Experiment No : 7

Aim : Using Mid-point Ellipse algorithm, draw an animated solar system

Theory :
Ellipses are frequently used component in pictures and graphs, a procedure for generating either full ellipses or arcs is included in many graphics packages. Hence various algorithms for drawing rasterised ellipses have been formulated. One such algorithm is the Mid-Point Ellipse algorithm. This algorithm takes advantage of the symmetry of the ellipse and only computes points for 1 quadrant of the ellipse.

Code & Output :

```
#include<stdio.h>
#include<graphics.h>

void midPtEllipseAlgo(long x_center,long y_center,long a,long b);

int main(){
   int gd=DETECT,gm;
   initgraph(&gd,&gm,NULL);

   midPtEllipseAlgo(250,230,35,25);
   midPtEllipseAlgo(250,230,60,30);
   midPtEllipseAlgo(250,230,90,60);
   midPtEllipseAlgo(250,230,120,90);
   midPtEllipseAlgo(250,230,150,120);
   midPtEllipseAlgo(250,230,180,150);
   midPtEllipseAlgo(250,230,210,180);
   midPtEllipseAlgo(250,230,240,210);


   for(int i=0;i<12;i++)
   {
   //sun
   //setfillstyle(SOLID_FILL,YELLOW);
   setcolor(YELLOW);
   circle(250,230,20);
   floodfill(250,230,15);
   //mercury
   //setfillstyle(SOLID_FILL,RED);
   setcolor(RED);
   circle(285,230,2);
   floodfill(285,230,15);
   delay(100);
   //venus
   //setfillstyle(SOLID_FILL,LIGHTRED);
   setcolor(LIGHTRED);
   circle(310,230,5);
   floodfill(310,230,15);
   //earth
   //setfillstyle(SOLID_FILL,BLUE);
   setcolor(BLUE);
   circle(340,230,7);
   floodfill(340,230,15);
   //mars
   //setfillstyle(SOLID_FILL,LIGHTRED);
   setcolor(LIGHTRED);
   circle(370,230,4);
```

```
   floodfill(370,230,15);
   //jupiter
   //setfillstyle(SOLID_FILL,MAGENTA);
   setcolor(MAGENTA);
   circle(400,230,12);
   floodfill(400,230,15);
   //SATURN
   //setfillstyle(SOLID_FILL,BROWN);
   setcolor(BROWN);
   circle(430,230,11);
   floodfill(430,230,15);
   //uranus
   //setfillstyle(SOLID_FILL,LIGHTBLUE);
   setcolor(LIGHTBLUE);
   circle(460,230,9);
   floodfill(460,230,15);
   //neptune
   //setfillstyle(SOLID_FILL,WHITE);
   setcolor(WHITE);
   circle(490,230,8);
   floodfill(490,230,15);
   }
   getch();
  closegraph();
}

void midPtEllipseAlgo(long x_center,long y_center,long a,long b)
{
   long x,y,a_sqr,b_sqr, fx,fy, d,tmp1,tmp2;
   x=0;
   y=b;
   a_sqr=a*a;
   b_sqr=b*b;
   fx=2*b_sqr*x;
   fy=2*a_sqr*y;
  d=b_sqr-(a_sqr*b)+(a_sqr*0.25);
  do
   {
  putpixel(x_center+x,y_center+y,WHITE);
  putpixel(x_center-x,y_center-y,WHITE);
  putpixel(x_center+x,y_center-y,WHITE);
  putpixel(x_center-x,y_center+y,WHITE);

   if(d<0)
    {
  d=d+fx+b_sqr;
    }
   else
  {
  y=y-1;
  d=d+fx+-fy+b_sqr;
  fy=fy-(2*a_sqr);
  }
  x=x+1;
  fx=fx+(2*b_sqr);
  delay(10);

   }
   while(fx<fy);
   tmp1=(x+0.5)*(x+0.5);
```

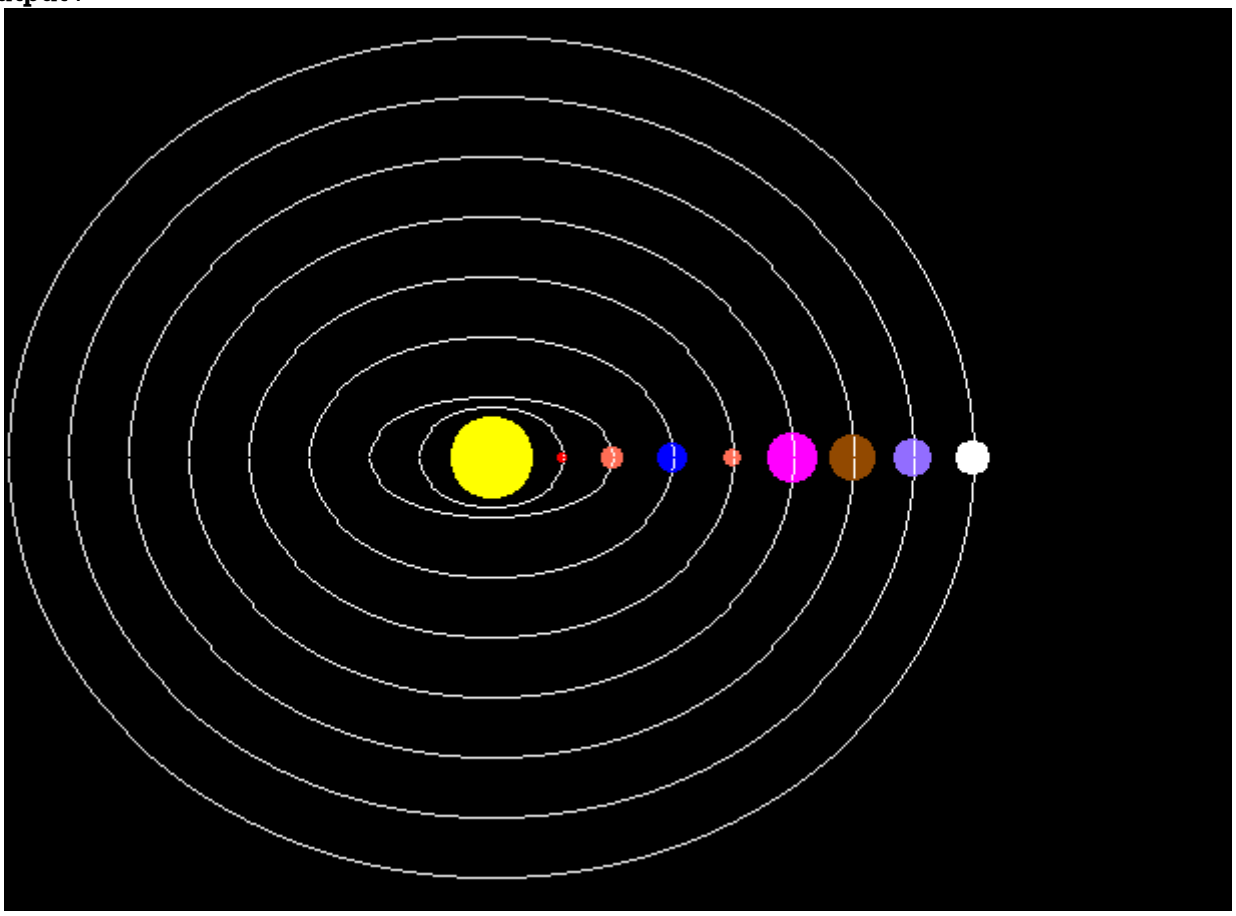
```
 tmp2=(y-1)*(y-1);
 d=b_sqr*tmp1+a_sqr*tmp2-(a_sqr*b_sqr);
 do
 {
putpixel(x_center+x,y_center+y,WHITE);
putpixel(x_center-x,y_center-y,WHITE);
putpixel(x_center+x,y_center-y,WHITE);
putpixel(x_center-x,y_center+y,WHITE);

 if(d>=0)
d=d-fy+a_sqr;
 else

{
x=x+1;
d=d+fx-fy+a_sqr;
fx=fx+(2*b_sqr);
}
 y=y-1;
 fy=fy-(2*a_sqr);
 }
 while(y>0);

}
```

Output :



Conclusion : Program to draw a solar system using mid point ellipse algorithm was succesffully written and executed

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