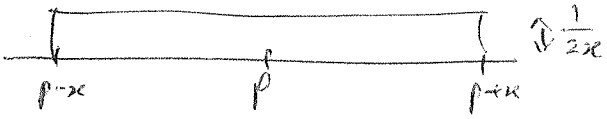
KDE on a network

Motivate by some questions

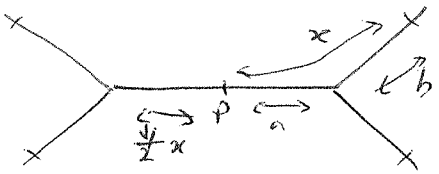
"Network" = Graph with distances, around linear along each edge, satisfying the Δ-inequality.

What is a "uniform distribution" of bandwidth x meters around a point p?

On a one-dimensional line, it's just



What about on the network



?

a) Could choose any point, uniformly at random, from the set of all points $\leq x$ distance from p. This means choosing a pt in region "a" is just as likely as choosing a pint in region "b".

b) In the one-dim case, we have a choice of left/right, and then a (uniform) choice of distance to travel.

If we apply the same idea to the network we have two choices: left/right from p, and then left/right at whichever junction we come to.

But the 2nd choice doesn't apply if the distance chosen to travel is $\leq \frac{1}{2}x$. So it is twice as likely to end in region a, as in region b.

- This corresponds to "splitting" the kernel at each junction.
- Same as imagining an "agent" who has decided how far to travel, uniformly at random in $[0, x]$, and then flips a coin at each junction to decide which way to go

The 2nd option is what's been used in the literature (such as it is). LB

But imagine an offender: the literature suggests that for repeat/non repeat behaviour, offenders have an "awareness space" onel