SAS绘图

示例SASHELP.CARS

MAKE	HORSEPOWER	LENGTH	INVOICE
Acura	265	189	$33,337
Audi	170	179	$23,508
BMW	225	180	$33,873
Buick	275	193	$34,357

直方图

```
libname t "temp";
ods path(prepend) t.template(update);
```

```
SAS Connection established. Subprocess id is 19646
```

```
34   ods listing close;ods html5 (id=saspy_internal) file=stdout options(bitmap_mode='inline')
device=svg style=HTMLBlue; ods
34 ! graphics on / outputfmt=png;
NOTE: Writing HTML5(SASPY_INTERNAL) Body file: STDOUT
35
36   libname t "temp";
NOTE: Libref T was successfully assigned as follows:
      Engine:        V9
      Physical Name: /folders/myfolders/SASData/temp
37   ods path(prepend) t.template(update);
38
39   ods html5 (id=saspy_internal) close;ods listing;

40
```

```
PROC SORT DATA = SASHELP.CARS OUT = C NODUPKEY;
BY MAKE;
RUN;

PROC PRINT DATA = C;
RUN;
```

The SAS System

Obs	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize	Cylinders	Horsepower	MPG_Ci
1	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5	6	265	1
2	Audi	A4 1.8T 4dr	Sedan	Europe	Front	$25,940	$23,508	1.8	4	170	2
3	BMW	X3 3.0i	SUV	Europe	All	$37,000	$33,873	3.0	6	225	1
4	Buick	Rainier	SUV	USA	All	$37,895	$34,357	4.2	6	275	1
5	Cadillac	Escalade	SUV	USA	Front	$52,795	$48,377	5.3	8	295	1
6	Chevrolet	Suburban 1500 LT	SUV	USA	Front	$42,735	$37,422	5.3	8	295	1
7	Chrysler	PT Cruiser 4dr	Sedan	USA	Front	$17,985	$16,919	2.4	4	150	2
8	Dodge	Durango	SUV	USA	All	$32,235	$29,472	4.7	8	230	1

		SLT									
9	Ford	Excursion 6.8 XLT	SUV	USA	All	$41,475	$36,494	6.8	10	310	1
10	GMC	Envoy XUV SLE	SUV	USA	Front	$31,890	$28,922	4.2	6	275	1
11	Honda	Civic Hybrid 4dr manual (gas/electric)	Hybrid	Asia	Front	$20,140	$18,451	1.4	4	93	4
12	Hummer	H2	SUV	USA	All	$49,995	$45,815	6.0	8	316	1
13	Hyundai	Santa Fe GLS	SUV	Asia	Front	$21,589	$20,201	2.7	6	173	2
14	Infiniti	G35 4dr	Sedan	Asia	Rear	$28,495	$26,157	3.5	6	260	1
15	Isuzu	Ascender S	SUV	Asia	All	$31,849	$29,977	4.2	6	275	1
16	Jaguar	X-Type 2.5 4dr	Sedan	Europe	All	$29,995	$27,355	2.5	6	192	1
17	Jeep	Grand Cherokee Laredo	SUV	USA	Front	$27,905	$25,686	4.0	6	195	1
18	Kia	Sorento LX	SUV	Asia	Front	$19,635	$18,630	3.5	6	192	1
19	Land Rover	Range Rover HSE	SUV	Europe	All	$72,250	$65,807	4.4	8	282	1
20	Lexus	GX 470	SUV	Asia	All	$45,700	$39,838	4.7	8	235	1
21	Lincoln	Navigator Luxury	SUV	USA	All	$52,775	$46,360	5.4	8	300	1
22	MINI	Cooper	Sedan	Europe	Front	$16,999	$15,437	1.6	4	115	2
23	Mazda	Tribute DX 2.0	SUV	Asia	All	$21,087	$19,742	2.0	4	130	2
24	Mercedes-Benz	G500	SUV	Europe	All	$76,870	$71,540	5.0	8	292	1
25	Mercury	Mountaineer	SUV	USA	Front	$29,995	$27,317	4.0	6	210	1
26	Mitsubishi	Endeavor XLS	SUV	Asia	All	$30,492	$28,330	3.8	6	215	1
27	Nissan	Pathfinder Armada SE	SUV	Asia	Front	$33,840	$30,815	5.6	8	305	1
28	Oldsmobile	Alero GX 2dr	Sedan	USA	Front	$18,825	$17,642	2.2	4	140	2
29	Pontiac	Aztekt	SUV	USA	Front	$21,595	$19,810	3.4	6	185	1
30	Porsche	Cayenne S	SUV	Europe	All	$56,665	$49,865	4.5	8	340	1
31	Saab	9-3 Arc Sport 4dr	Sedan	Europe	Front	$30,860	$29,269	2.0	4	210	2
32	Saturn	VUE	SUV	USA	All	$20,585	$19,238	2.2	4	143	2
33	Scion	xA 4dr hatch	Sedan	Asia	Front	$12,965	$12,340	1.5	4	108	3
34	Subaru	Impreza 2.5 RS 4dr	Sedan	Asia	All	$19,945	$18,399	2.5	4	165	2
35	Suzuki	XL-7 EX	SUV	Asia	Front	$23,699	$22,307	2.7	6	185	1
36	Toyota	Prius 4dr (gas/electric)	Hybrid	Asia	Front	$20,510	$18,926	1.5	4	110	5
37	Volkswagen	Touareg V6	SUV	Europe	All	$35,515	$32,243	3.2	6	220	1
38	Volvo	XC90 T6	SUV	Europe	All	$41,250	$38,851	2.9	6	268	1

```
PROC UNIVARIATE DATA = SASHELP.CARS;
VAR HORSEPOWER;
RUN;
```

The SAS System

The UNIVARIATE Procedure
Variable: Horsepower

Moments			
N	428	Sum Weights	428
Mean	215.885514	Sum Observations	92399
Std Deviation	71.8360316	Variance	5160.41543
Skewness	0.93033074	Kurtosis	1.55215863
Uncorrected SS	22151103	Corrected SS	2203497.39
Coeff Variation	33.2750587	Std Error Mean	3.47232565

Basic Statistical Measures			
Location		Variability	
Mean	215.8855	Std Deviation	71.83603
Median	210.0000	Variance	5160
Mode	200.0000	Range	427.00000
		Interquartile Range	90.00000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	62.17318	Pr > |t|	<.0001
Sign	M	214	Pr >= |M|	<.0001
Signed Rank	S	45903	Pr >= |S|	<.0001

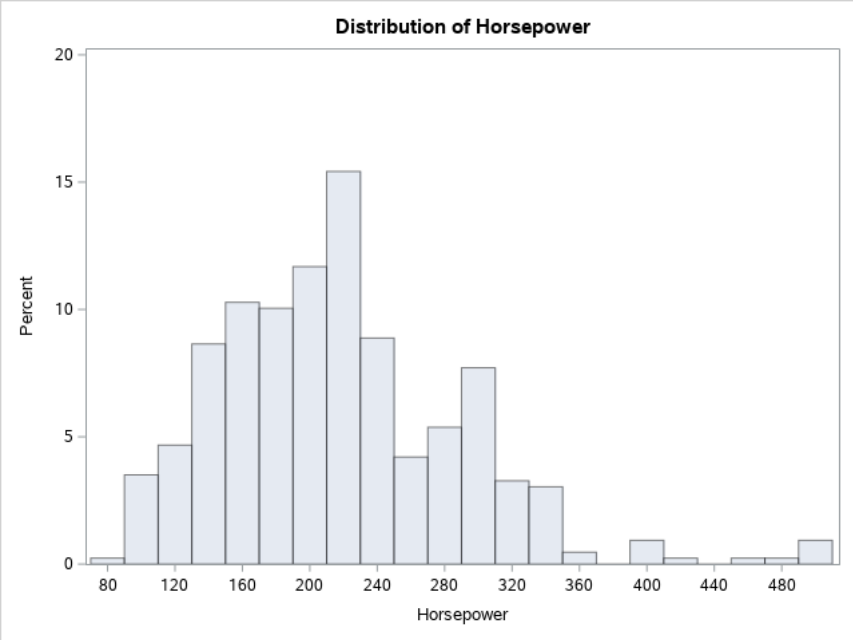
Quantiles (Definition 5)	
Level	Quantile
100% Max	500
99%	477
95%	340
90%	302
75% Q3	255
50% Median	210
25% Q1	165
10%	130
5%	115
1%	103
0% Min	73

Extreme Observations			
Lowest		Highest	
Value	Obs	Value	Obs
73	151	477	335
93	150	493	263
100	405	493	271
103	171	493	272
103	170	500	115

```
PROC UNIVARIATE DATA = SASHELP.CARS NOPRINT;
HISTOGRAM HORSEPOWER
/
MIDPOINTS = 100 TO 500 BY 20;
RUN;
```

The SAS System

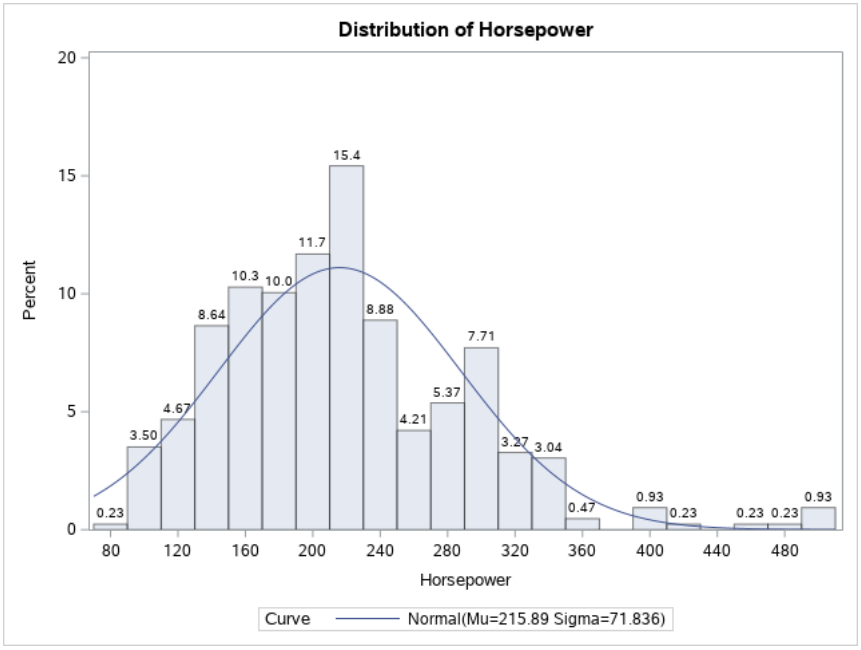
The UNIVARIATE Procedure




```
PROC UNIVARIATE DATA = SASHELP.CARS NOPRINT;
HISTOGRAM HORSEPOWER
/
NORMAL (
    MU = EST
    SIGMA = EST
    COLOR = BLUE
    W = 1
)
BARLABEL = PERCENT
MIDPOINTS = 100 TO 500 BY 20;
RUN;
```

The SAS System

The UNIVARIATE Procedure



The SAS System

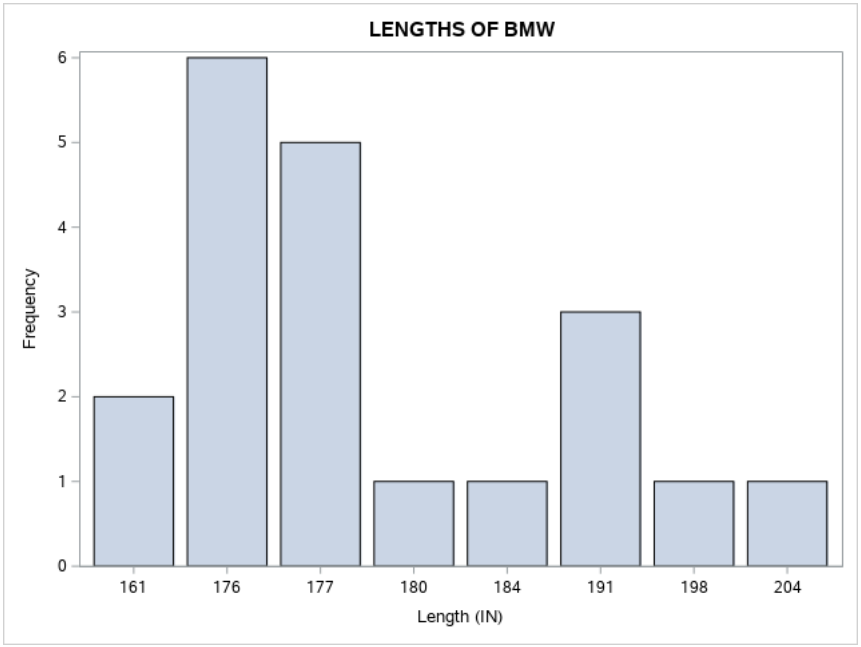
The UNIVARIATE Procedure
Fitted Normal Distribution for Horsepower

Parameters for Normal Distribution		
Parameter	**Symbol**	**Estimate**
Mean	Mu	215.8855
Std Dev	Sigma	71.83603

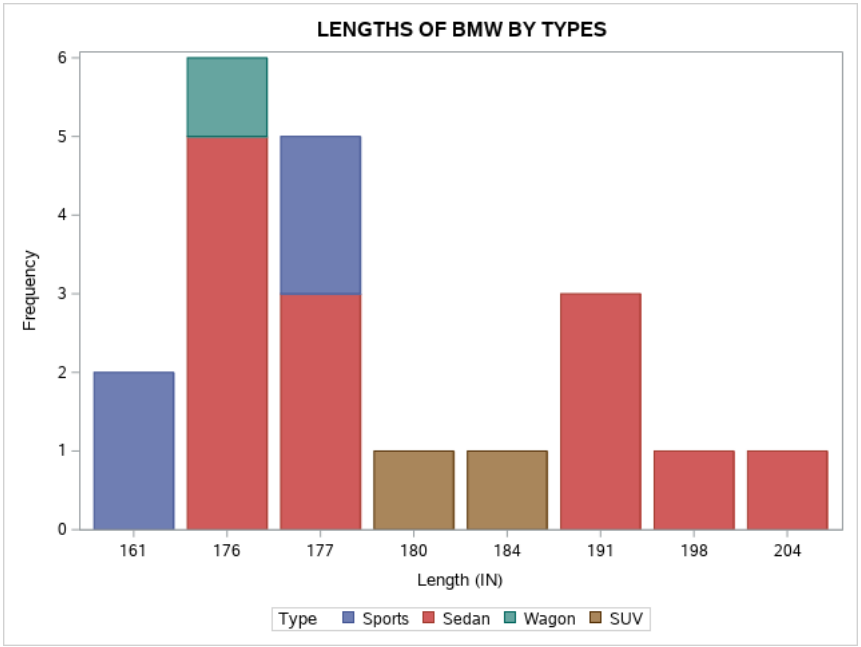
Goodness-of-Fit Tests for Normal Distribution				
Test	**Statistic**		**p Value**	
Kolmogorov-Smirnov	**D**	0.09051574	**Pr > D**	<0.010
Cramer-von Mises	**W-Sq**	0.58980554	**Pr > W-Sq**	<0.005
Anderson-Darling	**A-Sq**	3.68580519	**Pr > A-Sq**	<0.005

Quantiles for Normal Distribution		
	Quantile	
Percent	**Observed**	**Estimated**
1.0	103.000	48.7699
5.0	115.000	97.7258
10.0	130.000	123.8239
25.0	165.000	167.4328
50.0	210.000	215.8855
75.0	255.000	264.3382
90.0	302.000	307.9471
95.0	340.000	334.0453
99.0	477.000	383.0011

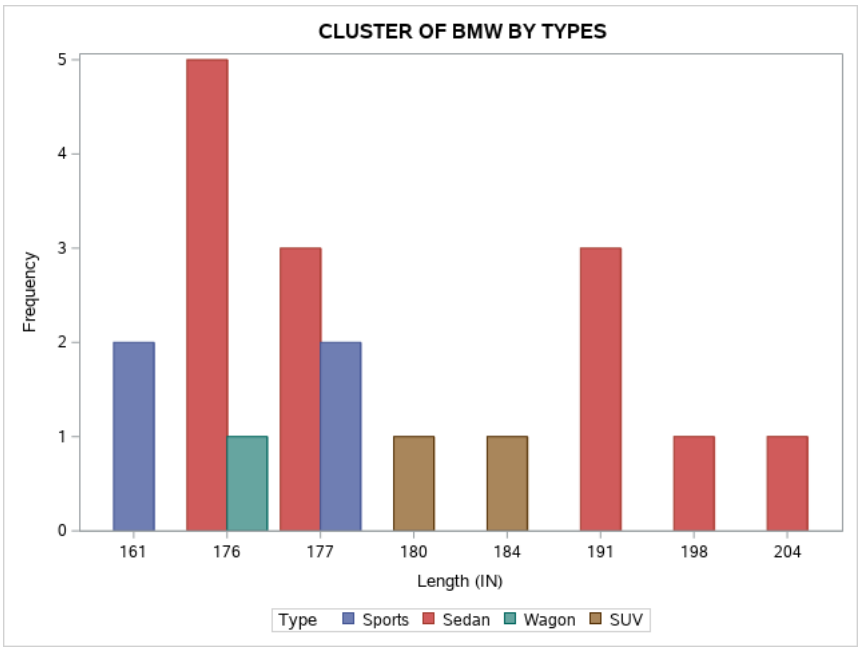
```
PROC SGPLOT DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')));
VBAR LENGTH;
TITLE 'LENGTHS OF BMW';
RUN;
QUIT;
```




```
PROC SGPLOT DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')));
VBAR LENGTH /GROUP = TYPE ;
TITLE 'LENGTHS OF BMW BY TYPES';
RUN;
QUIT;
```



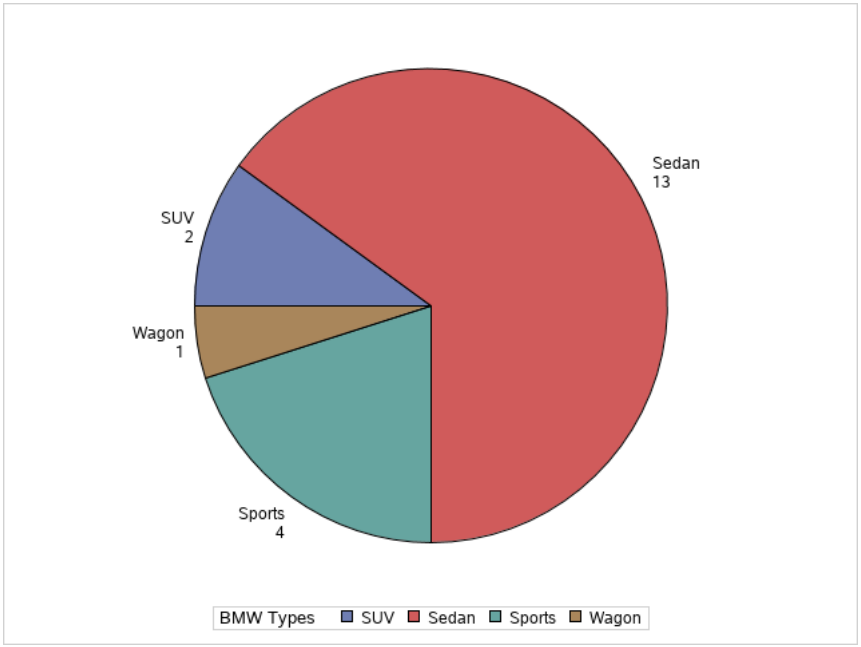

```
PROC SGPLOT DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')));
VBAR LENGTH /GROUP = TYPE GROUPDISPLAY = CLUSTER;
TITLE 'CLUSTER OF BMW BY TYPES';
RUN;
QUIT;
```




```
PROC TEMPLATE;
  DEFINE STATGRAPH PIE0;
    BEGINGRAPH;
      LAYOUT REGION;
        PIECHART CATEGORY = type /
          DATALABELLOCATION = OUTSIDE
          CATEGORYDIRECTION = CLOCKWISE
          START = 180 NAME = 'pie';
        DISCRETELEGEND 'pie' /
          TITLE = 'BMW Types';
      ENDLAYOUT;
    ENDGRAPH;
  END;
RUN;

PROC SGRENDER
    DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')))
    TEMPLATE = PIE0;
RUN;
```

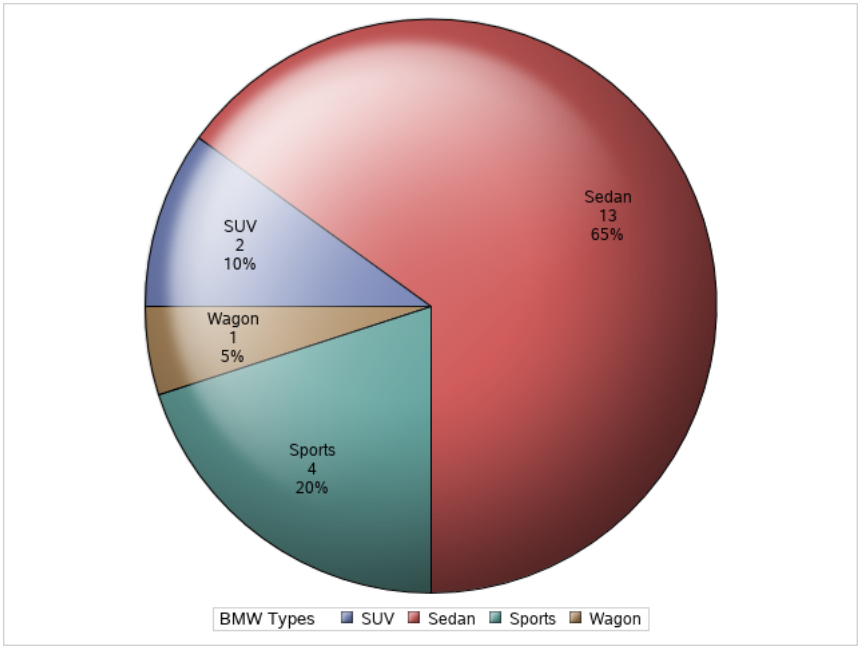
CLUSTER OF BMW BY TYPES



```
PROC TEMPLATE;
  DEFINE STATGRAPH PIE1;
    BEGINGRAPH;
      LAYOUT REGION;
        PIECHART CATEGORY = type /
          DATALABELLOCATION = INSIDE
          DATALABELCONTENT=ALL
          CATEGORYDIRECTION = CLOCKWISE
          DATASKIN= SHEEN
          START = 180 NAME = 'pie';
        DISCRETELEGEND 'pie' /
          TITLE = 'BMW Types';
      ENDLAYOUT;
    ENDGRAPH;
  END;
RUN;

PROC SGRENDER
    DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')))
    TEMPLATE = PIE1;
RUN;
```

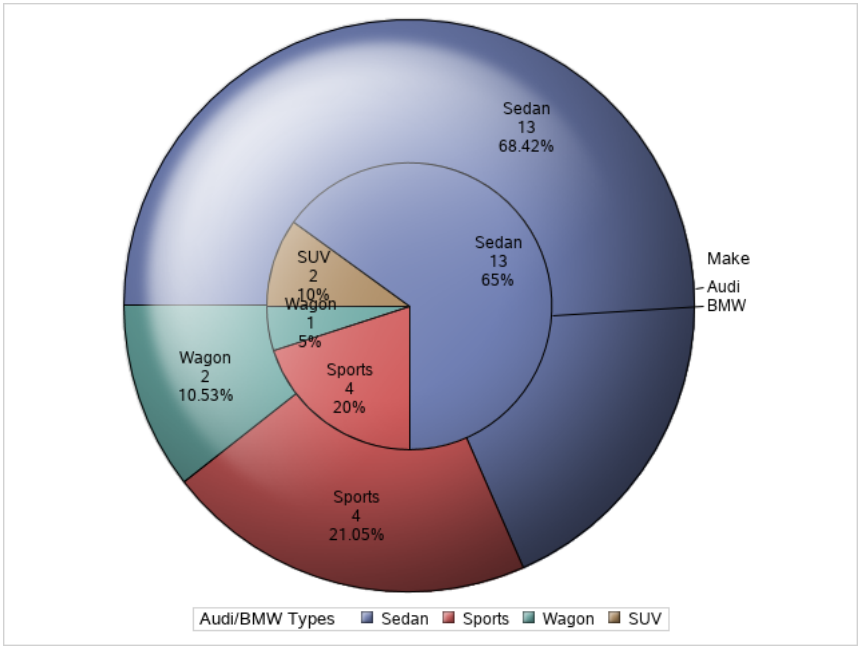
CLUSTER OF BMW BY TYPES



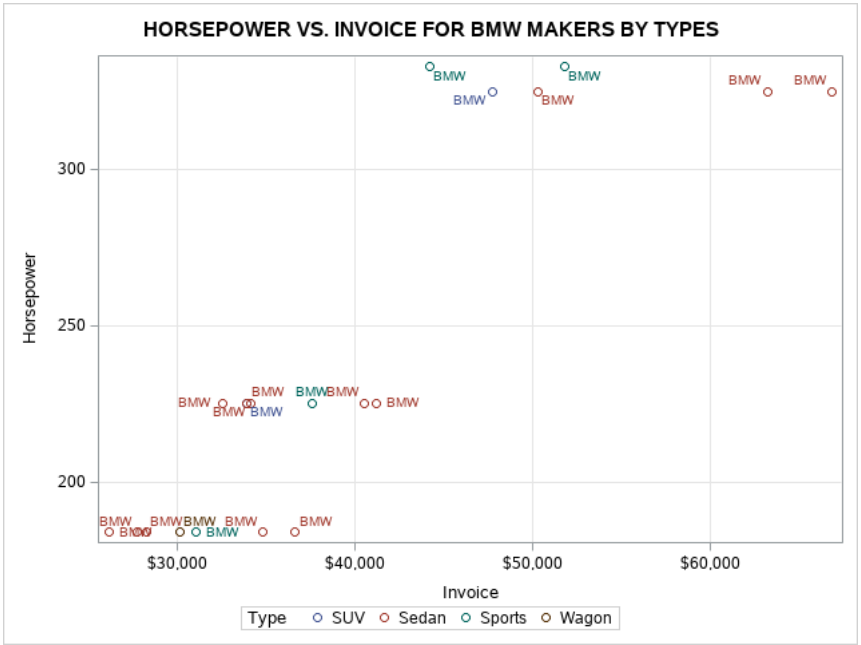

```
PROC TEMPLATE;
  DEFINE STATGRAPH PIE2;
    BEGINGRAPH;
      LAYOUT REGION;
        PIECHART CATEGORY = type / Group = make
          DATALABELLOCATION = INSIDE
          DATALABELCONTENT=ALL
          CATEGORYDIRECTION = CLOCKWISE
          DATASKIN= SHEEN
          START = 180 NAME = 'pie';
        DISCRETELEGEND 'pie' /
          TITLE = 'Audi/BMW Types';
      ENDLAYOUT;
    ENDGRAPH;
  END;
RUN;

PROC SGRENDER
    DATA = SASHELP.CARS(WHERE = (MAKE IN ('Audi', 'BMW')))
    TEMPLATE = PIE2;
RUN;
```

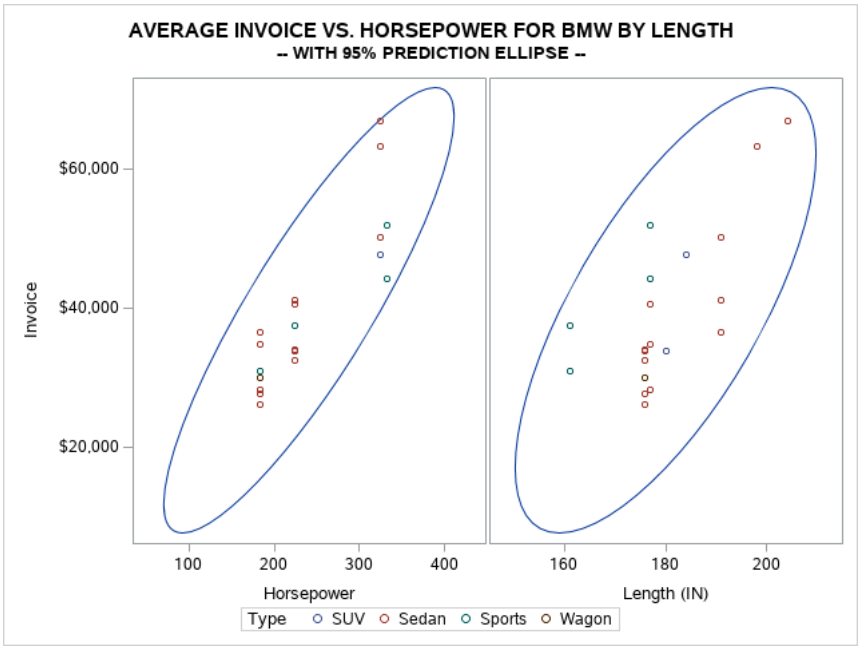
CLUSTER OF BMW BY TYPES



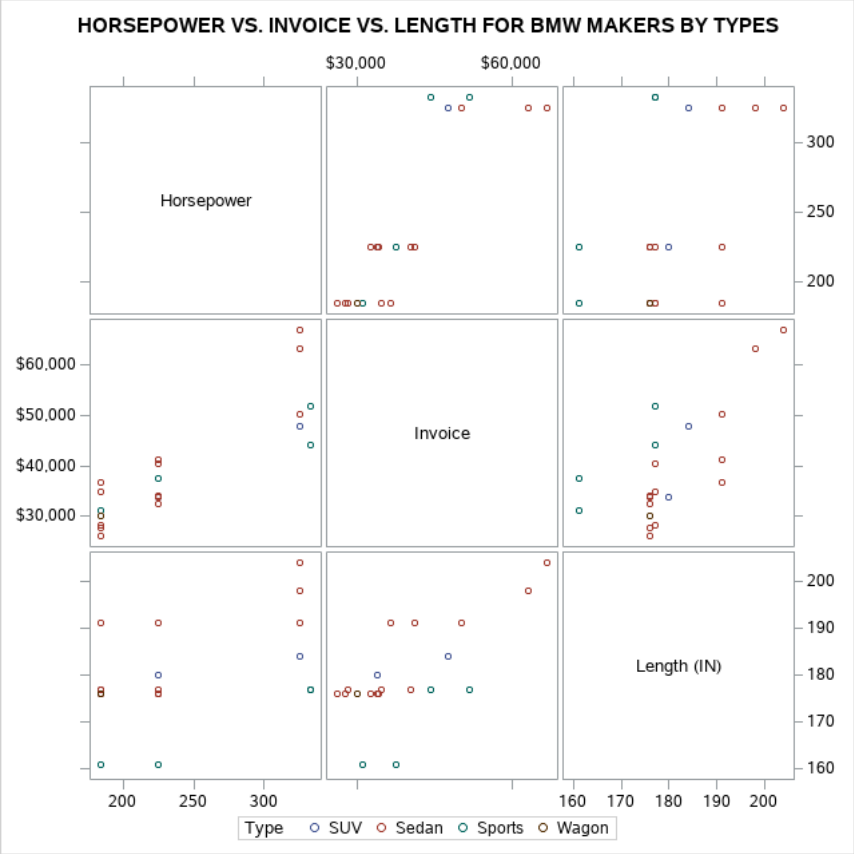

```
PROC SGSCATTER
    DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')));
    PLOT HORSEPOWER * INVOICE
    / DATALABEL = MAKE GROUP = TYPE GRID;
    TITLE 'HORSEPOWER VS. INVOICE FOR BMW MAKERS BY TYPES';
RUN;
```



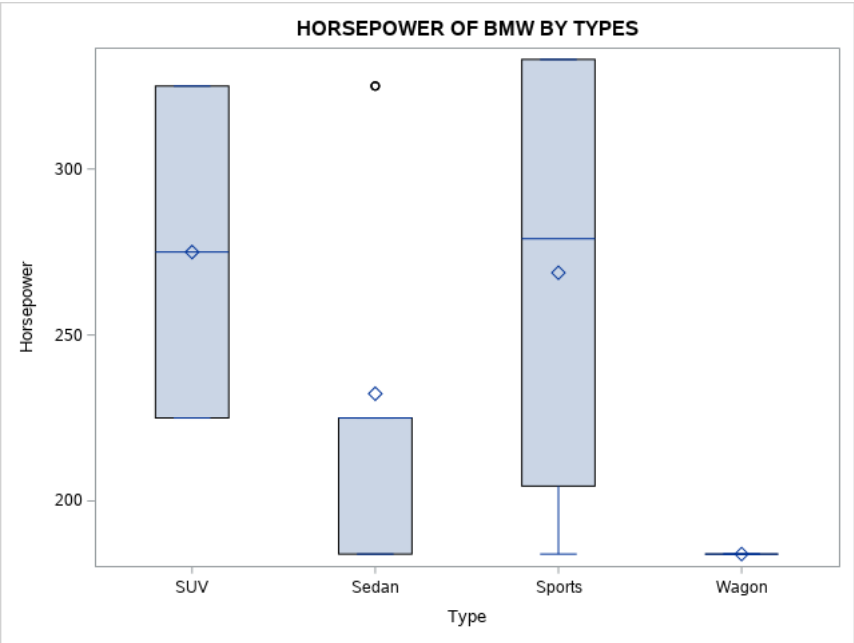
```
PROC SGSCATTER DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')));
    COMPARE Y = INVOICE  X = (HORSEPOWER LENGTH)
    /GROUP = TYPE ELLIPSE = (ALPHA = 0.05 TYPE = PREDICTED);
    TITLE
    'AVERAGE INVOICE VS. HORSEPOWER FOR BMW BY LENGTH';
    TITLE2
    '-- WITH 95% PREDICTION ELLIPSE --'
    ;
    FORMAT
    INVOICE DOLLAR6.0;
RUN;
```



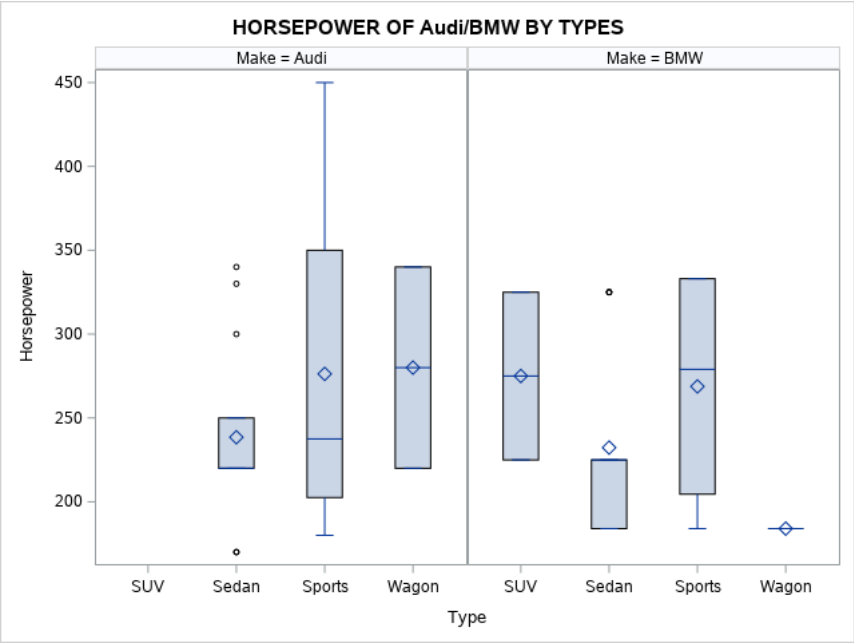

```
PROC SGSCATTER DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')));
    MATRIX HORSEPOWER INVOICE LENGTH
    / GROUP = TYPE;
    TITLE 'HORSEPOWER VS. INVOICE VS. LENGTH FOR BMW MAKERS BY TYPES';
RUN;
```



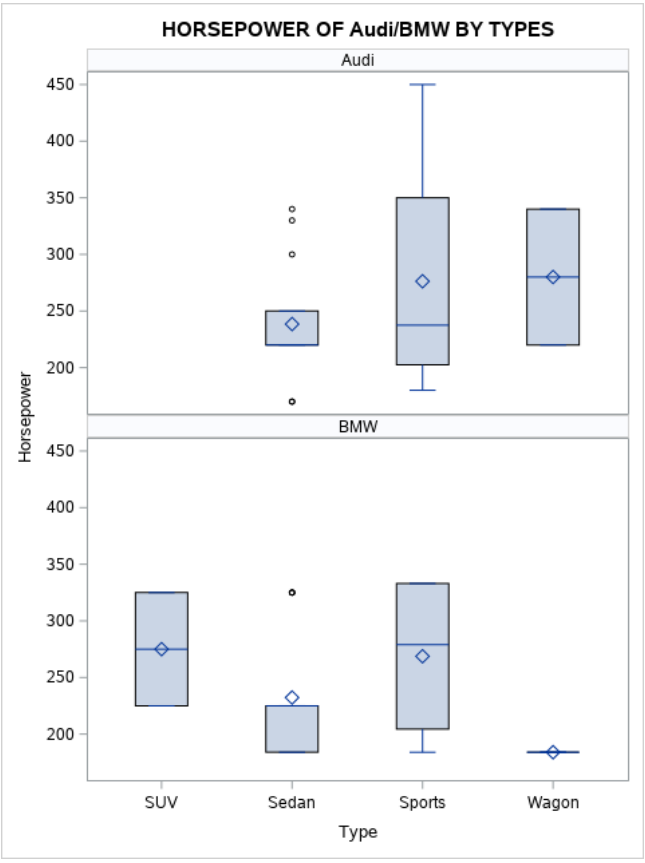

```
PROC SGPLOT DATA = SASHELP.CARS(WHERE = (MAKE IN ('BMW')));
    VBOX HORSEPOWER
    / CATEGORY = TYPE;
    TITLE 'HORSEPOWER OF BMW BY TYPES';
RUN;
```



```
PROC SGPANEL DATA = SASHELP.CARS(WHERE = (MAKE IN ('Audi', 'BMW')));
    PANELBY MAKE;
    VBOX HORSEPOWER / CATEGORY = TYPE;
    TITLE 'HORSEPOWER OF Audi/BMW BY TYPES';
RUN;
```




```
PROC SGPANEL DATA = SASHELP.CARS(WHERE = (MAKE IN ('Audi', 'BMW')));
    PANELBY MAKE / COLUMNS = 1 NOVARNAME;
    VBOX HORSEPOWER / CATEGORY = TYPE;
    TITLE 'HORSEPOWER OF Audi/BMW BY TYPES';
RUN;
```



Visualizing Longitudinal Data with Dropouts

tumor data

template

```
data Tumor;
   infile datalines missover;
   input ID Time Dead Dose P1-P15;
   label ID='Subject ID';
   datalines;
 1 47 1  1.0  0  5  6  8 10 10 10 10
 2 71 1  1.0  0  0  0  0  0  0  0  0  1  1  1  1 1 1 1
 3 81 0  1.0  0  1  1  1  1  1  1  1  1  1  1  1 1 1 1
 4 81 0  1.0  0  0  0  0  0  0  0  0  0  0  0  0 0 0 0
 5 81 0  1.0  0  0  0  0  0  0  0  0  0  0  0  0 0 0 0
 6 65 1  1.0  0  0  0  1  1  1  1  1  1  1  1  1 1
 7 71 0  1.0  0  0  0  0  0  0  0  0  0  0  0  0 0 0 0
 8 69 0  1.0  0  0  0  0  0  0  0  0  0  0  0  0 0 0
 9 67 1  1.0  0  0  1  1  2  2  2  2  3  3  3  3 3 3
10 81 0  1.0  0  0  0  0  0  0  0  0  0  0  0  0 0 0 0
11 37 1  1.0  9  9  9
12 81 0  1.0  0  0  0  0  0  0  0  0  0  0  0  0 0 0 0
13 77 0  1.0  0  0  0  0  1  1  1  1  1  1  1  1 1 1 1
14 81 0  1.0  0  0  0  0  0  0  0  0  0  0  0  0 0 0 0
15 81 0  1.0  0  0  0  0  0  0  0  0  0  0  0  0 0 0 0
16 54 0  2.5  0  1  1  1  2  2  2  2  2  2  2  2
17 53 0  2.5  0  0  0  0  0  0  0  0  0  0  0  0
18 38 0  2.5  5 13 14
19 54 0  2.5  2  6  6  6  6  6  6  6  6  6  6  6
20 51 1  2.5 15 15 15 16 16 17 17 17 17 17 17
21 47 1  2.5 13 20 20 20 20 20 20 20
22 27 1  2.5 22
23 41 1  2.5  6 13 13 13
24 49 1  2.5  0  3  3  3  3  3  3  3  3
25 53 0  2.5  0  0  1  1  1  1  1  1  1  1  1  1
26 50 1  2.5  0  0  2  3  4  6  6  6  6  6
27 37 1  2.5  3 15 15
28 49 1  2.5  2  3  3  3  3  4  4  4  4
29 46 1  2.5  4  6  7  9  9  9  9
30 48 0  2.5 15 26 26 26 26 26 26 26
31 54 0 10.0 12 14 15 15 15 15 15 15 15 15 15 15
32 37 1 10.0 12 16 17
33 53 1 10.0  3  6  6  6  6  6  6  6  6  6  6  6
34 45 1 10.0  4 12 15 20 20 20
35 53 0 10.0  6 10 13 13 13 15 15 15 15 15 15 20
36 49 1 10.0  0  2  2  2  2  2  2  2  2
37 39 0 10.0  7  8  8
38 27 1 10.0 17
39 49 1 10.0  0  6  9 14 14 14 14 14 14
40 43 1 10.0 14 18 20 20 20
41 28 0 10.0  8
42 34 1 10.0 11 18
43 45 1 10.0 10 12 16 16 16 16
44 37 1 10.0  0  1  1
45 43 1 10.0  9 19 19 19 19
;

proc print data = tumor;
run;
```

HORSEPOWER OF Audi/BMW BY TYPES

Obs	ID	Time	Dead	Dose	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
1	1	47	1	1.0	0	5	6	8	10	10	10	10	.	.	.	.	.	.	.
2	2	71	1	1.0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1
3	3	81	0	1.0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
4	4	81	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	5	81	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	6	65	1	1.0	0	0	0	1	1	1	1	1	1	1	1	1	1	.	.

7	7	71	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	8	69	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	.
9	9	67	1	1.0	0	0	1	1	2	2	2	2	3	3	3	3	3	3	.
10	10	81	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	11	37	1	1.0	9	9	9	.	.	.	.	.	.	.	.	.	.	.	.
12	12	81	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	13	77	0	1.0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1
14	14	81	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	15	81	0	1.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16	16	54	0	2.5	0	1	1	1	2	2	2	2	2	2	2	2	.	.	.
17	17	53	0	2.5	0	0	0	0	0	0	0	0	0	0	0	0	.	.	.
18	18	38	0	2.5	5	13	14	.	.	.	.	.	.	.	.	.	.	.	.
19	19	54	0	2.5	2	6	6	6	6	6	6	6	6	6	6	6	.	.	.
20	20	51	1	2.5	15	15	15	16	16	17	17	17	17	17	17	.	.	.	.
21	21	47	1	2.5	13	20	20	20	20	20	20	20	.	.	.	.	.	.	.
22	22	27	1	2.5	22	.	.	.	.	.	.	.	.	.	.	.	.	.	.
23	23	41	1	2.5	6	13	13	13	.	.	.	.	.	.	.	.	.	.	.
24	24	49	1	2.5	0	3	3	3	3	3	3	3	3	.	.	.	.	.	.
25	25	53	0	2.5	0	0	1	1	1	1	1	1	1	1	1	1	.	.	.
26	26	50	1	2.5	0	0	2	3	4	6	6	6	6	6	.	.	.	.	.
27	27	37	1	2.5	3	15	15	.	.	.	.	.	.	.	.	.	.	.	.
28	28	49	1	2.5	2	3	3	3	3	4	4	4	4	.	.	.	.	.	.
29	29	46	1	2.5	4	6	7	9	9	9	9	.	.	.	.	.	.	.	.
30	30	48	0	2.5	15	26	26	26	26	26	26	26	.	.	.	.	.	.	.
31	31	54	0	10.0	12	14	15	15	15	15	15	15	15	15	15	15	.	.	.
32	32	37	1	10.0	12	16	17	.	.	.	.	.	.	.	.	.	.	.	.
33	33	53	1	10.0	3	6	6	6	6	6	6	6	6	6	6	6	.	.	.
34	34	45	1	10.0	4	12	15	20	20	20	.	.	.	.	.	.	.	.	.
35	35	53	0	10.0	6	10	13	13	13	15	15	15	15	15	15	20	.	.	.
36	36	49	1	10.0	0	2	2	2	2	2	2	2	2	.	.	.	.	.	.
37	37	39	0	10.0	7	8	8	.	.	.	.	.	.	.	.	.	.	.	.
38	38	27	1	10.0	17	.	.	.	.	.	.	.	.	.	.	.	.	.	.
39	39	49	1	10.0	0	6	9	14	14	14	14	14	14	.	.	.	.	.	.
40	40	43	1	10.0	14	18	20	20	20	.	.	.	.	.	.	.	.	.	.
41	41	28	0	10.0	8	.	.	.	.	.	.	.	.	.	.	.	.	.	.
42	42	34	1	10.0	11	18	.	.	.	.	.	.	.	.	.	.	.	.	.
43	43	45	1	10.0	10	12	16	16	16	16	.	.	.	.	.	.	.	.	.
44	44	37	1	10.0	0	1	1	.	.	.	.	.	.	.	.	.	.	.	.
45	45	43	1	10.0	9	19	19	19	19	.	.	.	.	.	.	.	.	.	.

```
data tumor1;
set tumor;
array p[10];
do droptime=1 to dim(p);
if missing(p[droptime]) then leave;
end;
droptime =droptime-1;
```

```
do MeasureTime =1 to dim(p);
Npap =p[MeasureTime];
output;
end;
keep ID MeasureTime Npap droptime;
run;


proc means data=tumor1 nway noprint;
class DropTime MeasureTime;
var Npap;
output out =meanout mean=mean_Npap;
run;


proc template;
define statgraph scatterplot;
dynamic _X_ _Y_ _VMCG_ _MSIZE_ _LMCG_;
begingraph;
entrytitle "Figure 1. Triangle plot about (non)informative dropout.";
layout overlay;
scatterplot x=_X_ y=_Y_ /name="sca"  markercolorgradient=_VMCG_       markerattrs=(symbol=squarefilled size=_MSIZE_);
discretelegend "sca";
continuouslegend "sca"/ orient=vertical halign=right title=_LMCG_;
endlayout;
endgraph;
end;
run;

ods graphics on/width=1000 height=1000;
proc sgrender data =meanout template=scatterplot;
dynamic _X_='MeasureTime' _Y_='DropTime' _VMCG_='mean_Npap'
_MSIZE_='30pt' _LMCG_='Npap';
Label MeasureTime="Measurement Time" DropTime="Dropout Time";
run;
```

HORSEPOWER OF Audi/BMW BY TYPES

Figure 1. Triangle plot about (non)informative dropout.