stipple

October 25, 2020

[47]:
```
import numpy as np
import random as r
from PIL import Image, ImageOps, ImageDraw
#open image, convert to grayscale
im = Image.open("/users/larafs/desktop/spiritedaway.png").convert('L')
im.size
```

[47]:
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(1480, 1184)
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[48]:
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#invert image
invert_im = ImageOps.invert(im)
w, h = invert_im.size
```

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```
#put into 2d array
im_a = np.array(invert_im)
```

[50]:
```
#image initialization
img = Image.new("RGB", (w,h), "white")
draw = ImageDraw.Draw(img)
dotSize = 1
```

[51]:
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for i in range(round(im_a.size/100)):
    #sum rows and sample column
    cnormalized = im_a.sum(axis=1) / np.sum(im_a.sum(axis=1))
    row = 0
    column = 0

    #generate ksi for x
    ksi1 = r.uniform(0,1)
    sum1 = cnormalized[0]

    #find row
    while sum1 < ksi1:
        row = row + 1
        sum1 = sum1 + cnormalized[row]

    #sample row
```

```
    rnormalized = im_a[row-1] / im_a[row-1].sum()

    #generate ksi for y
    ksi2 = r.uniform(0,1)
    sum2 = rnormalized[0]

    #find column
    while sum2 < ksi2:
        column = column + 1
        sum2 = sum2 + rnormalized[column]

    #draw dots onto image
    draw.rectangle([column-1,row-1,column+dotSize-2, row+dotSize-2],␣
↪fill="black")
```

[52]:
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img.save('image.png')
```