```
In[1]:= SetDirectory["C:/drorbn/classes/LinAlg2/CT"]; pict = Import["S1.gif"];

In[2]:= pixels = N[pict[[1, 1]] / 255];

In[3]:= {H, W} = Dimensions[pixels]

Out[3]= {35, 45}

In[4]:= M = Round[Sqrt[H^2 + W^2]]

Out[4]= 57
```
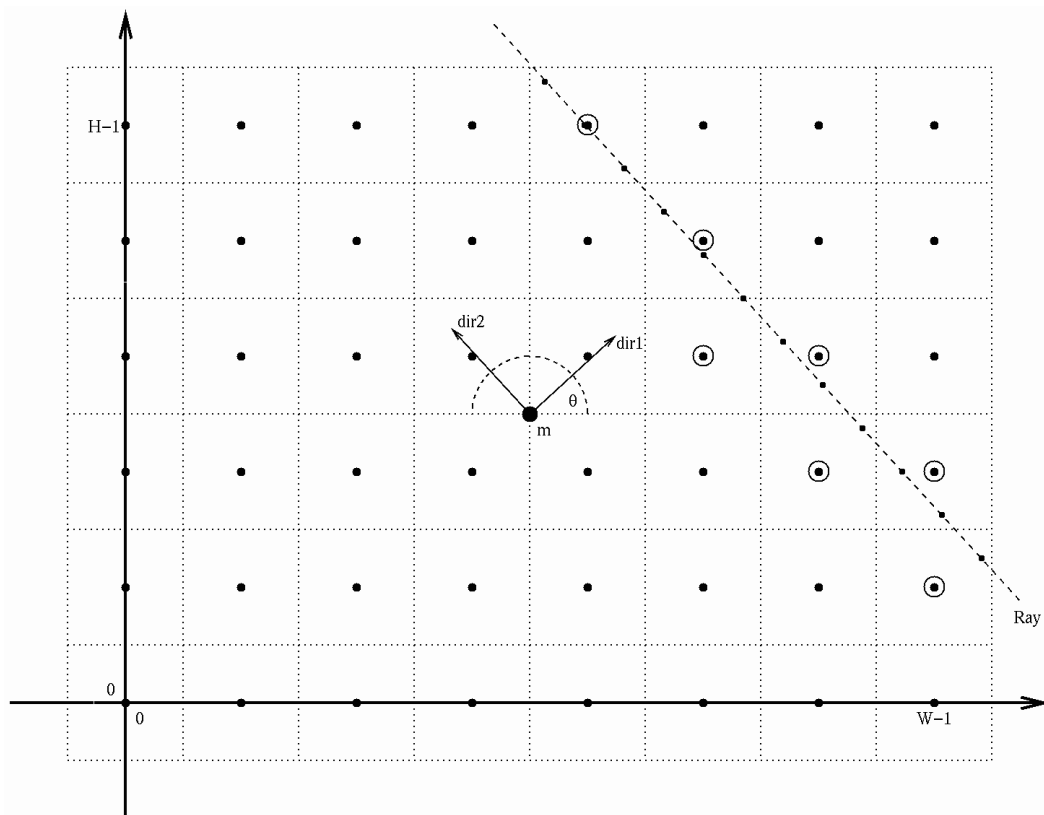


```
In[5]:= Clear[Ray]; Ray[i1_, i2_] := Ray[i1, i2] = Module[
            {
             r = {}, dir1, dir2, p1, p2, k,
             m = {H / 2 - 1 / 2, W / 2 - 1 / 2},
             θ = N[π * i1 / M]
            },
            dir1 = {Cos[θ], Sin[θ]};
            dir2 = {Cos[θ + π / 2], Sin[θ + π / 2]};
            For[k = -M / 2, k ≤ M / 2, k += 1 / 2,
             {p1, p2} = Round[m + (i2 - M / 2) * dir1 + k * dir2];
             If[0 ≤ p1 < H && 0 ≤ p2 < W, AppendTo[r, {p1 + 1, p2 + 1}]]
            ];
            Union[r]
           ]
```
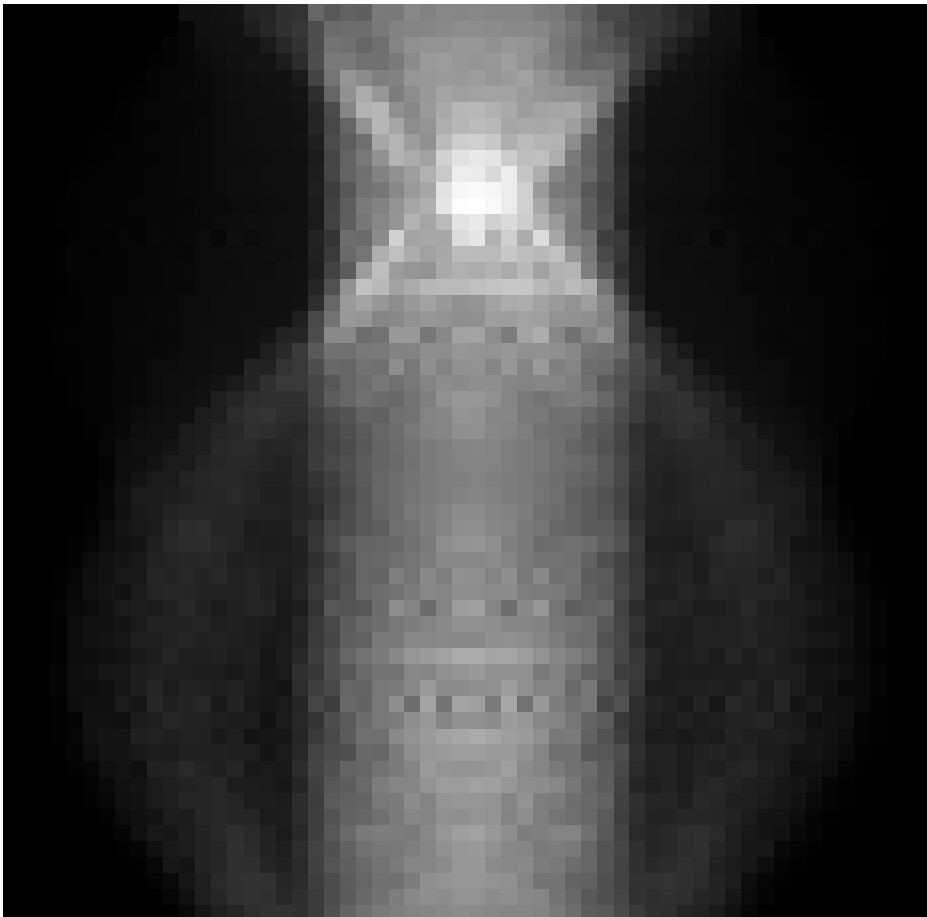
In[6]:= **Ray[50, 22]**

Out[6]= {{16, 1}, {16, 2}, {17, 2}, {17, 3}, {17, 4}, {18, 5}, {18, 6}, {18, 7},
{19, 7}, {19, 8}, {19, 9}, {20, 9}, {20, 10}, {20, 11}, {20, 12}, {21, 12},
{21, 13}, {21, 14}, {22, 15}, {22, 16}, {23, 17}, {23, 18}, {23, 19},
{24, 20}, {24, 21}, {25, 22}, {25, 23}, {25, 24}, {26, 24}, {26, 25}, {26, 26},
{26, 27}, {27, 27}, {27, 28}, {27, 29}, {28, 29}, {28, 30}, {28, 31}, {29, 32},
{29, 33}, {29, 34}, {30, 34}, {30, 35}, {30, 36}, {31, 37}, {31, 38}, {31, 39},
{32, 39}, {32, 40}, {32, 41}, {33, 42}, {33, 43}, {33, 44}, {34, 44}, {34, 45}}

In[7]:= **CTScan = Table[**
   Plus @@ Extract[pixels, Ray[i1, i2]] + 0 * Random[Real, {-1, 1}],
   {i1, 1, M}, {i2, 0, M}
   ]; Dimensions[CTScan]

Out[7]= {57, 58}

In[8]:= **Show[Graphics[Raster[CTScan / Max[CTScan]]], AspectRatio → Automatic]**

Out[8]= ▪ Graphics ▪

In[9]:= **Save["CTScan.m", CTScan]**