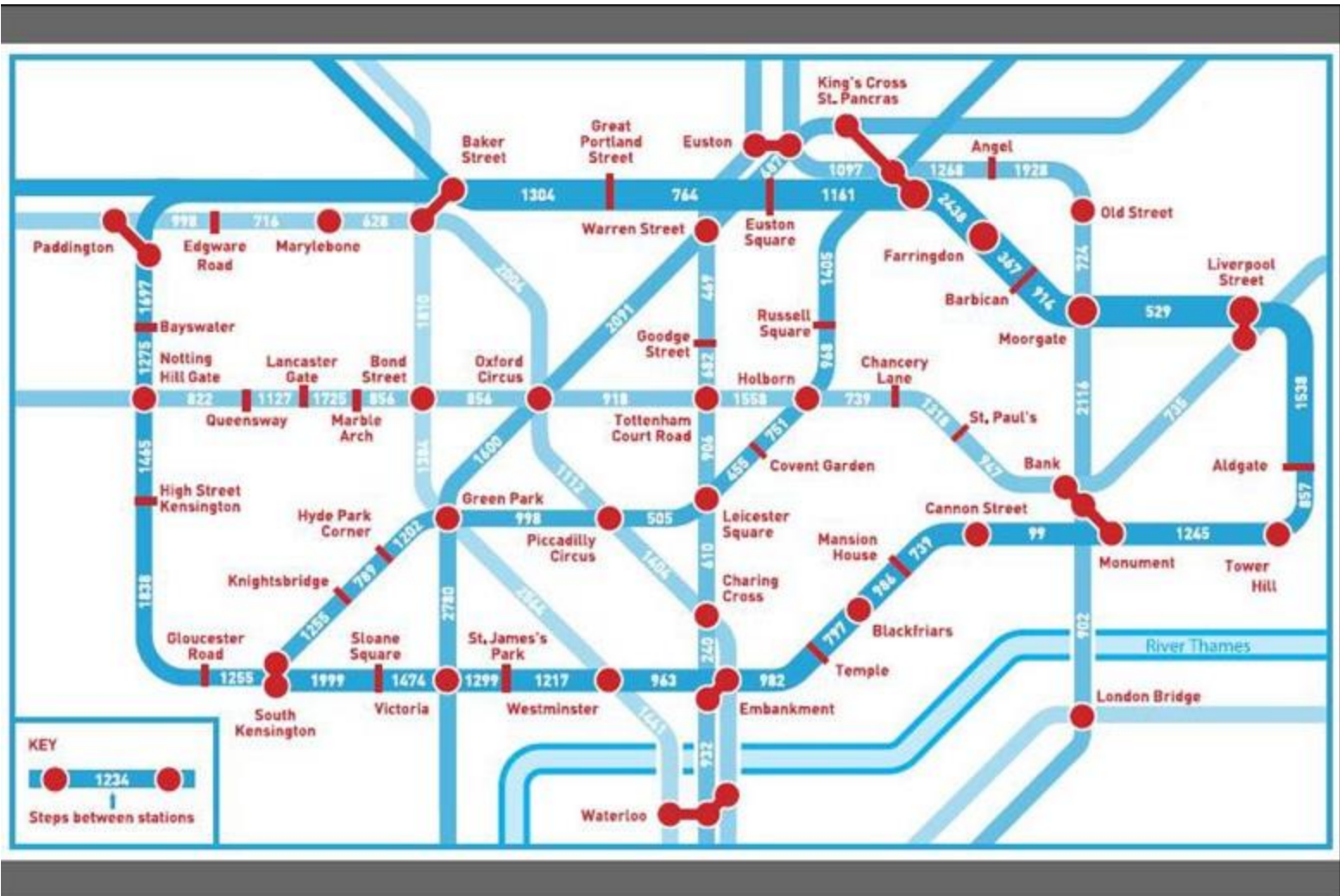


Maps and images - distances between tube stops (BBC)



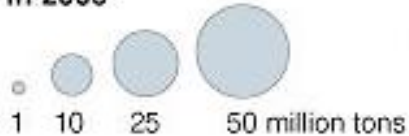


NY Times 01/26/09

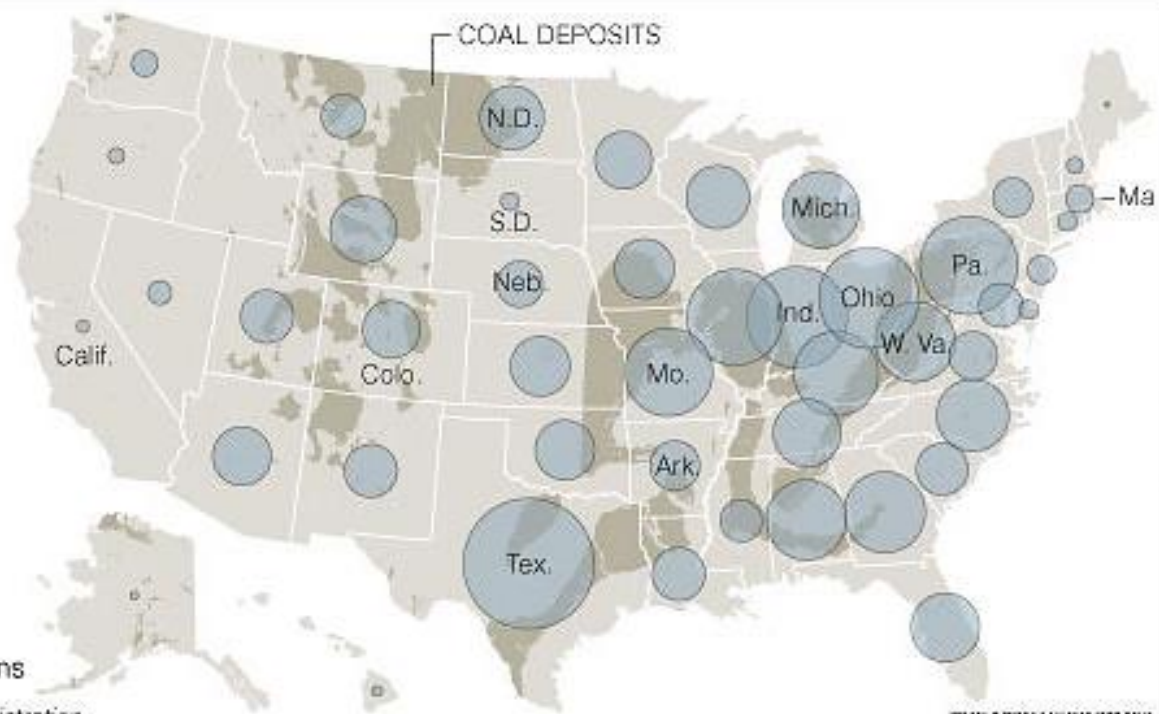
A Divide: Brown-Green

Although many of the lawmakers in charge of regulating greenhouse gas emissions come from the West and East Coasts, most manufacturing jobs are in the Midwest.

Amount of coal used to generate electric power in 2006



Source: Energy Information Administration



THE NEW YORK TIMES

Spatial process data.

(s,t) : geographic coordinates,

e.g. (latitude, longitude), (x-coord,y-coord)

$y(s,t)$ real-valued

e.g. available for $s=0,\dots,S-1$; $t=0,\dots,T-1$

How to display?

Starkey Reserve, Oregon - elk, deer, cows, humans



Example. Height of 500mb surface $S=64$, $t=32$

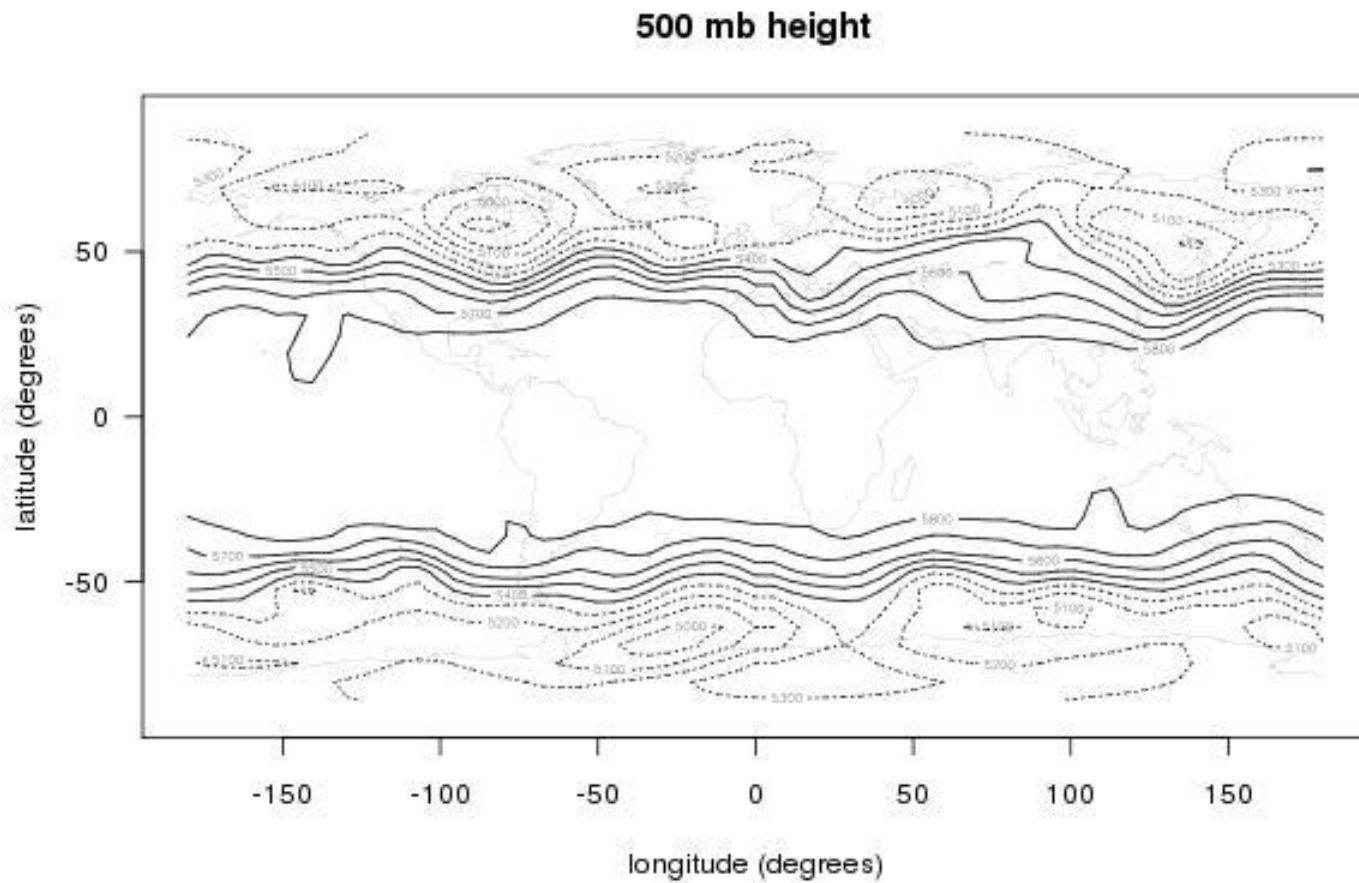
1200 GMT January 1, 1986

data based on many observations, interpolated to grid

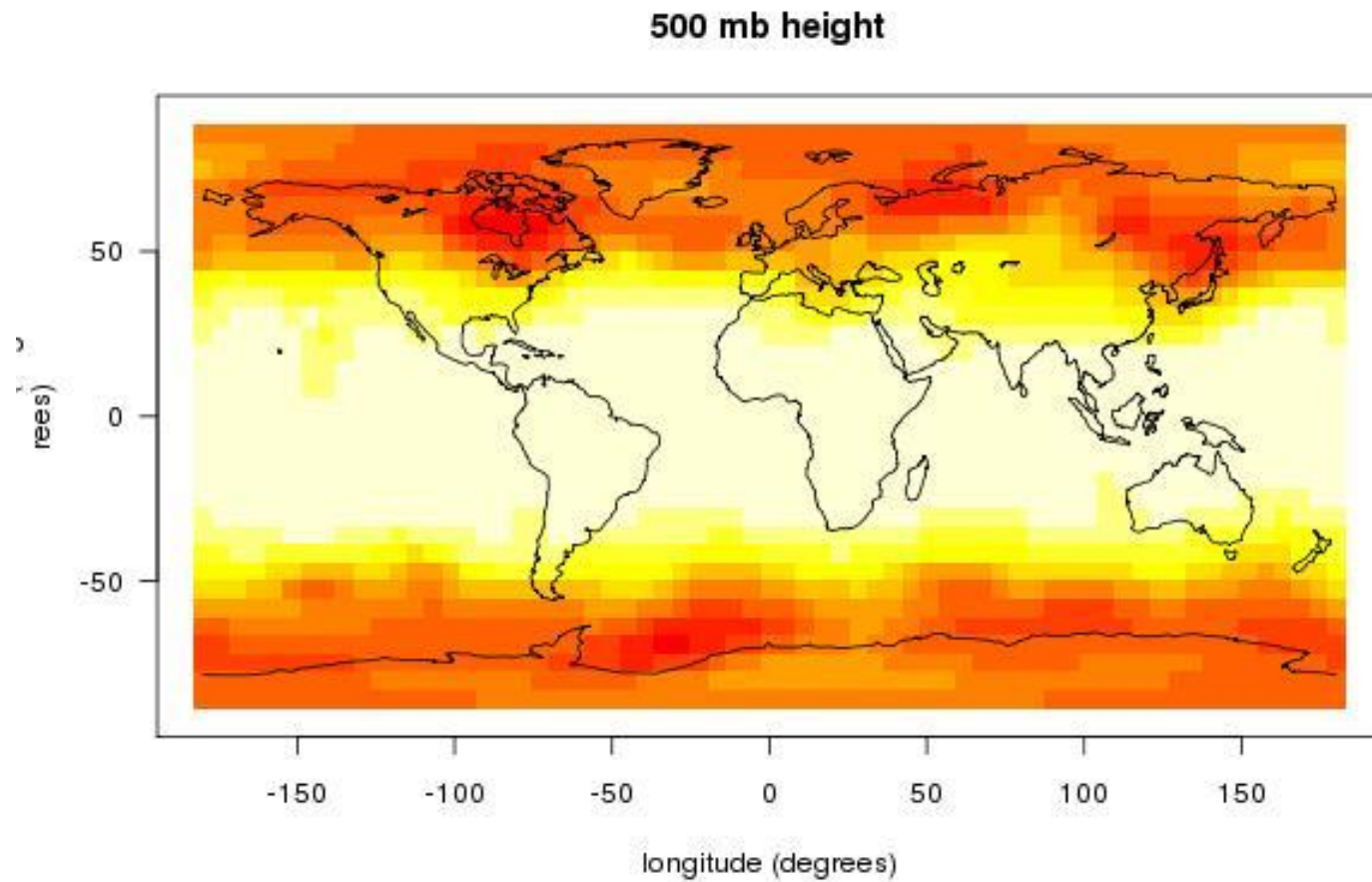
display by contours over a world map

and pixels

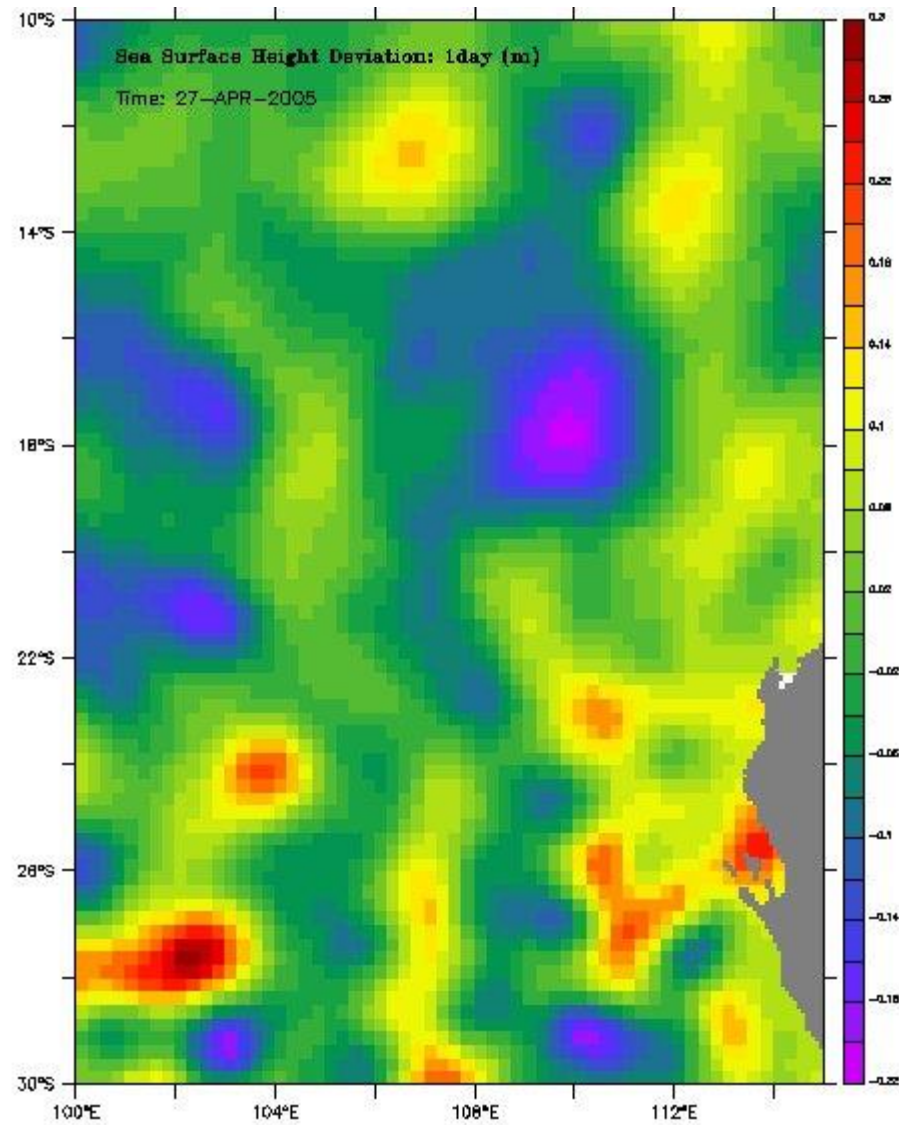
contours



pixels



Sea surface height



Stacking.

Galton - photos of faces

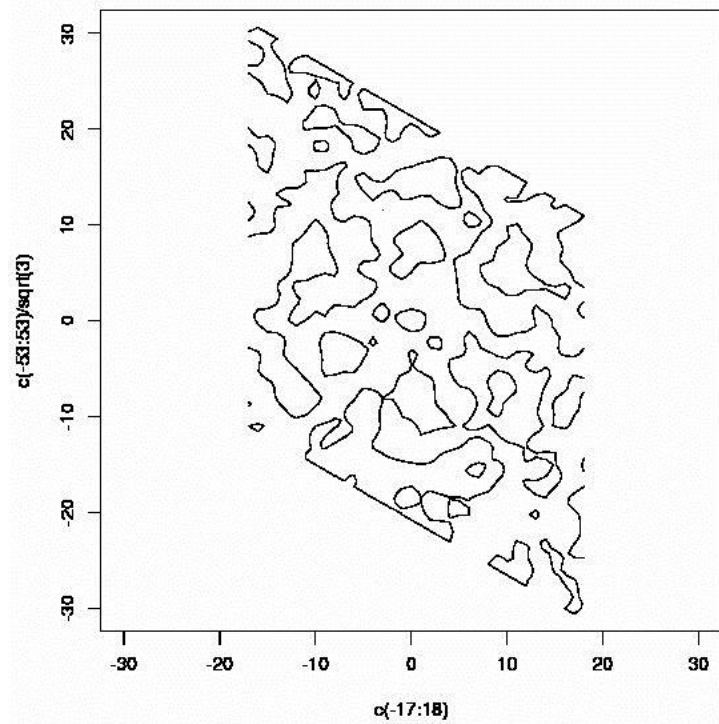
electron micrographs

crystal, purple membrane

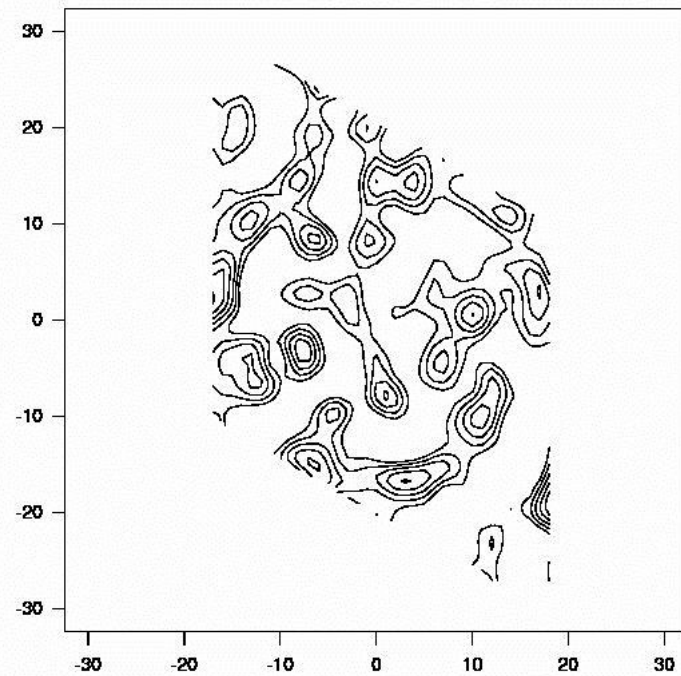
160 "units"

$$\sum_{j=1}^{160} y_j(s,t)/160$$

stacking via FFT



Simple averaging



Data may be aggregate, e.g. over polygons

coordinates of vertices

choropleth plot: a thematic map in which areas are shaded

perspective plot

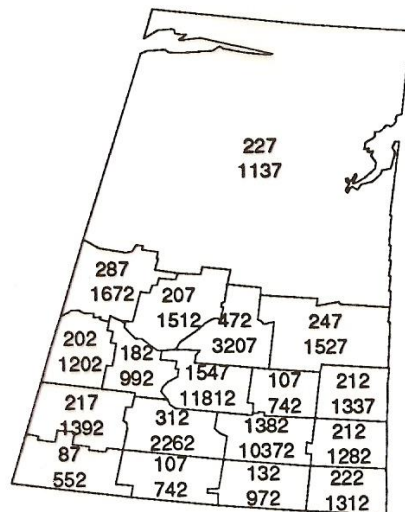
hidden lines

map(), persp(), polygon() computational geometry

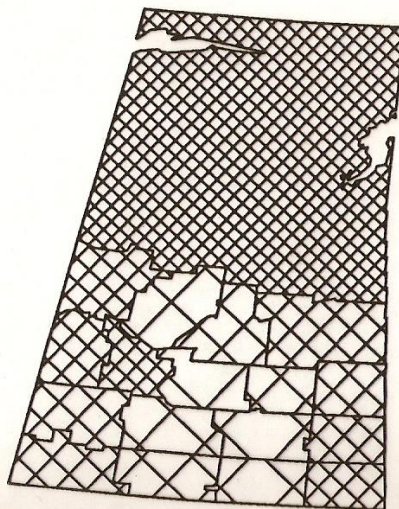
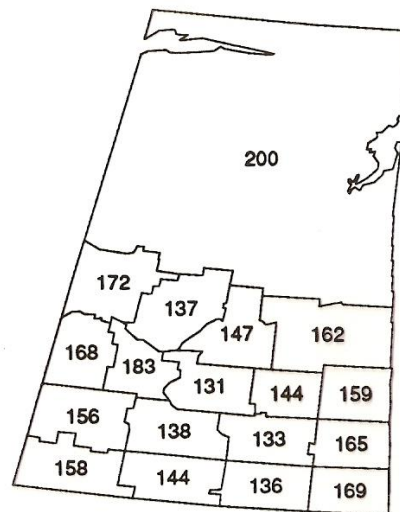
point in polygon

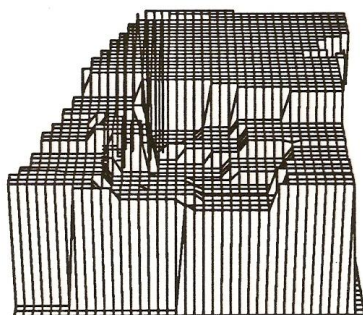
Saskatchewan births, counts, rates

1986 births and populations, ages 25 to 29



Rates per 1000





Contouring.

Contour line, γ , (a function of two variables), is a curve connecting points where the function has the same value.

Smooth function $f: \mathbb{R}^2 \rightarrow \mathbb{R}$

c : value

$$f^{-1}(c) = \gamma_{x,y}$$

There may be more than one component

One method.

Suppose $f(s,t)$ available for a regular grid

Suppose wish $f^{-1}(c)$

Pick an edge, AB, of a pixel

I. It will be intercepted if $\min\{f(A),f(B)\} \leq c \leq \max\{f(A),f(B)\}$

using this can learn all edges intercepted

II. If one edge of a cell is intercepted, so is another one

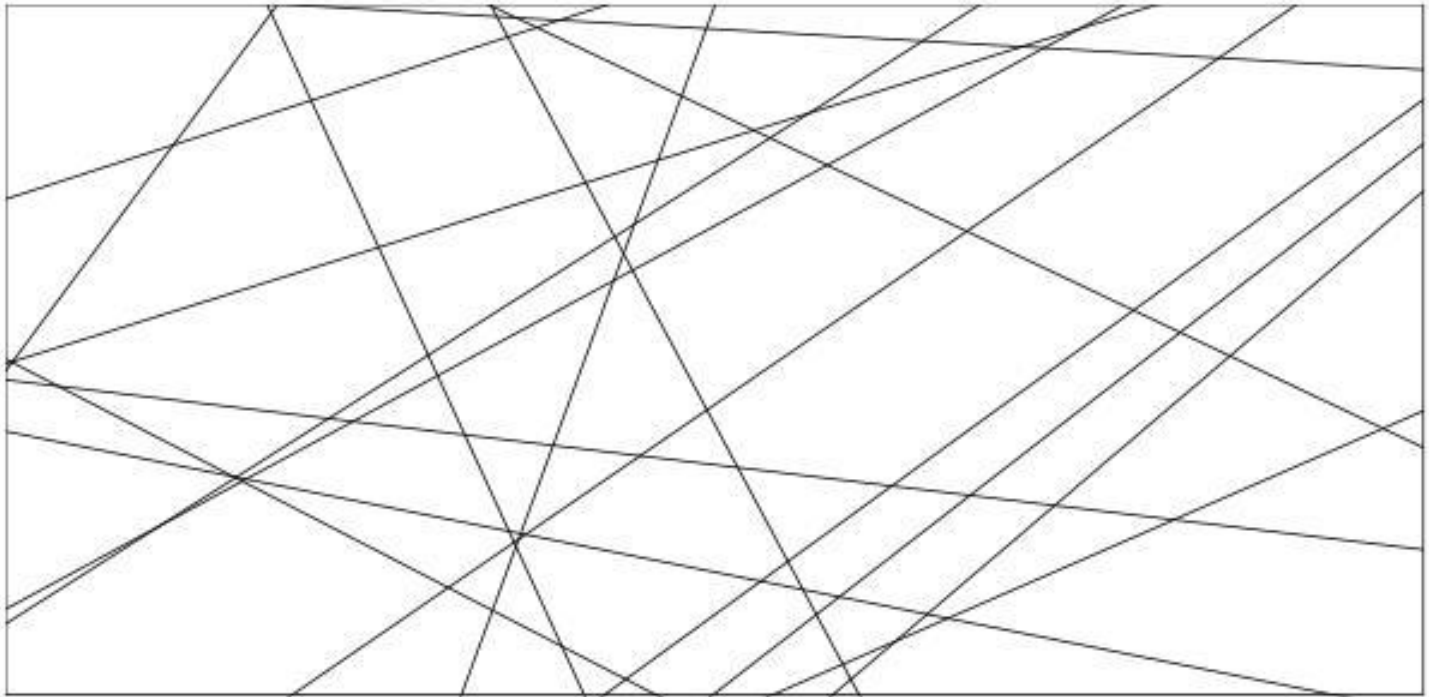
search in order E-S-W-N

III. Get intersection coordinates by interpolation

connect by line

IV. Move to pertinent adjacent cell and continue

Simulated Line Process



Cell Boundaries

