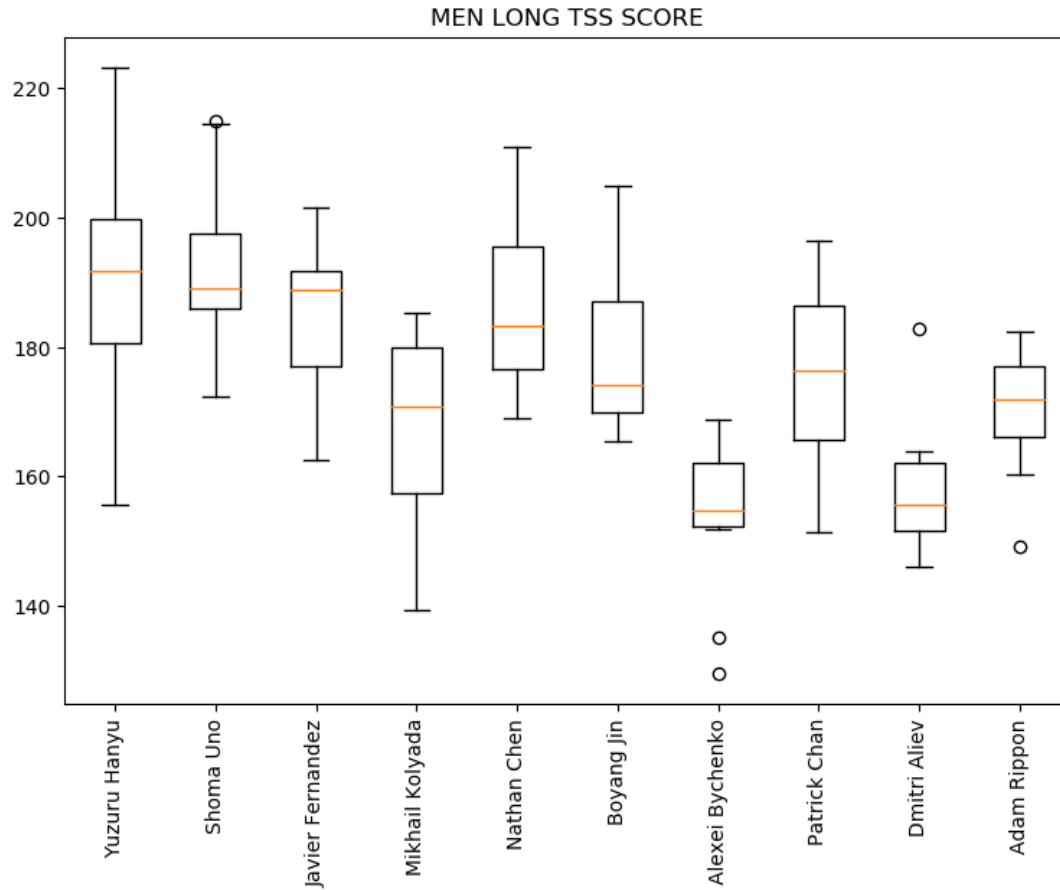
# Methods: Plotting Strengths and Weaknesses

- Long program technical mark vs long program component mark

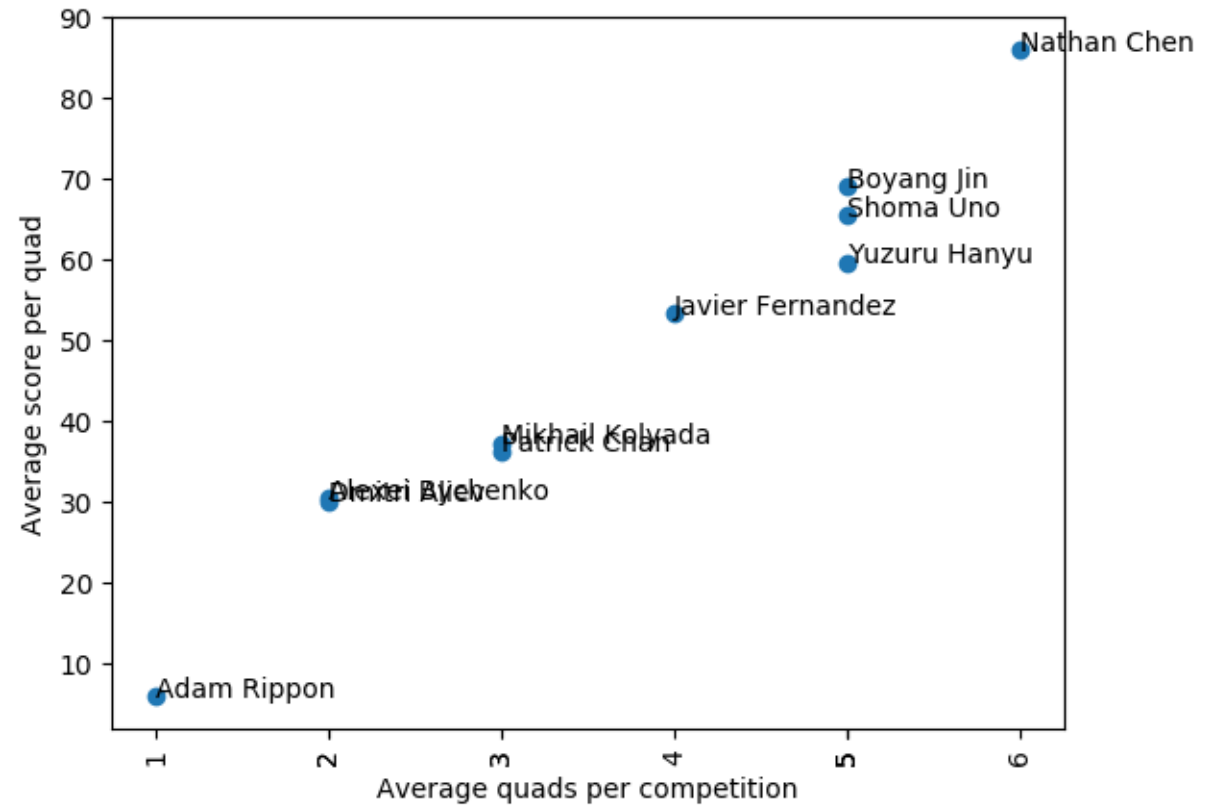




# Methods: Box Plot

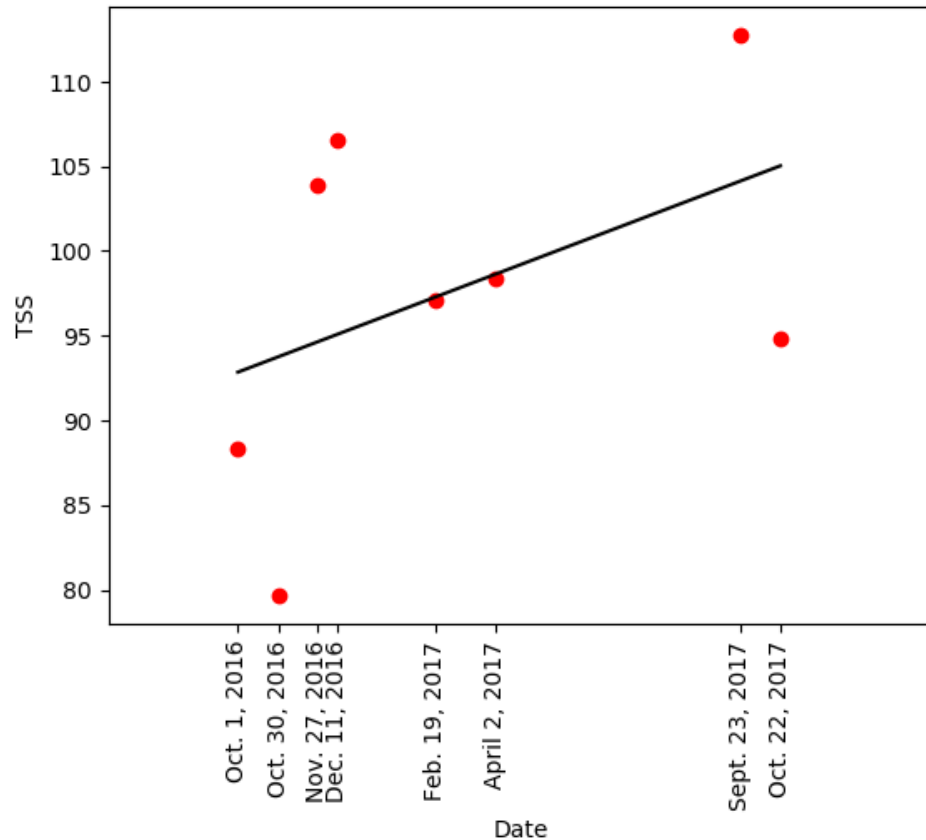


# Methods: Plotting Quad Prowess



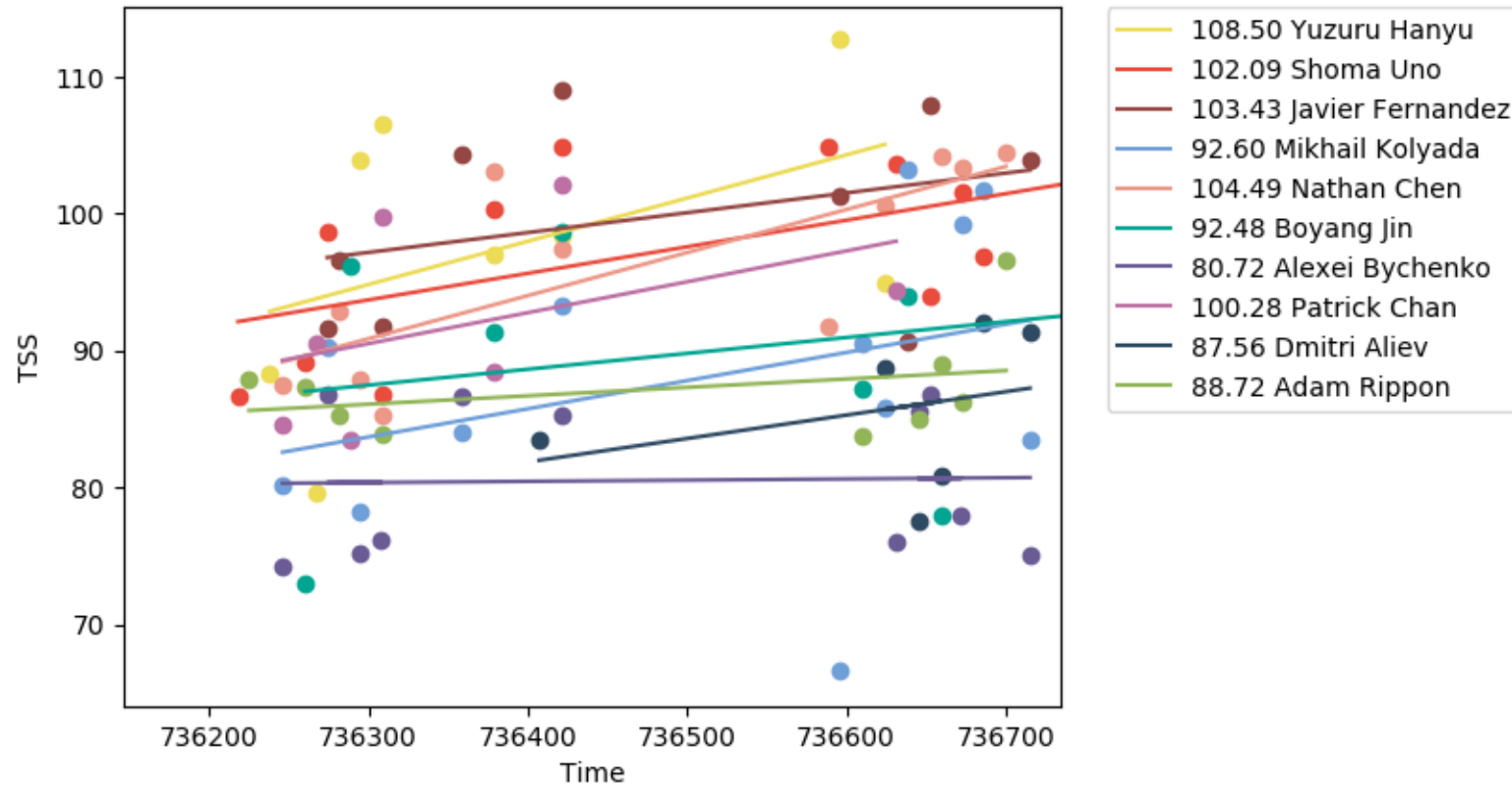
# Methods: Linear Regression

- Short program total segment score prediction for Yuzuru Hanyu: 108.50



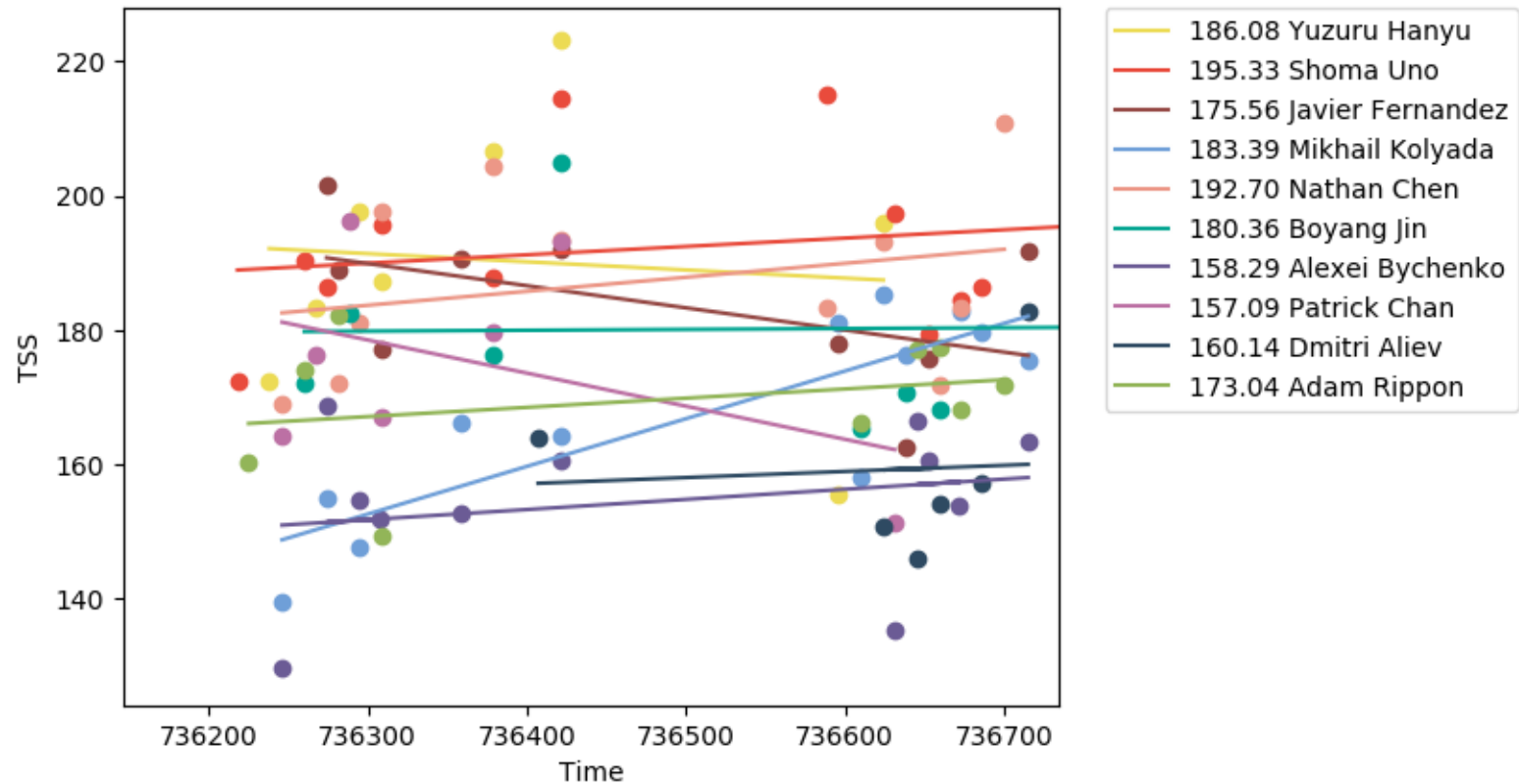
# Leaders in the short program TSS

- Yuzuru Hanyu (108.50), Nathan Chen (104.49), Javier Fernandez (103.43)



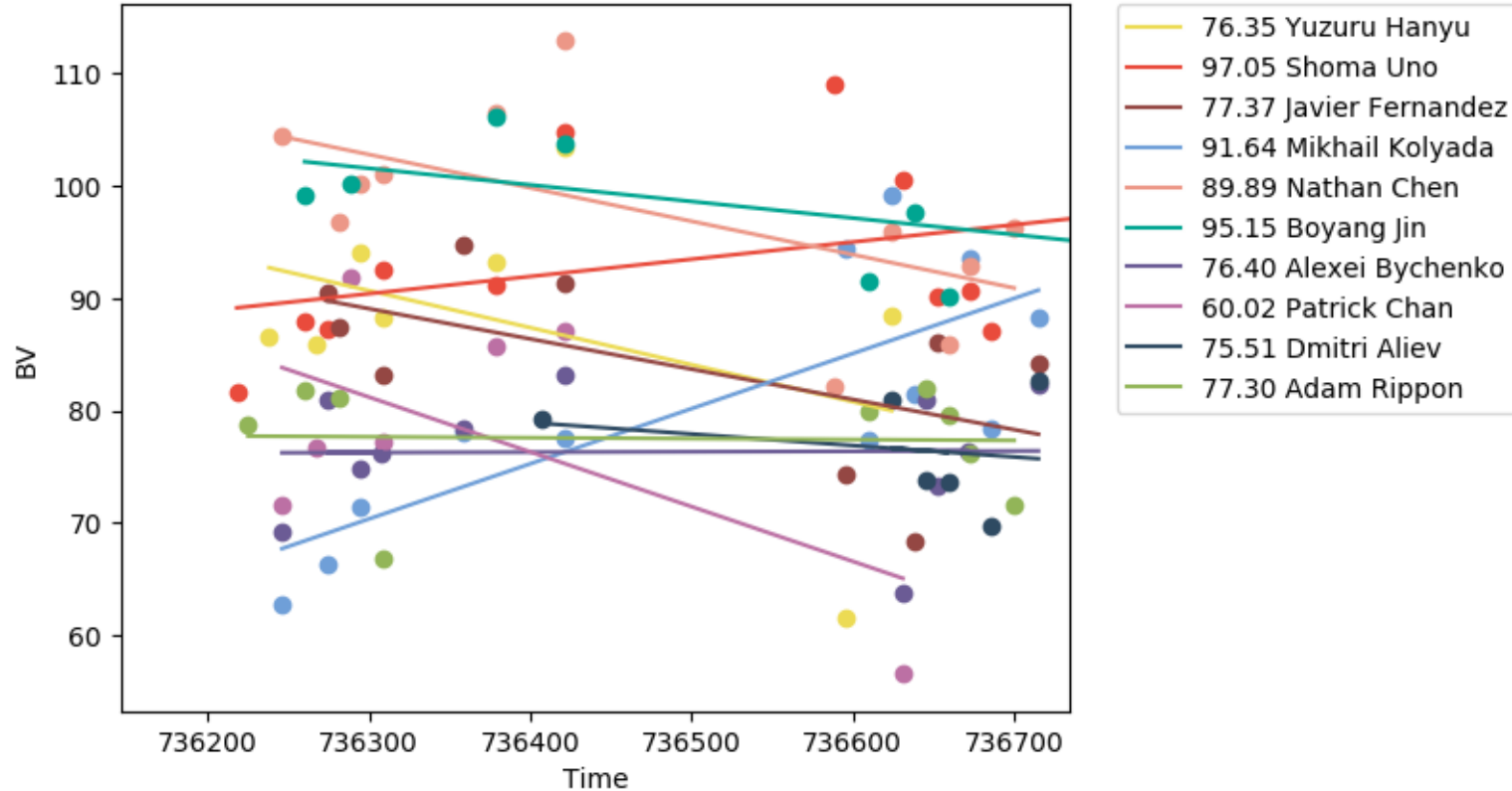
# Leaders in the long program TSS

- Shoma Uno (195.33), Nathan Chen (192.70), Yuzuru Hanyu (186.08)



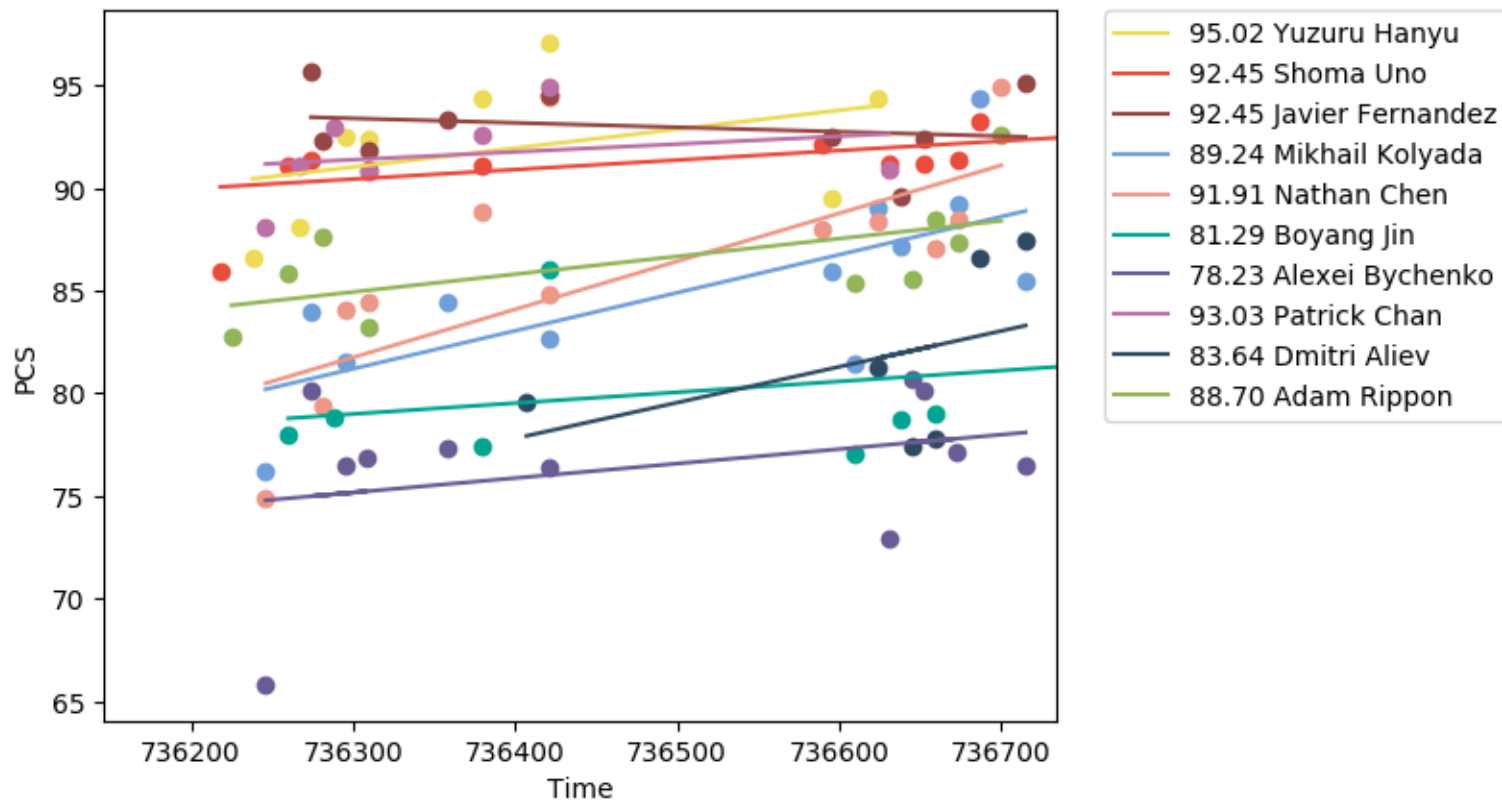
# Difficulty of technical content in the long program

- Top trajectories: Shoma Uno (97.05), Boyang Jin (95.15), Mikhail Kolyada (91.64)



# Best presentation of a long program

- Best trends: Yuzuru Hanyu (95.02), Patrick Chan (93.03), Shoma Uno / Javier Fernandez (92.45)



# Winning formula

- Short TES + Short PCS + Long TES + Long PCS

```
1. Shoma Uno jpn 298.78
2. Nathan Chen usa 297.53
3. Yuzuru Hanyu jpn 295.04
4. Javier Fernandez esp 279.58
5. Mikhail Kolyada rus 278.59
6. Boyang Jin chn 273.41
7. Adam Rippon usa 262.39
8. Patrick Chan can 258.09
9. Dmitri Aliev rus 249.56
10. Alexei Bychenko isr 239.38
```

```
1. Alina Zagitova rus 236.93
2. Evgenia Medvedeva rus 231.49
3. Kaori Sakamoto jpn 218.91
4. Kaetlyn Osmond can 218.30
5. Satoko Miyahara jpn 210.63
6. Maria Sotskova rus 210.29
7. Carolina Kostner ita 209.41
8. Mirai Nagasu usa 199.40
9. Gabrielle Daleman can 190.15
10. Karen Chen usa 189.76
```

```
1. Wenjing Sui Cong Han chn 233.74
2. Aljona Savchenko Bruno Massot ger 226.87
3. Evgenia Tarasova Vladimir Morozov rus 224.26
4. Vanessa James Morgan Cipres fra 217.37
5. Meagan Duhamel Eric Radford can 215.92
6. Xiaoyu Yu Hao Zhang chn 212.75
7. Natalia Zabiiako Alexander Enbert rus 203.57
8. Valentina Marchei Ondrej Hotarek ita 197.63
9. Nicole Della Monica Matteo Guarise ita 196.28
10. Julianne Seguin Charlie Bilodeau can 188.20
```

```
1. Gabriella Papadakis Guillaume Cizeron fra 201.75
2. Tessa Virtue Scott Moir can 200.64
3. Maia Shibutani Alex Shibutani usa 193.26
4. Madison Hubbell Zachary Donohue usa 193.08
5. Madison Chock Evan Bates usa 189.29
6. Ekaterina Bobrova Dmitri Soloviev rus 187.62
7. Anna Cappellini Luca Lanotte ita 184.09
8. Kaitlyn Weaver Andrew Poje can 181.16
9. Charlene Guignard Marco Fabbri ita 175.28
10. Piper Gilles Paul Poirier can 168.39
```



## 2017 World Championships podium:

Shoma Uno (silver)  
Yuzuru Hanyu (gold)  
Boyang Jin (bronze)



# Possible applications of the project



- Analysis and predictions of skaters performance can make naming to the Worlds / Olympic team easier for skating federations which want to take into account factors other than placement at Nationals
  - USFSA controversial passing of silver medalist Ross Miner for Worlds and Olympic team in 2018
- Maximise Olympic Team Event chances

# Future of the project

- Lots of data to analyze:
  - Group skaters according to ability
  - % of clean performances vs performances with errors
  - Avg. costliness of errors (negative GOE) per skater
  - Moment of peaking (best performances) in the season per skater
  - Where each skater gains most points: jumps, spins, step sequences, presentation
  - Strategies for maximizing points according to skaters' strengths
  - Similar analysis for ladies, pairs and ice dance





# Thank you!

