Retracing My SAS® Global Forum 2016 Steps
Visualizing iPhone Health App Step Data With a (What Else?) Step Plot
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ABSTRACT

After returning from SAS Global Forum 2016 in Las Vegas, I opened my iPhone’s Health App for the first time and was surprised to learn it had dutifully tracked the steps I’d taken since the day I bought it, including those during SGF.

At SGF 2016, my wanderings were largely confined to the area of the Las Vegas Strip shown above. This included my hotel (Flamingo, lower left), the convention center (Sands Expo, upper right), and the conference hotel (The Venetian, middle).

iPhone Health App step data lacks the precision needed to do a cute Family Circus-like take on the data. So, I opted for the next best thing to illustrate my not-unlike Billy wandering—an ODS Graphics step plot of the 70,000+ steps taken during SGF!

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• SAS XML LIBNAME used to read exported Health App data.
• Photos/captions added with image/text annotation.
• Hourly grid lines (PDT) shown via reference lines/labels.
• Broken-axis feature used to exclude time sleeping.
• Flat lines represent time not moving; lengthier ones are flights, Opening Session, Hands-On Workshops, Keynotes.
• Lengthier, steeper ascents include walks between hotels, sightseeing, circulating at Quad & networking events.
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* Step plot of steps tracked by iPhone Health App at SAS Global Forum 2016
  See idownloadblog.com/2015/06/10/how-to-export-import-health-data/ for how to get step data.

filename health '/folders/myfolders/export.xml'; * XML data provided by iPhone Health App;
filename map '/folders/myfolders/HealthData.map';
libname health xmlv2 xmlmap=map automap=replace;

proc sql;
* Grab step data from iPhone XML;
create table steps as
select input(substr(record_startDate,1,19),YMDDTTM19.) as startDT format=datetime26.,
input(substr(record_endDate,1,19),YMDDTTM19.) as endDT format=datetime26., record_value as steps
from health.Record(when=(record_type="HKQuantityTypeIdentifierStepCount")
where record_startDate between '2016-04-18' and '2016-04-22 05' order by 1;

data totSteps(keep=time totsteps);
retain totsteps 0;
set steps end=eof;
if intck('hour',lag1(endDT),startDT)>4 then do;
  put "End of Day, Steps Taken=: " totsteps;
totsteps=0;
end;
time=startDT;
output;
totsteps=steps;
time=endDT;
format time datetime19.;
output;
if eof;
put "End of Day, Steps Taken=: " totsteps;

* Add cumulative steps for each day;
* Reset cumulative steps if "new morning";
* 4+ hours of inactivity = "new morning";
* Display steps taken during prior "day";
* Time and total steps at beginning of period;
* Time and total steps at end of period;
* Display steps taken during prior "day";
data anno;
length image label $100. anchor widhtunit textcolor function xlspace ylspace border textweight $20.;

* Annotate step plot with headings and photos;
function="text"; ylspace='datavalue'; xlspace='datavalue';
border='false'; textcolor="GRAY"; anchor="bottomleft";
width=17; widthunit="percent"; textsize=38; textweight="bold"; y1=24250;

* Headings for each day of conference;
x1='18APR2016:05:20:00'dt; label="MONDAY" APRIL 18 27,621 STEPS" output;
x1='19APR2016:10:00:00'dt; label="TUESDAY" APRIL 19 16,956 STEPS" output;
x1='20APR2016:09:45:00'dt; label="WEDNESDAY" APRIL 20 15,749 STEPS" output;
x1='21APR2016:10:00:00'dt; label="THURSDAY" APRIL 21 13,112 STEPS" output;

%macro photo(lbl=, image=, time=, steps=, width=); * Macro to insert captioned photos taken at SGF 2016;
function="Image"; * Image annotation parameters;
image="/folders/myfolders/SGF2017Photos/&img"; anchors="bottomleft";
imagecapital='false'; layer=\"back\"; border='true'; linethickness=10; linecolor=\"black\";
drawspace=\"wallpercent\"; x1=\"time\"; y1=\"steps\"; width=\"width\"; widthunit=\"percent\";
xlspace='datavalue'; ylspace='datavalue';
output;
function="text"; * Caption annotation parameters;
label="&lbl"; anchor="topleft"; border='false'; textcolor=\"BLACK\";
width=20; widthunit=\"percent\"; textsize=14; textweight=\"bold\";
xlspace=\"datavalue\"; y1=\"y1-100\"; ylspace=\"datavalue\";
output;
%mend;

* Day 1 photos;
%photo(lbl=VENETIAN LOBBY, image=VenetianLobby.jpg, time=18APR2016:19:45:00 steps=7000 width=9.41); 
%photo(lbl=VENETIAN SHOPS, image=VenetianShopsV2.jpg, time=18APR2016:05:45:00 steps=18250 width=17.42); 
%photo(lbl=ORD TO LAS, image=SpiritOrdTolAS.jpg, time=18APR2016:05:45:00 steps=7000 width=10.53); 
%photo(lbl=CTA BLUE LINE, image=BlueLine.jpg, time=18APR2016:14:00:00 steps=1000 width=12.41); 
%photo(lbl=FLAMINGO ROOM VIEW, image=ViewFlamingoRoom.jpg, time=18APR2016:05:45:00 steps=11600 width=12.30); 
%photo(lbl=SGF MINGLE, image=SGFMonEveMingle.jpg, time=18APR2016:22:30:00 steps=15350 width=6.30); 

* Day 2 photos;
%photo(lbl=E-MINER HANDS ON, image=SasEmHandsOn.jpg, time=19APR2016:10:30:00 steps=6750 width=9.38); 
%photo(lbl=SAS STUDIO HANDS ON, image=SasStudioStaHandsOn.jpg, time=19APR2016:17:30:00 steps=1000 width=8.95); 
%photo(lbl=WELCOME RECEPTION (QUAD), image=QuahwatsNewWithSGProcs.jpg, time=19APR2016:10:30:00 steps=19000 width=18.09); 
%photo(lbl=OPENING SESSION, image=OpeningSession.jpg, time=19APR2016:10:30:00 steps=11750 width=15.87);
%photo(lbl=TECHNOLOGY CONNECTION, img=TechConnection.jpg, time=20APR2016:10:15:00, steps=18150, width=21.12);
%photo(lbl=KICKBACK PARTY, img=BrooklynBowlKickback.jpg, time=20APR2016:10:15:00, steps=9100, width=10.45);
%photo(lbl=REDEFINING SUCCESS, img=ArriahHuffington.jpg, time=20APR2016:19:30:00, steps=1000, width=8.50);
%photo(lbl=DATA (FORD, img=Ford.jpg, time=20APR2016:18:15:00, steps=13500, width=6.54);
%photo(lbl=VIYA, img=Viya.jpg, time=20APR2016:13:45:00, steps=1000, width=6.46);

* Day 3 photos;

%photo(lbl=THE SAS PACK, img=SasPack.jpg, time=21APR2016:18:30:00, steps=1000, width=9.65);
%photo(lbl=GTL HANDS-ON, img=GtlHandsOn.jpg, time=21APR2016:10:30:00, steps=14050, width=21.68);
%photo(lbl=EXCEL PLAYGROUND, img=ExcelPlayground.jpg, time=21APR2016:18:30:00, steps=9700, width=9.15);
%photo(lbl=CASINO, img=Slots.jpg, time=21APR2016:18:30:00, steps=20250, width=4.60);
%photo(lbl=B&B BURGER, img=BandBBurger.jpg, time=21APR2016:14:25:00, steps=20250, width=7.41);
%photo(lbl=LAS TO ORD, img=LAStoORD.jpg, time=21APR2016:20:15:00, steps=20250, width=7.45);

data _null_;
length reflines labels $ 4096 ;
do d='20APR2016:00:00:00' to '21APR2016:00:00:00' by 60 60 24;
do h=6 to 27;
  t-d-h 60 60;
  reflines-trim(reflines)|| ""||put(t,datetimen.)||""||",";
  l=t-2 60 60;
  * Step data is in Chicago time (CDT);
  reflines-trim(reflines)|| ""||put(t,datetimen.)||""||",";
  l=t-2 60 60;
  * Convert Chicago to Vegas time (PDT, -2 hours) for labels;
  daylabel=' ';
  * Add day of week to 1st time label of each day;
  if l in ('18APR2016:04:00:00') then daylabel='**'||upcase(put(datepart(l,downname3))).;
  labels-trim(labels)|| ""||compress(put(timepart(l),timeampm5.).)||trim(daylabel)||""*";
end;
call symput('reflines', reflines);
call symput('labels', labels);
run;
%put &labels;
* Create macro vars with reference lines/labels for plot;
* Labels are Vegas times (4AM-1AM);
* Sneak a peek;

%put &reflines;
* Generate hourly reference lines + labels;

Genenerate Reference Lines And Labels Macro Vars

Photos/Captions (cont.)
ods _all_ close;  * Plot steps with a (what else?) step plot;  ods listing image_dpi=150 gpath="/folders/myfolders" device=png;  ods graphics on / reset width=40in height=22in imagename="SGF2017steps" imagefmt=png antialias;  proc sgplot data=totsteps sganno=anno nowall;  * Step Plot (Time of Day vs. Cumulative Steps Taken);  step x=time y=totsteps / lineattrs=(thickness=3pt);  yaxis display=(nolabel) valueattrs=(size=8.75pt weight=bold) grid gridattrs=(pattern=dot color=black) values=(0 to 28000 by 1000) valuesformat=comma9. grid;  xaxis display=(nolabel) type=time /* Broken x-axis for sleeping hours (no steps) */ ranges=('18APR2016:05:21:41'dt to '19APR2016:03:15:37'dt  '19APR2016:09:49:46'dt to '20APR2016:00:35:03'dt  '20APR2016:09:48:54'dt to '21APR2016:01:47:23'dt  '21APR2016:09:48:49'dt to '22APR2016:01:55:52'dt) values=('18APR2016:05:21:41'dt to '22APR2016:01:55:52'dt by "06:00:00"t);  refline &reflines / lineattrs=(pattern=dot color=black) labelattrs=(size=8.75pt weight=bold) axis=x splitchar="" label=(&labels) labelloc=outside labelpos=min;  footnote height=32pt bold "Retracing My SAS® Global Forum 2016 Steps: Visualizing iPhone Health App Step Data With a (What Else?) Step Plot";