Gaming Monitor Preferences

Conjoint Analysis

Our team

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Objective

The goal of this study is to understand the customer preferences on gaming monitors using conjoint analysis and clustering the customers to identify the target audience.

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What is Conjoint Analysis

What is Conjoint Analysis?

Definition: Conjoint Analysis is a sophisticated market research technique used to measure the value consumers place on features of a product or service.

Purpose: It helps to identify the perfect product mix that maximizes consumer satisfaction and company profitability.

Insights Gathered: Understand consumer preferences, willingness to pay and the trade-offs customers are willing to make.

Applications:

- ❑ **Product Development:** Tailor new products to consumer desires.
- ❑ **Pricing Strategy:** Optimize pricing based on feature value.
- ❑ **Market Segmentation:** Identify and target specific consumer groups.
- ❑ **Competitive Analysis:** Benchmark against competitors' offerings.

Benefits of Conjoint Analysis

- **Data-Driven Decisions:** Conjoint analysis equips decision-makers with empirical data, reducing reliance on intuition and enabling more objective strategies. It quantifies the consumer preferences, leading to more informed decisions across various aspects of product development and marketing.

- **Customer-Centric Approach:** By revealing what consumers value most, conjoint analysis ensures that companies prioritize features and services that resonate with their target audience. This approach helps in creating products and services tailored to meet the needs and desires of customers more accurately.

- **Strategic Advantage:** Utilizing conjoint analysis can uncover unique market insights, which can inform a company's strategic moves to outperform competitors. It aids in identifying niche market opportunities and areas for innovation that may not be immediately apparent, leading to a sustainable competitive edge.

Conjoint Analysis Process Flow

- **Define Objectives:** Establish the goal of the conjoint study.
- **Select Attributes & Levels:** Choose the product attributes and possible levels for each.
- **Design Questionnaire:** Create a survey that includes potential product configurations.
- **Collect Data:** Respondents rank or rate these configurations according to their preferences.
- **Analyse Data:** Utilize statistical software to simulate market choices and determine the relative value of each attribute.
- **Interpret Results:** Understand the attribute importance and how changes in levels affect the desirability of the product.
- **Implement Strategy:** Apply insights to make decisions on product features, pricing, positioning or segmentation.

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Dataset & EDA

Attributes & Levels

Screen Type	Screen Size	Adaptive Sync	Resolution	Color Gamut
• Widescreen • Ultra-Wide • Curved • Curved Ultra-Wide	• 21” • 24” • 27” • 30” • 35”	• G-Sync • Free-Sync • None	• 1080p (FHD) • 1440p (2k/QHD) • 2160p (4k/UHD)	• 70% • 85% • 100%
Refresh Rates	**Wide Viewing Angle**	**Response Time**	**HDR**	**Price**
• 75hz • 120hz • 144hz • 165hz • 240hz	• Yes • No	• 1ms • 3ms • 5ms	• Yes • No	• $250 • $400 • $550 • $700 • $850

Profiles & Baselines

- **# of Profiles: 480** Monitor Configurations were considered for the analysis
- **# of Respondents: 385** respondents responded to the surveys

Attribute	Baseline
Screen Type	Widescreen
Screen Size	24”
Adaptive Sync	No Adaptive Sync
Resolution	1080p (FHD)
Refresh Rate	75hz

Attribute	Baseline
Wide Viewing Angle	No
Response Time	5ms
HDR	No
Color Gamut	70%
Price	$400

Data Preprocessing

Merging

Combined respondents' data with monitor configurations data

Datatypes

Handled datatype issues for color gamut & price attributes

Mapping

Defined mapping functions to combine levels of each attribute

Baselines

Defined baseline for each attribute based on the industry standards

Encoding

One-hot encoded the attributes based on the defined baselines

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Conjoint Analysis & Price Elasticity

Dep. Variable:	Choice	No. Observations:	18480
Model:	Logit	Df Residuals:	18454
Method:	MLE	Df Model:	25
Date:	Mon, 06 Nov 2023	Pseudo R-squ.:	0.07487
Time:	23:32:31	Log-Likelihood:	-9613.9
converged:	True	LL-Null:	-10392.
Covariance Type:	nonrobust	LLR p-value:	0.000

	coef	std err	z	P>|z|	[0.025	0.975]
ScreenType_Curved	-0.6086	0.058	-10.574	0.000	-0.721	-0.496
ScreenType_Curved Ultra-Wide	-0.6430	0.055	-11.684	0.000	-0.751	-0.535
ScreenType_NoneOfThese	-1.2826	0.036	-35.943	0.000	-1.353	-1.213
ScreenType_Ultra-Wide	-0.6749	0.057	-11.844	0.000	-0.787	-0.563
ScreenSize_21"	-0.6144	0.066	-9.337	0.000	-0.743	-0.485
ScreenSize_27"	-0.3611	0.062	-5.864	0.000	-0.482	-0.240
ScreenSize_30"	-0.5111	0.063	-8.130	0.000	-0.634	-0.388
ScreenSize_35"	-0.5242	0.060	-8.715	0.000	-0.642	-0.406
AdaptiveSync_Free-Sync	-0.2099	0.051	-4.103	0.000	-0.310	-0.110
AdaptiveSync_G-Sync	0.0196	0.049	0.396	0.692	-0.077	0.116
Resolution_1440p (2k / QHD)	0.0144	0.051	0.286	0.775	-0.085	0.113
Resolution_2160p (4k / UHD)	0.1764	0.051	3.435	0.001	0.076	0.277
RefreshRate_120hz	0.0976	0.067	1.464	0.143	-0.033	0.228
RefreshRate_144hz	0.3952	0.065	6.106	0.000	0.268	0.522
RefreshRate_165hz	0.2876	0.063	4.570	0.000	0.164	0.411
RefreshRate_240hz	0.4523	0.064	7.024	0.000	0.326	0.579
WideViewingAngle_Yes	-0.1115	0.042	-2.629	0.009	-0.195	-0.028
ResponseTime_1ms	0.5224	0.051	10.325	0.000	0.423	0.622
ResponseTime_3ms	0.0724	0.052	1.391	0.164	-0.030	0.174
HDR_Yes	-0.0798	0.042	-1.916	0.055	-0.161	0.002
ColorGamut_100%	0.0133	0.050	0.265	0.791	-0.085	0.111
ColorGamut_85%	-0.0555	0.049	-1.127	0.260	-0.152	0.041
Price_$250	0.3384	0.055	6.145	0.000	0.230	0.446
Price_$550	-0.6451	0.060	-10.681	0.000	-0.764	-0.527
Price_$700	-1.2272	0.066	-18.607	0.000	-1.356	-1.098
Price_$850	-1.4777	0.072	-20.521	0.000	-1.619	-1.337

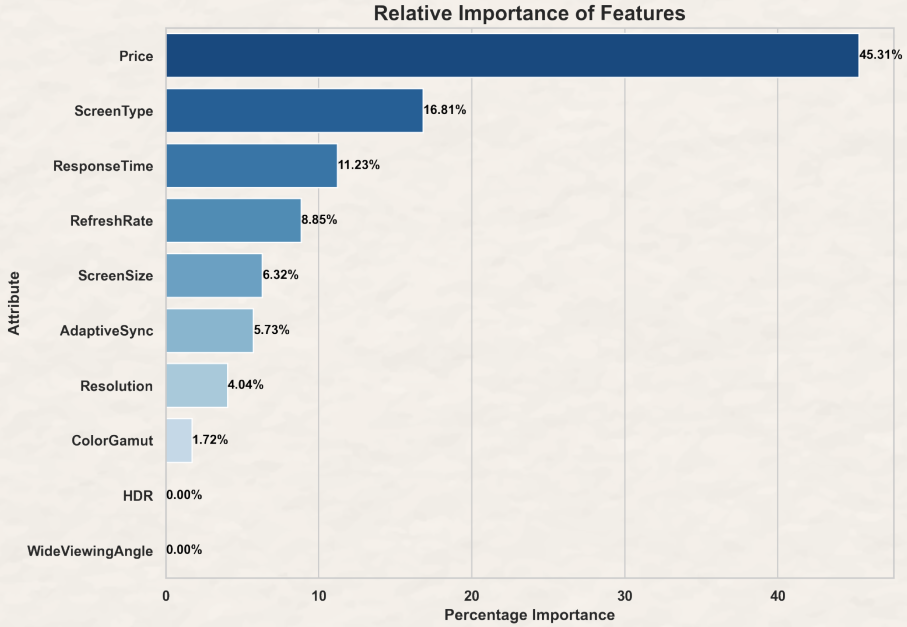
Interpretation

- **Screen Type & Size:**
  - **Preference for Standard Widescreen Monitors:** Strong aversion towards non-standard types (Curved, Curved Ultra-Wide, NoneOfThese). Sizes above 24" are less favoured.

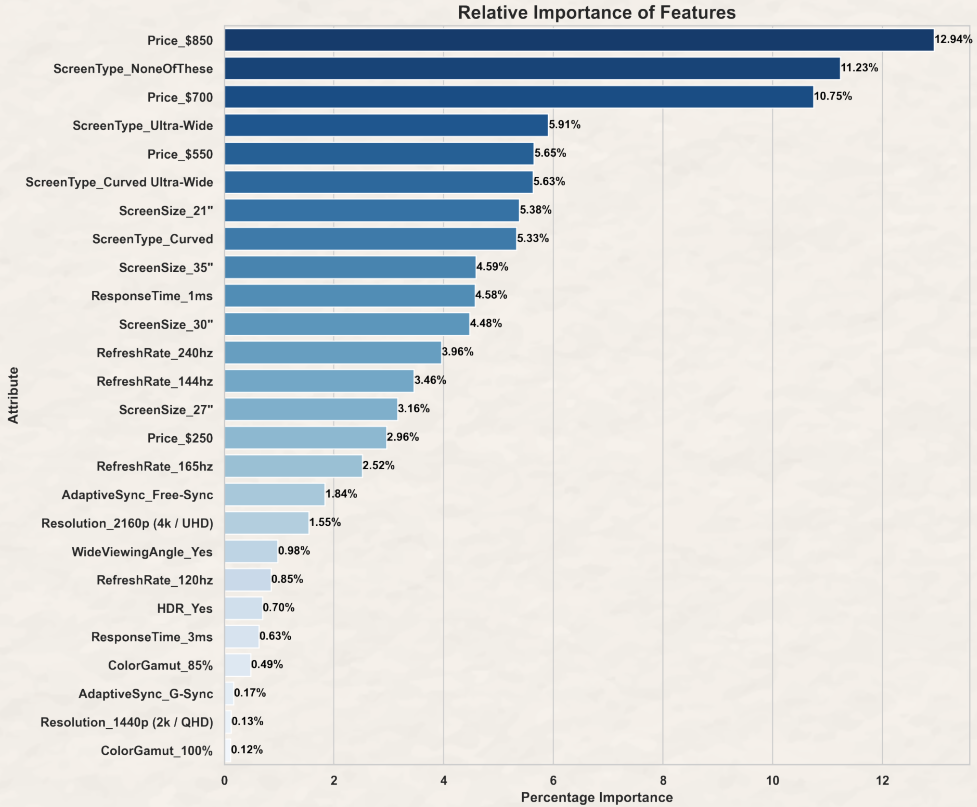
- **Key Tech Features:**
  - **Tech-Forward Priorities:** Preference for 4k resolution, higher refresh rates (144hz, 165hz, 240hz), and 1ms response time.
  - **Adaptive Sync & HDR:** Less preference for Free-Sync; slight aversion to HDR-enabled screens.

- **Other Influential Factors:**
  - **Price Sensitivity:** Lower prices ($250) are favoured; preferences decline as prices rise.
  - **Wide Viewing Angle:** Monitors with wide viewing angles are less preferred.

Attribute Importance



Price, **screen type**, and display performance features such as **response time** and **refresh rate** are the most influential attributes for consumers purchasing gaming monitors.

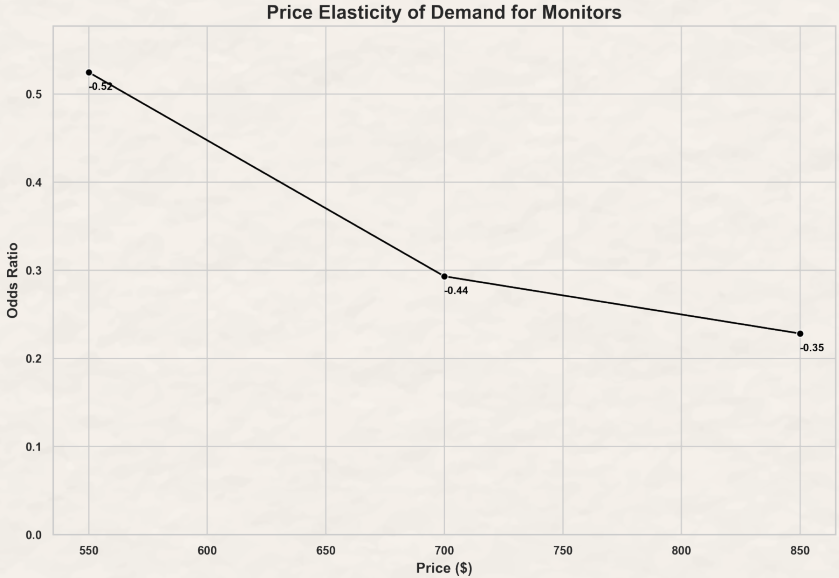


- The first method measures the importance of the attribute as a whole, considering the spread of its possible values. It's about the impact of the entire attribute (like Price) having different levels on the decision-making process.

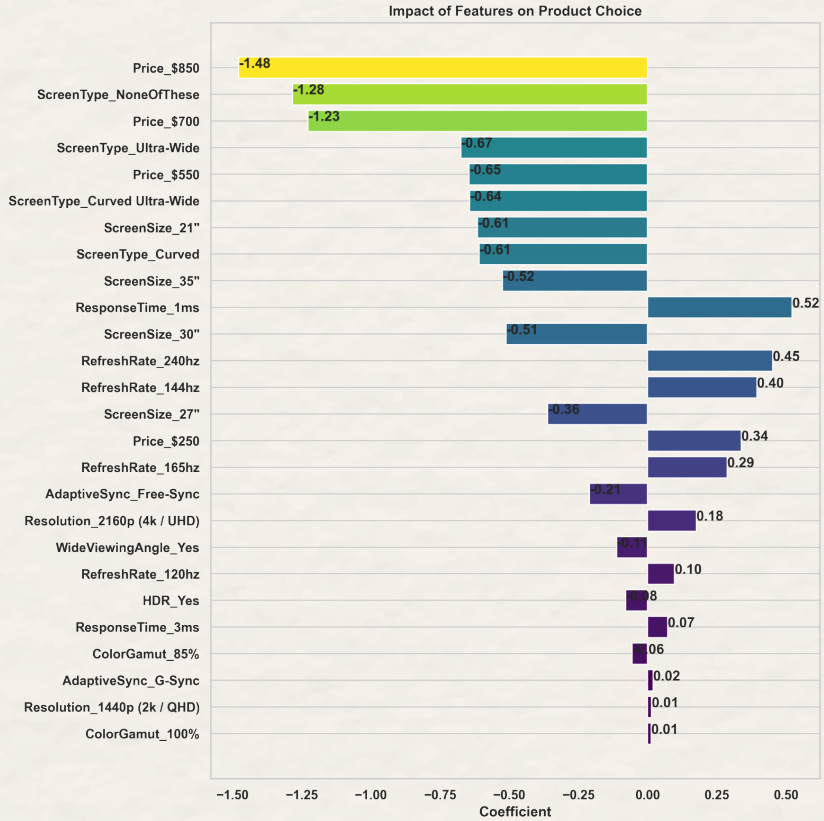
- The second method is more granular and looks at each level's impact individually. It tells you how important each individual coefficient is in the context of all coefficients.

So, if Price has a wide range of coefficients, it might seem more important in the first method because it contributes to a greater span in utility. However, in the second method, each Price level's importance is diluted when considering all other attributes' coefficients.

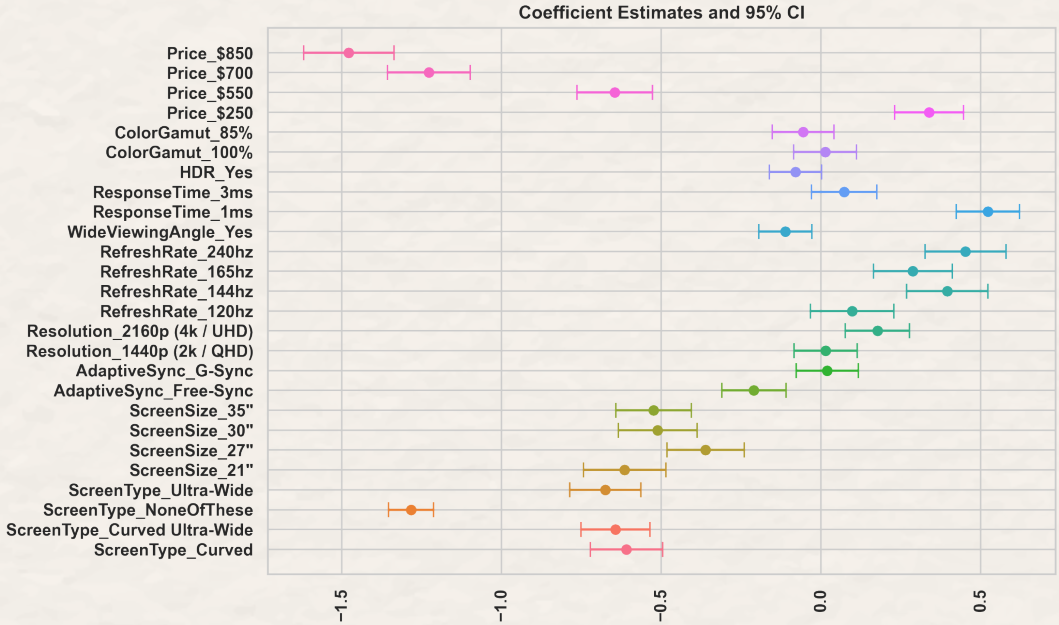
Price Elasticity



Based on the graph, it is evident that the odds ratio decreases as the price of monitors increases. In other words, higher prices are associated with lower odds of monitors being chosen/purchased, which is consistent with the law of demand (with a rising price comes a decreasing demand).



The graph presents a visual comparison of how various monitor features affect consumer choices, with bars colored from dark blue to yellow to signify negative to positive impacts. Features with the most significant negative effect, such as higher prices, are at the top, while those with positive or negligible effects are at the bottom. The color-coding and arrangement provide a clear hierarchy of feature impacts on customer preference.



The displayed graph illustrates the coefficient estimates and their respective 95% confidence intervals for different product features. Each point represents the coefficient value of a feature, and the lines show the range of values within the confidence interval. The diversity of colors enhances the distinction between features, making the graph both informative and visually engaging for presentation purposes.

05

Segmentation

Cluster Analysis

Definition: Cluster analysis is a statistical technique that groups data points (in this case, customers) into clusters or segments based on their similarity.

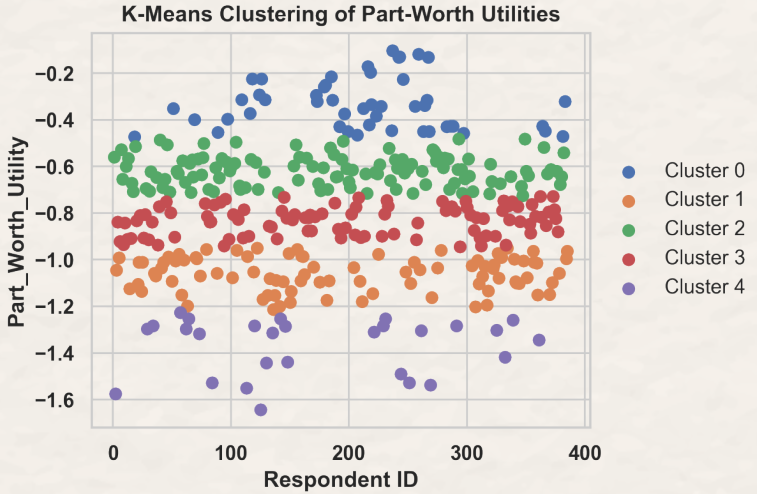
Goal: To understand the preferences of different customer segments, so that businesses can target their marketing efforts more effectively.

Process:

- First, utility scores are collected for individual customers, capturing their preferences for various product attributes (e.g., price, screen type, screen size, resolution, etc.).
- Next, cluster analysis algorithms (e.g., k-means) is applied to the utility score data to group customers into segments.
- Each cluster represents a distinct group of customers with similar preferences.

Cluster Representations

Cluster	Screen Type	Screen Size	Adaptive Sync	Resolution	Refresh Rate	Wide Viewing Angle	Response Time	HDR	Color Gamut	Average Price
0	Widescreen	24"	G-Sync	1440p (2k/QHD)	165hz	No	1ms	No	85%	$350.98
1	Widescreen	24"	G-Sync	2160p (4k/UHD)	240hz	Yes	1ms	Yes	100%	$530.57
2	Widescreen	24"	G-Sync	1440p (2k/QHD)	240hz	Yes	1ms	Yes	85%	$408.90
3	Widescreen	24"	G-Sync	2160p (4k/UHD)	240hz	Yes	1ms	Yes	100%	$455.02
4	Curved Ultra-Wide	21"	Free-Sync	2160p (4k/UHD)	144hz	Yes	3ms	Yes	100%	$611.94



Cluster	Characterization
0	Budget-oriented gamers prioritizing performance
1	High-end users requiring top-tier performance and fidelity
2	Mid-range gamers or tech enthusiasts seeking accessible high performance
3	Users desiring high-end features with more sensitivity to price
4	Consumers valuing immersive experiences for work or gaming

06

Conclusion

Key Findings

❑ **Price Trumps All:** The research underlines that pricing stands as the most influential factor in gaming monitor purchase decision, suggesting that competitive and well-strategized pricing models are key to attracting customers.

❑ **Display Performance is Paramount:** Attributes related to display performance, such as response time and refresh rate, significantly influence consumer preferences, indicating the priority placed on superior gaming experiences.

❑ **Diverse Consumer Preferences:** The cluster analysis identified distinct consumer segments, ranging from budget-oriented users prioritizing performance to high-end consumers seeking top-tier features, a diverse market with varying demands.

❑ **Feature Importance Varies:** While display-related features take precedence, attributes like color gamut, HDR, and wide viewing angles show minimal impact on consumer choice, hinting at their lesser significance in driving purchasing decisions.

❑ **Target Audience Insights:** Through clustering, specific target audiences emerge, such as mid-range gamers or tech enthusiasts seeking accessible high performance and users valuing immersive experiences for work or gaming. Understanding these segments can aid in targeted marketing strategies.

Future Work

❑ **Market Simulation:**

- **Product Launch and Development:** Simulating a market environment can be used to test the introduction of new products or product features. Companies can model how potential customers react to product changes and use this information to refine product development

❑ **Enhancing Customer Segmentation:**

- Understanding the clusters in detail to offer better targeting insights
- Segmentation with Individual coefficients
- Understand singularity matrix error when running segmentation with individual coefficients

Appendix

	Respondent ID	const	ScreenType_Curved	ScreenType_Curved Ultra-Wide	ScreenType_NoneOfThese	ScreenType_Ultra-Wide	ScreenSize_21"	ScreenSize_27"	ScreenSi
0	23	-24.792722	6.769664	-21.699339	24.792722	15.594261	20.099431	21.223331	13.4
1	24	36.372979	-6.098219	-28.487883	-37.471591	-16.013508	-18.253477	-7.317025	-54.5
2	31	-3.820219	6.969745	-30.689339	1.422324	-1.382374	-7.949858	6.139823	7.7
3	45	-52.955235	-7.651173	-19.639103	52.955235	-38.639488	-66.530577	21.615091	-4.5
4	50	-42.227247	4.004492	0.844693	43.836684	-6.383512	27.438010	26.493101	0.8
5	71	-70.261675	36.315262	63.617858	69.163063	97.049504	-98.197388	-81.569195	-5.8
6	77	17.597559	-47.209367	-44.285824	-18.696171	-44.933153	-1.154432	7.366738	5.5
7	78	-36.167658	-1.934459	-30.507493	36.167658	-25.739235	32.013904	19.689620	-7.7
8	84	-2.788791	-53.971059	-37.106812	-23.639880	-42.190637	58.850748	60.080811	24.8
9	87	14.537645	-42.830755	-18.527419	-16.935540	-61.588996	63.478411	101.128376	31.8
10	91	-22.656231	-7.634094	-14.579226	20.258336	12.239591	-5.675677	-41.337508	-18.3
11	92	-17.444763	17.527556	-71.039449	-14.440498	-19.514826	5.573339	78.807955	30.3
12	106	-51.163192	15.632093	73.042549	49.553754	88.629812	7.707111	-11.988305	30.8
13	108	-6.043133	4.961159	11.831955	3.645238	4.481676	-40.875335	-18.308103	9.8
14	114	112.849574	-98.872984	-99.688008	-112.849574	-114.786098	-64.116319	-33.546893	-40.5
15	119	-197.752023	32.049273	53.620395	196.653410	77.625116	22.110787	17.423292	-4.2
16	120	-20.497659	-6.584949	-3.011799	38.020016	-5.885849	-12.667445	-14.261044	-5.3
17	128	91.959811	-36.060519	-47.074951	-92.652958	-64.781288	-38.274479	-29.696039	-20.2
18	138	-66.153412	-20.145058	-34.284376	23.460673	-7.016884	20.851525	-51.350997	-11.8
19	148	-49.717761	29.366492	45.262549	23.178463	-20.019157	-33.401695	-8.490667	-19.8