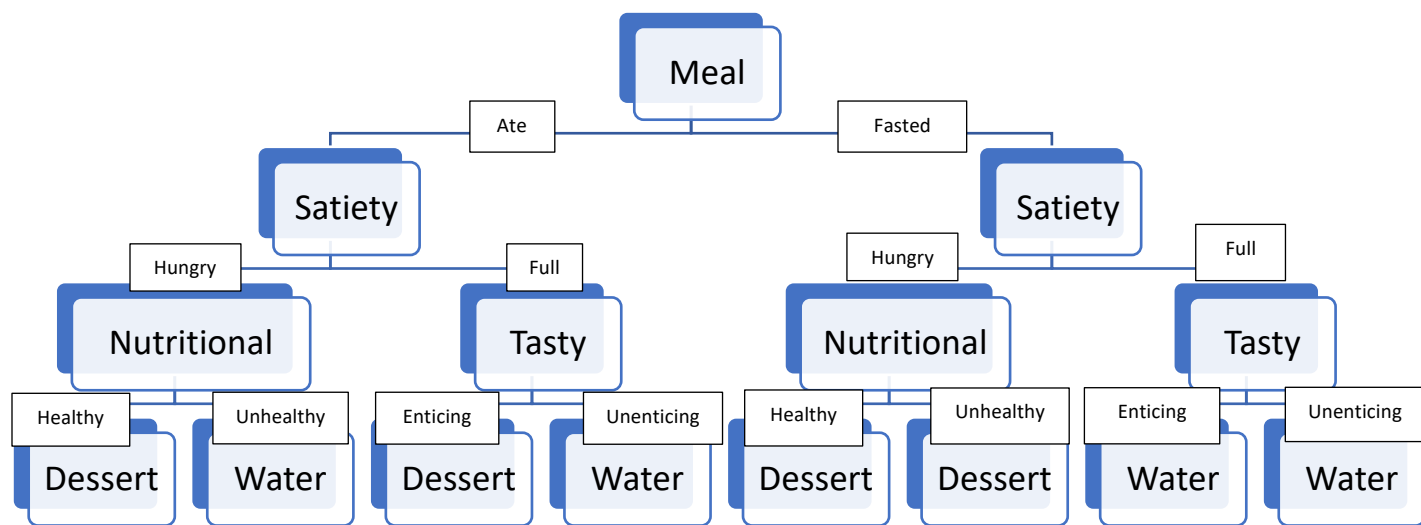


**My Decision Tree:**



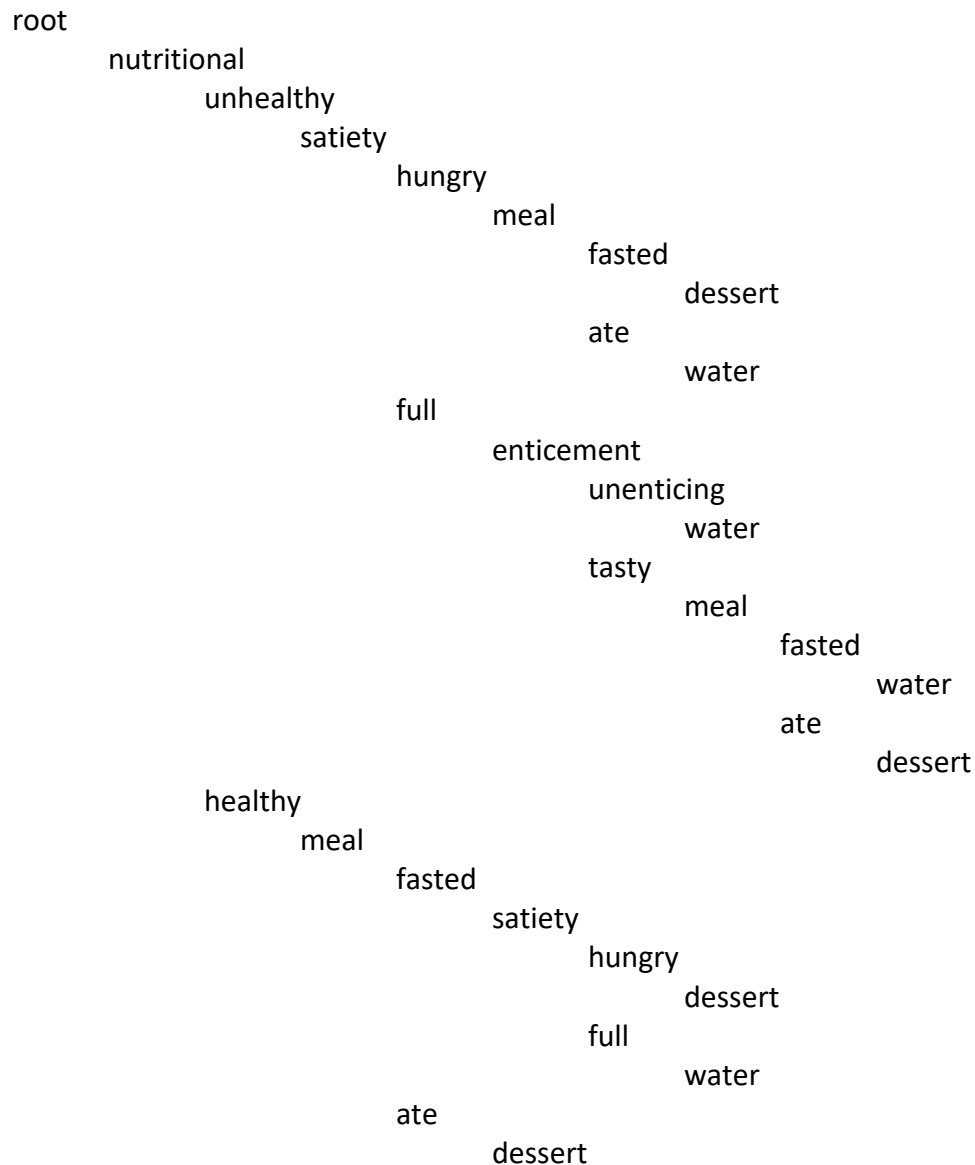
## **Summary:**

My final project consists of creating a decision tree by hand, coding up the data corresponding to that tree, writing the ID3 algorithm, printing the ID3 algorithm tree, and showing the efficacy of my algorithm. As you can see in Figure 1, my decision tree has four distinct attributes (meal, satiety, nutrition, and enticement) with two possible attribute values for each attribute and two possible classifications (water, dessert). There are many ways I could have made the data (i.e., dictionary, list of lists, etc.), however, I chose a more unorthodox route. I created a numpy array composed of unique combinations of variables representing the attribute values. I assign those variables 0s and 1s corresponding to the attribute values by following the tree. I then sampled from these 16 unique combinations using `np.random.choice()` to expand to a sufficient number of rows (i.e., 10000). Finally, I split the expanded data object to have a training set and testing set (two data objects). After creating the data, I wrote the main with four important lists corresponding to the attributes, changeable attributes, attribute values, and the classifications. Subsequently, I wrote the routine to run the algorithm. Next, I worked on the ID3 algorithm and Node Class. Finally, I worked out a way to classify the data to show the efficacy of my algorithm.

To test my ID3 algorithm, I went to [Kaggle](#) and selected a dataset related to diamonds full of categorical variables with a classification of natural or lab made diamonds. Although, there were important variables like price and carat, I removed them for this exercise to accommodate the decisions tree's preference for categorical variables. My main challenge was to convert the data to my unorthodox setup of four lists (allattr, attr, attrvals, and classif\_list) and the data object filled with integers. I read in the file and converted the data to the desired structures. Subsequently, I used the already built algorithms to take care of the rest.

Results: Printed results from python console.

Thank you for your interest in the Food Choice Decision Tree



The decision tree is complete.

Now we look at the accuracy of the ID3 algorithm!

We have 100.0% accuracy!

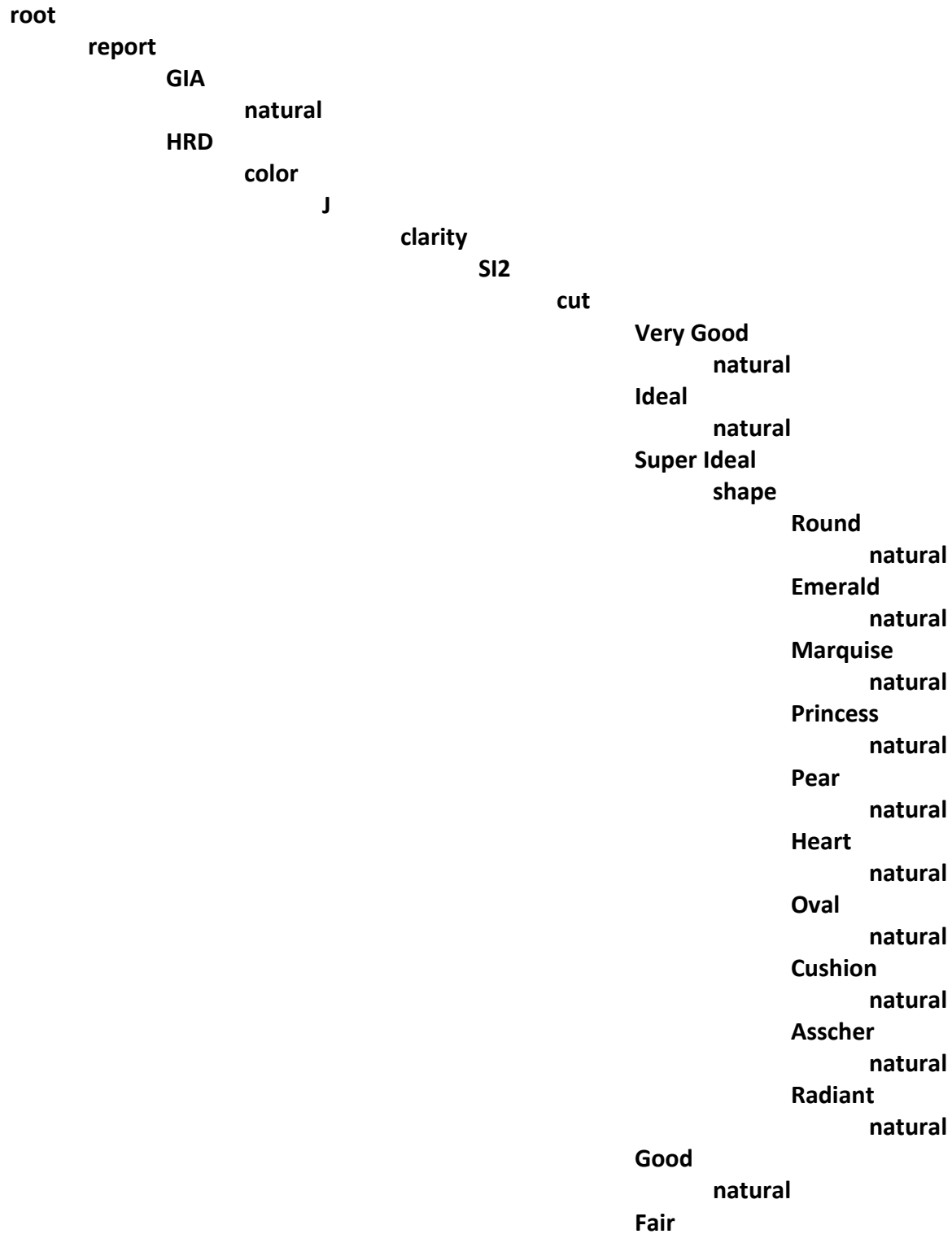
What if we purposefully flip one classification in the test data so that it does not follow the tree?

We get 99.9% accuracy, as expected!

## Diamond Real-World Data

But what about real-world data?!

This is the Diamond Classification Decision Tree!



SI1	shape	Round	natural
		Emerald	natural
		Marquise	natural
		Princess	natural
		Pear	natural
		Heart	natural
		Oval	natural
		Cushion	natural
		Asscher	natural
		Radiant	natural
VS2	cut	Very Good	lab
		Ideal	
			shape
			Round
			Emerald
			Marquise
			Princess
			Pear
			Heart
			Oval
			Cushion

natural  
Asscher  
natural  
Radiant  
natural  
Super Ideal  
lab  
Good  
lab  
Fair  
natural  
VVS1  
cut  
Very Good  
lab  
Ideal  
shape  
Round  
natural  
Emerald  
natural  
Marquise  
natural  
Princess  
natural  
Pear  
natural  
Heart  
natural  
Oval  
natural  
Cushion  
natural  
Asscher  
natural  
Radiant  
natural  
Super Ideal  
shape  
Round  
natural  
Emerald  
natural  
Marquise

VS1	cut	shape	color	clarity	price
				natural	
		Princess		natural	
		Pear		natural	
		Heart		natural	
		Oval		natural	
		Cushion		natural	
		Asscher		natural	
		Radiant		natural	
	Good			natural	
	Fair			natural	
				natural	
	Very Good			lab	
	Ideal			lab	
	Super Ideal			lab	
	Good			lab	
	Fair			lab	
		shape			
		Round		natural	
		Emerald		natural	
		Marquise		natural	
		Princess		natural	
		Pear		natural	
		Heart		natural	
		Oval		natural	

I  
cut  
Very Good  
clarity  
SI2  
SI1  
lab  
shape  
Round  
natural  
Emerald  
natural  
Marquise  
natural  
Princess  
natural  
Pear  
natural  
Heart  
natural  
Oval  
natural  
Cushion  
natural  
Asscher  
natural  
Radiant  
natural  
natural  
Cushion  
natural  
Asscher  
natural  
Radiant  
natural  
VVS2  
lab  
IF  
natural  
FL  
natural  
VS2  
lab  
VVS1



			shape
			Round
			natural
			Emerald
			natural
			Marquise
			natural
			Princess
			natural
			Pear
			natural
			Heart
			natural
			Oval
			natural
			Cushion
			natural
			Asscher
			natural
			Radiant
			natural
		VS1	
			lab
		VVS2	
			lab
		IF	
			natural
		FL	
			natural
	Ideal		
	clarity		
		SI2	
			shape
			Round
			natural
			Emerald
			lab
			Marquise
			natural
			Princess
			natural
			Pear
			natural
			Heart

Super Ideal clarity	SI1	lab	Oval	natural
			Cushion	natural
			Asscher	natural
			Radiant	natural
			VS2	lab
			VVS1	lab
			VS1	lab
			VVS2	lab
	IF	natural	FL	natural
			SI2	lab
			SI1	shape
			Round	natural
			Emerald	natural
			Marquise	natural
			Princess	natural
			Pear	natural
Heart	natural	Oval	natural	
		Cushion	natural	

			natural
		Asscher	
			natural
		Radiant	
			natural
VS2			
	shape		
		Round	
			natural
		Emerald	
			natural
		Marquise	
			natural
		Princess	
			natural
		Pear	
			natural
		Heart	
			natural
		Oval	
			natural
		Cushion	
			natural
		Asscher	
			natural
		Radiant	
			natural
VVS1			
	shape		
		Round	
			natural
		Emerald	
			natural
		Marquise	
			natural
		Princess	
			natural
		Pear	
			natural
		Heart	
			natural
		Oval	
			natural
		Cushion	

Good	clarity	VS1	shape	Asscher	natural		
				Radiant	natural		
				Round	natural		
				Emerald	natural		
				Marquise	natural		
				Princess	natural		
				Pear	natural		
				Heart	natural		
				Oval	natural		
				Cushion	natural		
				Asscher	natural		
				Radiant	natural		
		VVS2	lab	IF	natural		
				FL	natural		
				SI2	shape	Round	natural
						Emerald	natural
						Marquise	natural
						Princess	natural

Fair	clarity	SI1	natural	Pear	natural
		VS2	natural	Heart	natural
		VVS1	natural	Oval	natural
		VS1	lab	Cushion	natural
		VVS2	natural	Asscher	natural
		IF	natural	Radiant	natural
		FL	natural		
		SI2	natural		
		SI1	natural		
		VS2	natural		
Fair	clarity	VVS1	natural		
		VS1	natural		
		VVS2	natural		
		IF	natural		
		FL	natural		

E natural

F natural

G clarity

SI2

cut

Very Good

shape

Round

natural

Emerald

natural

Marquise

natural

Princess

natural

Pear

natural

Heart

natural

Oval

natural

Cushion

natural

Asscher

natural

Radiant

natural

Ideal

natural

Super Ideal

natural

Good

natural

Fair

natural

SI1

cut

Very Good

natural

Ideal

VS2	cut	Super Ideal shape	natural
			Round
			natural
			Emerald
			natural
			Marquise
			natural
			Princess
			natural
			Pear
natural			
Heart			
natural			
Oval			
natural			
Cushion			
natural			
Asscher			
natural			
Radiant			
natural			
Good			
natural			
Fair			
natural			
Very Good			
natural			
Ideal			
natural			
Super Ideal shape			
Round			
natural			
Emerald			
natural			
Marquise			
natural			
Princess			
natural			
Pear			

cut	shape	color	clarity	carat	price
VVS1	Heart	natural			
	Oval	natural			
	Cushion	natural			
	Asscher	natural			
	Radiant	natural			
	Good				
	Fair	natural			
	Very Good	natural			
	Ideal	shape			
	Round	natural			
	Emerald	natural			
	Marquise	natural			
	Princess	natural			
	Pear	natural			
	Heart	natural			
	Oval	natural			
	Cushion	natural			
	Asscher	natural			
	Radiant	natural			
	Super Ideal	shape			
Round					



VS1	cut	shape	color	clarity	cert
		Round	natural		
		Emerald	natural		
		Marquise	natural		
		Princess	natural		
		Pear	natural		
		Heart	natural		
		Oval	natural		
		Cushion	natural		
		Asscher	natural		
		Radiant	natural		
	Good		natural		
	Fair		natural		
	Very Good		lab		
	Ideal		natural		
	Super Ideal				
		Round	natural		
		Emerald	natural		
		Marquise	natural		
		Princess	natural		
		Pear	natural		
		Heart	natural		
		Oval			



FL natural

FL natural

H

shape

Round

cut

Very Good

clarity

SI2 natural

SI1 lab

VS2 lab

VVS1 natural

VS1 lab

VVS2 lab

IF natural

FL natural

Ideal

clarity

SI2 natural

SI1 natural

VS2 natural

VVS1 lab

VS1 lab

VVS2 lab

IF natural

FL natural

Super Ideal

**clarity**

SI2

**natural**

SI1

**natural**

**VS2**

**natural**

## VVS1

**natural**

**VS1**

**natural**

**VVS2**

**natural**

**IF**

**natural**

FL

**natural**

**Good**

## clarity

SI2

**natural**

SI1

**natural**

**VS2**

**natural**

## VVS1

**natural**

**VS1**

**natural**

**VVS2**

**natural**

**IF**

**natural**

FL

**natural**

**Fair**

**natural**

## Emerald

**natural**

## Marquise

**natural**

## Princess

**natural**

## Pear

Heart natural  
natural  
Oval  
natural  
Cushion  
natural  
Asscher  
natural  
Radiant  
natural  
D  
natural  
IGI  
clarity  
SI2  
color  
J  
shape  
Round  
cut  
Very Good  
natural  
Ideal  
natural  
Super Ideal  
lab  
Good  
natural  
Fair  
natural  
Emerald  
lab  
Marquise  
lab  
Princess  
cut  
Very Good  
natural  
Ideal  
natural  
Super Ideal  
natural  
Good

			natural
		Fair	
			natural
Pear			
	cut		
		Very Good	
		lab	
		Ideal	
			natural
		Super Ideal	
			natural
		Good	
			natural
		Fair	
			natural
Heart			
	lab		
Oval			
	cut		
		Very Good	
			natural
		Ideal	
			natural
		Super Ideal	
			natural
		Good	
			natural
		Fair	
			natural
Cushion			
	cut		
		Very Good	
		lab	
		Ideal	
			lab
		Super Ideal	
			natural
		Good	
			natural
		Fair	
			natural
Asscher			
	lab		
Radiant			

	cut	shape	lab		
Very Good	shape	Round	natural		
		Emerald	lab		
		Marquise	natural		
		Princess	natural		
		Pear	natural		
		Heart	lab		
		Oval	natural		
		Cushion	lab		
		Asscher	natural		
		Radiant	lab		
		Ideal	shape	Round	natural
				Emerald	natural
				Marquise	lab
				Princess	natural
Pear	natural				
		Heart	lab		
		Oval	natural		
		Cushion	natural		
		Asscher			

Clarity	Shape	Color	Cut	Weight	Price
Super Ideal	shape	natural	Radiant	1.00	1000
			natural	1.00	1000
			Round	1.00	1000
			lab	1.00	1000
			Emerald	1.00	1000
			lab	1.00	1000
			Marquise	1.00	1000
			lab	1.00	1000
			Princess	1.00	1000
			natural	1.00	1000
			Pear	1.00	1000
			lab	1.00	1000
			Heart	1.00	1000
			natural	1.00	1000
Good	shape	natural	Oval	1.00	1000
			natural	1.00	1000
			Cushion	1.00	1000
			lab	1.00	1000
			Asscher	1.00	1000
			natural	1.00	1000
			Radiant	1.00	1000
			natural	1.00	1000
			Round	1.00	1000
			natural	1.00	1000
			Emerald	1.00	1000
			lab	1.00	1000
			Marquise	1.00	1000
			natural	1.00	1000
Princess	1.00	1000			
natural	1.00	1000			
Pear	1.00	1000			
natural	1.00	1000			
Heart	1.00	1000			
natural	1.00	1000			
Oval	1.00	1000			
natural	1.00	1000			
Cushion	1.00	1000			
lab	1.00	1000			
Asscher	1.00	1000			



Shape	Cut	Color	Clarity	Carat Weight	Price
E	Fair	natural	natural	1.00	1000
					1500
					2000
					2500
					3000
	Round	cut	natural	1.00	1200
					1800
					2400
					3000
					3600
Emerald	lab	natural	1.00	1100	
				1600	
				2100	
				2600	
				3100	
	Marquise	natural	natural	1.00	1300
					1900
					2500
					3100
					3700
Princess	cut	natural	1.00	1400	
				2000	
				2600	
				3200	
				3800	
	Pear	cut	natural	1.00	1500
					2100
					2700
					3300
					3900

			natural
		Fair	
			natural
Heart			
	cut		
		Very Good	
			natural
		Ideal	
			natural
		Super Ideal	
			natural
		Good	
			natural
		Fair	
			natural
Oval			
	cut		
		Very Good	
			natural
		Ideal	
			natural
		Super Ideal	
			lab
		Good	
			natural
		Fair	
			natural
Cushion			
	cut		
		Very Good	
			lab
		Ideal	
			natural
		Super Ideal	
			natural
		Good	
			lab
		Fair	
			natural
Asscher			
	lab		
Radiant			
	lab		

shape

Round

cut

Very Good

natural

Ideal

natural

Super Ideal

natural

Good

natural

Fair

natural

Emerald

cut

Very Good

natural

Ideal

lab

Super Ideal

lab

Good

lab

Fair

natural

Marquise

cut

Very Good

natural

Ideal

natural

Super Ideal

natural

Good

natural

Fair

natural

Princess

cut

Very Good

natural

Ideal

natural

Super Ideal

			natural
		Good	
			natural
		Fair	
			natural
Pear			
	cut		
		Very Good	
			natural
		Ideal	
			natural
		Super Ideal	
			natural
		Good	
			natural
		Fair	
			natural
Heart			
	cut		
		Very Good	
			natural
		Ideal	
			natural
		Super Ideal	
			natural
		Good	
			natural
		Fair	
			natural
Oval			
	cut		
		Very Good	
			natural
		Ideal	
			natural
		Super Ideal	
			natural
		Good	
			natural
		Fair	
			natural
Cushion			
	cut		
		Very Good	

		Ideal	natural
			natural
		Super Ideal	lab
		Good	lab
		Fair	natural
	Asscher		
		lab	
	Radiant		
		lab	
G	cut		
		Very Good	shape
		Round	natural
			natural
		Emerald	lab
		Marquise	natural
		Princess	natural
		Pear	natural
		Heart	natural
		Oval	natural
		Cushion	natural
		Asscher	lab
		Radiant	natural
	Ideal		
		shape	
		Round	natural
		Emerald	natural
		Marquise	

		natural
	Princess	
		natural
	Pear	
		natural
	Heart	
		natural
	Oval	
		natural
	Cushion	
		natural
	Asscher	
		natural
	Radiant	
		lab
Super Ideal		
shape		
	Round	
		lab
	Emerald	
		natural
	Marquise	
		natural
	Princess	
		natural
	Pear	
		natural
	Heart	
		natural
	Oval	
		natural
	Cushion	
		natural
	Asscher	
		natural
	Radiant	
		natural
Good		
shape		
	Round	
		natural
	Emerald	
		natural
	Marquise	

**natural**

## Princess

**natural**

## Pear

## lab

## Heart

**natural**

## Oval

**natural**

## Cushion

**natural**

## Asscher

**natural**

## Radiant

**natural**

**Fair**

**shape**

## Round

**natural**

## Emerald

**natural**

## Marquise

**natural**

## Princess

**natural**

## Pear

**natural**

## Heart

**natural**

## Oval

**natural**

## Cushion

**natural**

## Asscher

**natural**

## Radiant

**natural**

H

**shape**

## Round

cut

**Very Good**

**natural**

## Ideal

		natural
	Super Ideal	
	lab	
	Good	
		natural
	Fair	
		natural
Emerald		
cut		
	Very Good	
		natural
	Ideal	
		natural
	Super Ideal	
		natural
	Good	
		lab
	Fair	
		natural
Marquise		
cut		
	Very Good	
		natural
	Ideal	
		lab
	Super Ideal	
		lab
	Good	
		natural
	Fair	
		natural
Princess		
cut		
	Very Good	
		natural
	Ideal	
		natural
	Super Ideal	
		natural
	Good	
		natural
	Fair	
		natural
Pear		



	cut	Very Good natural
		Ideal natural
		Super Ideal natural
		Good lab
		Fair natural
Heart	cut	Very Good natural
		Ideal natural
		Super Ideal natural
		Good natural
		Fair natural
Oval	cut	Very Good natural
		Ideal natural
		Super Ideal natural
		Good natural
		Fair natural
Cushion	cut	Very Good natural
		Ideal natural
		Super Ideal natural
		Good

cut	shape	color	clarity	carat	price	cert
D	Very Good	Fair	natural			
			natural			
			Asscher			
			natural			
			Radiant			
	Ideal	Fair	lab			
			Round			
			natural			
			Emerald			
D	Very Good	Fair	lab			
			Marquise			
			natural			
			Princess			
	Ideal	Fair	natural			
			Pear			
			lab			
			Heart			
			natural			
D	Very Good	Fair	natural			
			Oval			
			natural			
			Cushion			
			lab			
	Ideal	Fair	Asscher			
			natural			
			Radiant			
			lab			
D	Very Good	Fair	natural			
			natural			
			Round			
			natural			
			Emerald			
	Ideal	Fair	natural			
			Marquise			
			natural			
			Princess			
			natural			
D	Very Good	Fair	natural			
			Pear			
			natural			
			Heart			
	Ideal	Fair				

Category	Shape	Source
Super Ideal	Oval	natural
	Cushion	natural
	Asscher	lab
	Radiant	natural
	Round	natural
	Emerald	lab
	Marquise	natural
	Princess	natural
	Pear	natural
	Heart	natural
Good	Oval	natural
	Cushion	natural
	Asscher	natural
	Radiant	natural
	Round	lab
	Emerald	lab
	Marquise	natural
	Princess	natural
	Pear	lab
	Heart	

SI1	cut	Very Good	shape	Round	color	Oval	natural
						Cushion	natural
						Asscher	lab
						Radiant	natural
						Fair	natural
						J	natural
						I	natural
						E	lab
						F	natural
						G	natural
SI1	cut	Very Good	shape	Round	color	H	natural
						D	natural
						Emerald	lab
						Marquise	lab
						Princess	color
						J	natural
						I	lab
						E	natural
						F	natural

Ideal	shape	Round	color	J	natural	
				I	natural	
				E	lab	
				F		
				Radiant	lab	
					Asscher	lab
					Cushion	lab
					Oval	lab
	Heart	lab				
		D	lab			
		H	natural			
		G	lab			
		F	lab			
		E	lab			
		I	lab			
		J	lab			
Pear	color					
	D	natural				
	H	lab				
	G	natural				

[illegible]

Fair	shape	Round	color	
			J	natural
			I	natural
			E	natural
			F	lab
			G	natural
			H	natural
			D	lab
		Emerald	lab	
		Marquise	lab	
		Princess	natural	
		Pear	lab	
		Heart	lab	
		Oval	lab	
		Cushion	lab	
		Asscher	lab	
		Radiant	lab	
		color		
		J	natural	
		I	natural	
		E	natural	
F				

VS2	cut	Very Good	shape	Round	color	G	natural
						H	natural
						D	natural
						D	natural
						Emerald	
						natural	
						Marquise	
						natural	
						Princess	
						natural	
						Pear	
						lab	
						Heart	
						natural	
Oval							
lab							
Cushion							
lab							
Asscher							
natural							
Radiant							
natural							
J							
I	natural						
E	natural						
F	natural						
G	lab						
H	natural						
D	natural						



## lab

## Emerald

## lab

## Marquise

## lab

## Princess

## lab

## Pear

## lab

## Heart

## lab

## Oval

## lab

## Cushion

**color**

**J**

**lab**

1

**natural**

**E**

## lab

**F**

**natural**

## G

## lab

H

**natural**

D

**lab**

## Asscher

**lab**

## Radiant

## lab

## Ideal

**shape**

## Round

**color**

**J**

**natural**

1

**natural**

**E**

## lab

**F**

**natural**

## G

**natural**

H

**natural**

D

**lab**

## Emerald

## lab

## Marquise

## lab

## Princess

## lab

## Pear

## lab

## Heart

## lab

**Oval**

## lab

## Cushion

**color**

**J**

**natural**

1

**lab**

**E**

## lab

**F**

**lab**

## G

**lab**

H

**lab**

D

## lab

## Asscher

## lab

## Radiant

## lab

## Super Ideal

## lab

**Good**

**shape**

## Round

	color	
	J	lab
	I	natural
	E	lab
	F	lab
	G	lab
	H	natural
	D	natural
Emerald		
lab		
Marquise		
lab		
Princess		
lab		
Pear		
lab		
Heart		
lab		
Oval		
lab		
Cushion		
color		
	J	natural
	I	natural
	E	lab
	F	natural
	G	natural
	H	lab
	D	lab
Asscher		

The treemap displays the hierarchical distribution of diamond attributes. The 'color' attribute is the most prominent, accounting for approximately 60% of the total area. It is divided into 'Fair' (about 30%), 'Very Good' (about 20%), and 'VVS1' (about 10%). 'Fair' further branches into grades J, I, E, F, and G. 'Very Good' branches into H and D. 'VVS1' branches into J. The 'cut' attribute branches into eleven categories: Round, Emerald, Marquise, Princess, Pear, Heart, Oval, Cushion, Asscher, and Radiant. The 'lab' attribute branches into 'natural' and 'lab'.

Attribute	Sub-Attribute	Approximate Percentage	
color	Fair	J	~6%
		I	~6%
		E	~6%
		F	~6%
		G	~6%
	Very Good	H	~10%
		D	~10%
	VVS1	J	~10%
	cut	Round	~10%
		Emerald	~8%
		Marquise	~8%
		Princess	~8%
		Pear	~8%
		Heart	~8%
		Oval	~8%
Cushion		~8%	
Asscher		~8%	
Radiant		~8%	
lab		natural	~50%
lab	lab	~50%	

shape

- Round
  - natural
- Emerald
  - natural
- Marquise
  - natural
- Princess
  - natural
- Pear
  - lab
- Heart
  - natural
- Oval
  - natural
- Cushion
  - natural
- Asscher
  - natural
- Radiant
  - lab

Ideal

shape

- Round
  - natural
- Emerald
  - natural
- Marquise
  - natural
- Princess
  - natural
- Pear
  - lab
- Heart
  - natural
- Oval
  - natural
- Cushion
  - natural
- Asscher
  - natural
- Radiant
  - natural

Super Ideal

cut	shape	color	clarity	carat	price	cert
Very Good	Round	D	SI1	0.9	1000	lab
	Emerald	E	SI1	0.9	1000	natural
	Marquise	F	SI1	0.9	1000	natural
	Princess	G	SI1	0.9	1000	natural
	Pear	H	SI1	0.9	1000	lab
	Heart	I	SI1	0.9	1000	natural
	Oval	J	SI1	0.9	1000	lab
	Cushion	K	SI1	0.9	1000	natural
	Asscher	L	SI1	0.9	1000	natural
	Radiant	M	SI1	0.9	1000	natural
Ideal	Round	D	SI1	0.9	1000	natural
	Emerald	E	SI1	0.9	1000	natural
	Marquise	F	SI1	0.9	1000	natural
	Princess	G	SI1	0.9	1000	lab
	Pear	H	SI1	0.9	1000	lab
	Heart	I	SI1	0.9	1000	natural
	Oval	J	SI1	0.9	1000	natural
	Asscher	K	SI1	0.9	1000	natural

Color	Clarity	Cut	Shape	Setting	Material
E	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
F	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
G	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
H	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
I	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
J	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
K	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
L	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
M	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
N	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
O	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
P	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
Q	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
R	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
S	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
T	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
U	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
V	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
W	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion
					Asscher
					Radiant
X	lab	cut	Very Good	shape	Round
					Emerald
					Marquise
					Princess
					Pear
					Heart
					Oval
					Cushion

G	cut	Fair	lab
			natural
		Very Good	lab
		Ideal	shape
			Round
			natural
			Emerald
			lab
			Marquise
			natural
			Princess
			lab
			Pear
			lab
			Heart
			natural
			Oval
			lab
		H	cut
Asscher	natural		
Radiant	natural		
Super Ideal	lab		
Good	lab		
Fair	natural		
Very Good	lab		
Ideal	shape		
	Round		
	natural		
	Emerald		



lab  
Marquise  
natural  
Princess  
lab  
Pear  
lab  
Heart  
natural  
Oval  
lab  
Cushion  
lab  
Asscher  
natural  
Radiant  
natural  
Super Ideal  
lab  
Good  
shape  
Round  
natural  
Emerald  
natural  
Marquise  
natural  
Princess  
natural  
Pear  
natural  
Heart  
natural  
Oval  
natural  
Cushion  
lab  
Asscher  
natural  
Radiant  
natural  
Fair  
natural

D

VS1	cut	Very Good	shape	Round	color	J	natural
						I	natural
						E	lab
						F	natural
						G	natural
		Emerald	color	H	natural		
				D	lab		
				J	lab		
				I	natural		
				E	lab		
	Marquise	lab	F	lab			
			G	lab			
			H	lab			
			D	lab			
			Heart	lab			
	Princess	lab					
Pear	lab						

lab  
Oval  
lab  
Cushion  
color  
J  
lab  
I  
natural  
E  
lab  
F  
lab  
G  
lab  
H  
natural  
D  
lab  
Asscher  
lab  
Radiant  
lab  
Ideal  
color  
J  
shape  
Round  
natural  
Emerald  
lab  
Marquise  
lab  
Princess  
lab  
Pear  
lab  
Heart  
lab  
Oval  
lab  
Cushion  
lab  
Asscher

		lab
		Radiant
		lab
I		
	shape	
		Round
		natural
		Emerald
		lab
		Marquise
		lab
		Princess
		lab
		Pear
		lab
		Heart
		lab
		Oval
		lab
		Cushion
		lab
		Asscher
		natural
		Radiant
		lab
E		
	lab	
F		
	shape	
		Round
		natural
		Emerald
		lab
		Marquise
		lab
		Princess
		lab
		Pear
		lab
		Heart
		lab
		Oval
		lab
		Cushion

		lab
	Asscher	
		lab
	Radiant	
		lab
G		
	shape	
	Round	
		natural
	Emerald	
		lab
	Marquise	
		lab
	Princess	
		lab
	Pear	
		lab
	Heart	
		lab
	Oval	
		lab
	Cushion	
		lab
	Asscher	
		lab
	Radiant	
		lab

H		
	shape	
	Round	
		natural
	Emerald	
		lab
	Marquise	
		lab
	Princess	
		natural
	Pear	
		lab
	Heart	
		lab
	Oval	
		lab
	Cushion	

Quality	Shape	Color	Clarity	Cut	Lab				
Super Ideal	shape	D	lab	Asscher	lab				
				Radiant	lab				
				Round	lab				
				Emerald	lab				
				Marquise	lab				
				Princess	lab				
				Pear	color				
				Good				J	natural
								I	lab
								E	lab
F	lab								
G	lab								
H	natural								
D	lab								
Heart	lab								
Oval	lab								
Cushion	lab								
Asscher	lab								
Radiant	lab								

shape	Round	color	J	natural
			I	natural
			E	lab
			F	natural
			G	natural
			H	natural
			D	lab
	Emerald	lab		
	Marquise	lab		
	Princess	lab		
	Pear	lab		
	Heart	lab		
	Oval	lab		
	Cushion	color <th>J</th> <th>natural</th>	J	natural
			I	lab
			E	lab
			F	lab
			G	natural
			H	natural
			D	

The treemap visualizes the distribution of diamond attributes. The primary split is by 'cut', with 'Very Good' and 'VVS2' being the most prominent categories. 'Very Good' is further divided by 'shape' (Fair, Round) and 'color' (J, I, E, F, G, H, D). 'VVS2' is divided by 'shape' (Emerald, Marquise, Princess, Pear, Heart, Oval, Cushion) and 'lab' (Asscher, Radiant).

cut	shape	color	lab
Very Good	Fair		
	Round	J	natural
		I	natural
		E	lab
		F	natural
		G	natural
VVS2	Emerald		
	Marquise		
Princess			
Pear			
Heart			
Oval			
Cushion			
Asscher			
Radiant			



color

J

shape

Round  
natural  
Emerald  
lab  
Marquise  
natural  
Princess  
lab  
Pear  
lab  
Heart  
natural  
Oval  
lab  
Cushion  
natural  
Asscher  
natural  
Radiant  
natural

I

shape

Round  
natural  
Emerald  
natural  
Marquise  
lab  
Princess  
natural  
Pear  
lab  
Heart  
natural  
Oval  
lab  
Cushion  
natural  
Asscher  
natural  
Radiant

		lab
E		
	shape	
	Round	
		natural
	Emerald	
		lab
	Marquise	
		lab
	Princess	
		natural
	Pear	
		lab
	Heart	
		natural
	Oval	
		lab
	Cushion	
		lab
	Asscher	
		natural
	Radiant	
		lab

F		
	shape	
	Round	
		natural
	Emerald	
		lab
	Marquise	
		natural
	Princess	
		lab
	Pear	
		lab
	Heart	
		lab
	Oval	
		lab
	Cushion	
		lab
	Asscher	
		natural
	Radiant	

**natural**

## G

## lab

H

**shape**

## Round

**natural**

## Emerald

## lab

## Marquise

**natural**

## Princess

**natural**

## Pear

## lab

## Heart

**lab**

## Oval

## lab

## Cushion

**lab**

## Asscher

**natural**

## Radiant

**lab**

**D**

## lab

## Ideal

**color**

**J**

**shape**

## Round

**natural**

## Emerald

## lab

## Marquise

**natural**

## Princess

**lab**

## Pear

## lab

## Heart

**natural**

## Oval

lab  
Cushion  
lab  
Asscher  
natural  
Radiant  
natural

I

shape  
Round  
natural  
Emerald  
lab  
Marquise  
lab  
Princess  
lab  
Pear  
lab  
Heart  
lab  
Oval  
lab  
Cushion  
lab  
Asscher  
natural  
Radiant  
natural

E

lab

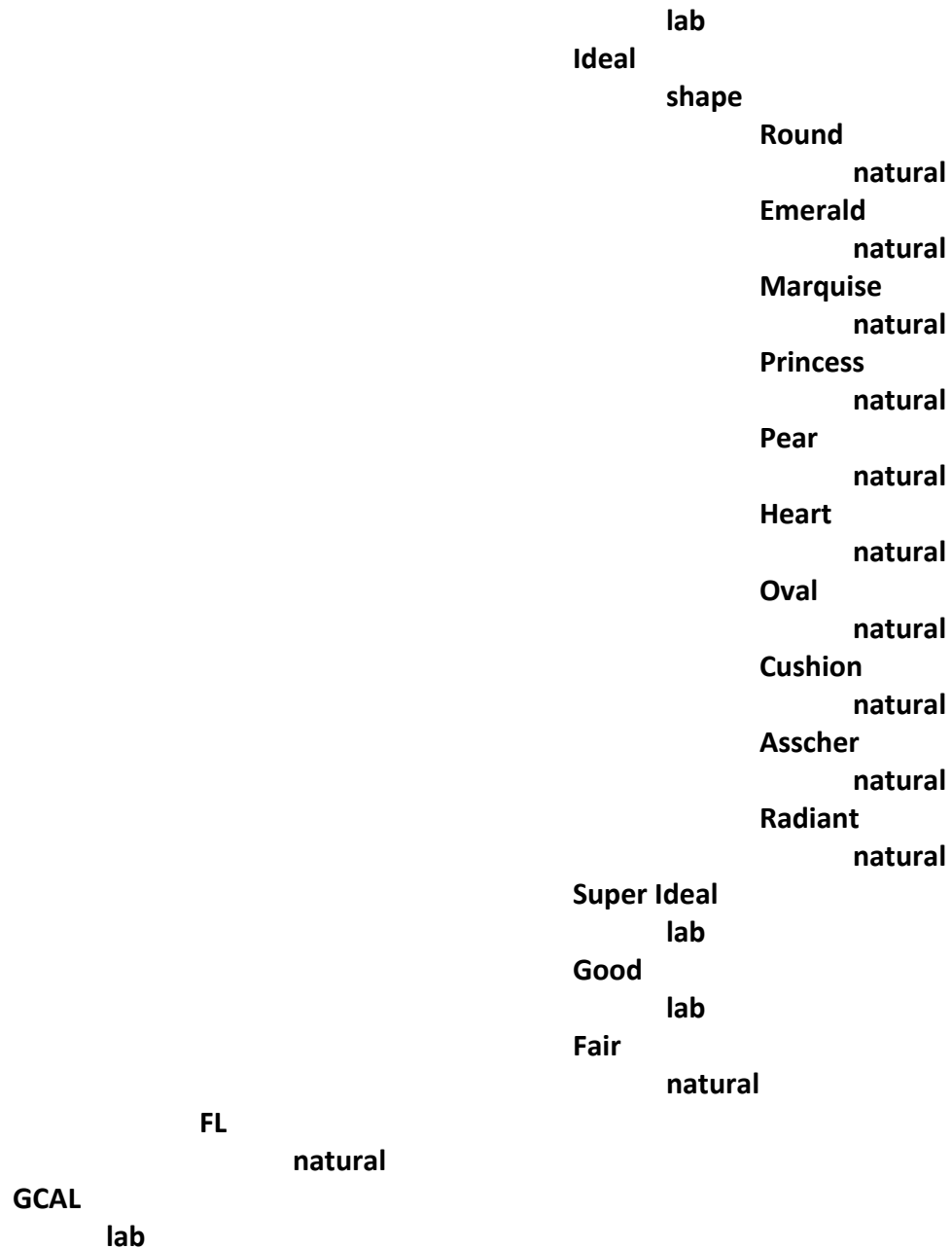
F

shape  
Round  
natural  
Emerald  
lab  
Marquise  
lab  
Princess  
lab  
Pear  
lab  
Heart

		lab
	Oval	
		lab
	Cushion	
		lab
	Asscher	
		lab
	Radiant	
		lab
G		
	shape	
	Round	
		natural
	Emerald	
		lab
	Marquise	
		lab
	Princess	
		lab
	Pear	
		lab
	Heart	
		natural
	Oval	
		lab
	Cushion	
		lab
	Asscher	
		natural
	Radiant	
		lab
H		
	shape	
	Round	
		natural
	Emerald	
		lab
	Marquise	
		lab
	Princess	
		lab
	Pear	
		lab
	Heart	

Category	Item	Value
Shape	Round	100%
	Emerald	95%
	Marquise	90%
	Princess	85%
	Pear	80%
	Heart	75%
	Oval	70%
	Cushion	65%
	Radiant	60%
	Asscher	55%
Color	D	100%
	E	95%
	F	90%
	G	85%
	H	80%
	I	75%
	J	70%
	K	65%
	L	60%
	M	55%
Clarity	FL	100%
	VVS1	95%
	VVS2	90%
	VS1	85%
	VS2	80%
	S1	75%
	S2	70%
	I1	65%
	I2	60%
	P1	55%
Treatments	Natural	100%
	Lab	95%
	Enhanced	90%
	Refracted	85%
	Refracted	80%
	Refracted	75%
	Refracted	70%
	Refracted	65%
	Refracted	60%
	Refracted	55%

					lab
					Asscher
					lab
					Radiant
					lab
			Fair		
				lab	
IF					
	color				
		J			
			natural		
		I			
			shape		
				Round	
					natural
				Emerald	
					natural
				Marquise	
					natural
				Princess	
					natural
				Pear	
					natural
				Heart	
					natural
				Oval	
					natural
				Cushion	
					natural
				Asscher	
					natural
				Radiant	
					natural
		E			
			lab		
		F			
			lab		
		G			
			lab		
		H			
			natural		
		D			
			cut		
				Very Good	



The Diamond decision tree is complete.

How accurate is the ID3 algorithm with the Diamonds?!

We have 89.72231302438247% accuracy!

Thank you for your time! Have a great day!