

GeneticsOfPolygons.org

Video animations with Mathematica

The best format for video is AVI because it is uncompressed and easy to edit. It involves a very simple frame-by-frame animation, giving the user full control over the process.

Typical animations are short so file size is not a real issue. But the generation process using high resolution is slow so we typically we break it up into segments. Mathematica will also generate 'mov' or 'swf' files but these may be harder to edit properly. With Adobe Premier Elements (about \$100) you can start with an avi file and output flv format, but it will not accept an flv file as input. The flv format is a fraction of the size of avi and the quality is decent, so keep an archive copy in avi and output flv for the web.

A 5 minute AVI video at 720 by 480 will be about 1 GB compared to about 13 MB in avi format. This is about an 80 to 1 compression.

Programs like Paint Shop Pro can take a Mathematica animated GIF and make an AVI file, or it will even take the raw frames and put them together into an AVI, but Mathematica does a pretty good job of doing this. Yes it is slow, but the results are worth the wait.

Default for AVI is uncompressed RGB frames using 8-bit color with Frame rate of 15 frames per second, so if the animation has 6000 frames, the length will be 6000/15 seconds or 6 minutes and 40 seconds.

Image Size must be a multiple of 4. The default width is 640 by 480, but it is worthwhile to upgrade the width to 720 with the ImageSize command.

Step 1. Generate the 'frames'. Most of my examples are projections where each new frame adds just one line. The raw data is the points. For example use Nodd.nb and your favorite polygon, pick an initial point q1:

IND[q1,2000]; Pf = PIM[q1, 1000, 2] This will generate 1000 P2 projections of the point q1 and store the 1000 points in Pf (Point file).

Step 2: Connect the dots

```
TD = Table[Line[{Pf[[k]], Pf[[k + 1]]}], {k, 2, 1000}];
```

```
Draw[k_] := Show[Graphics[{Drop[TD, k - Length[TD]],  
AbsolutePointSize[0.1], Point[Pf[[k]]]}]];
```

(* This enables you to Draw just the first k lines and include points if desired*)

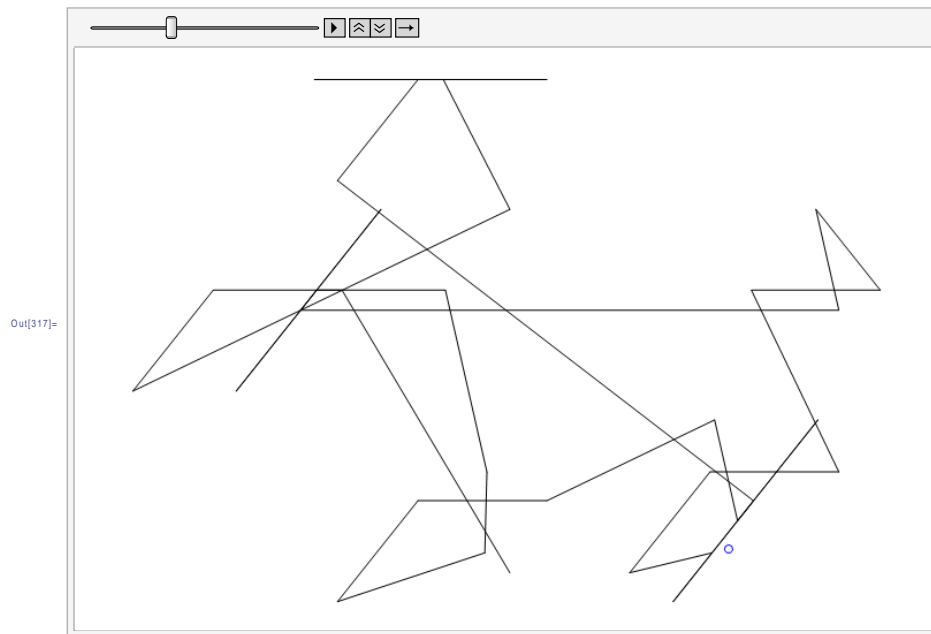
Step 3: Export the table of frames

```
Tx = Table[Draw[k], {k, 1, 1000}];
```

```
Export["Test.avi", Tx, ImageSize->{720,480}];
```

Any such AVI file can be imported back into Mathematica and animated:

```
Import["Test.avi", "Animation"]
```



For large files, use multiple Tx's and this will yield multiple avi's which are easy to combine in Adobe Premier or any video editor. An alternative is to skip files in the animations using TD:

```
TD = Table[Line[{Pf[[k]], Pf[[k + 1]]}], {k, 2, 1000, 4}]; (*take every 4th line*)
```

