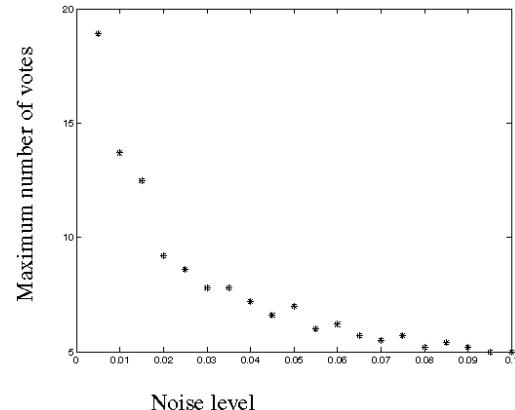


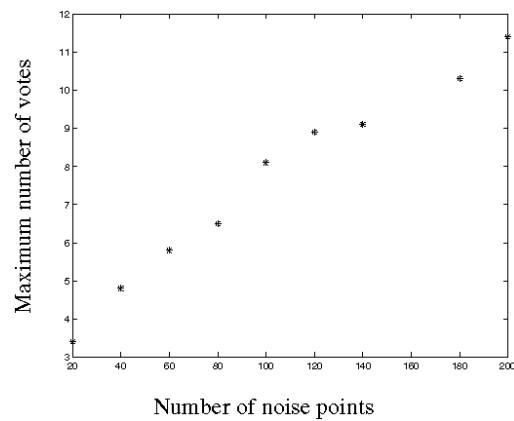
Difficulties with the Hough transform

- How big should the cells be? (too big, and we cannot distinguish between quite different lines; too small, and noise causes lines to be missed)
- How many lines?
 - count the peaks in the Hough array
- Who belongs to which line?
 - tag the votes
- Hough transform is a useful idea, but it is not often satisfactory in practice, because problems with noise and cell size defeat it

Votes for a real line of 20 points versus noise



Votes for a line in a picture that does not have one



Probability Concepts

- We will make use of the following concepts.
 - Basic probability in discrete spaces, events
 - Joint probability
 - Conditional probability
 - Independence (and conditional independence)
 - Marginal probability (marginalization)
 - Probability in continuous spaces (probability density functions)
- To learn/review them see supplementary chapter in the book posted on the web site or you favorite web text or video resource

Probabilistic Fitting

- Generative probabilistic model
 - Tells a story about how stochastic data comes to be
 - Darts fall around the center of the board, but where exactly?
 - Consider a model with parameters, Θ
 - Consider an observation, x_i
 - We denote the probability of seeing x_i under the model by:

$$p(x_i | \Theta)$$



Read “given” or “conditioned on”
Restricts to the case of Θ

Defined by $P(A|B) = \frac{P(A,B)}{P(B)}$