MATH 569 Statistical Learning

Part V: Kernel Smoothing Methods

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Fig 6.1

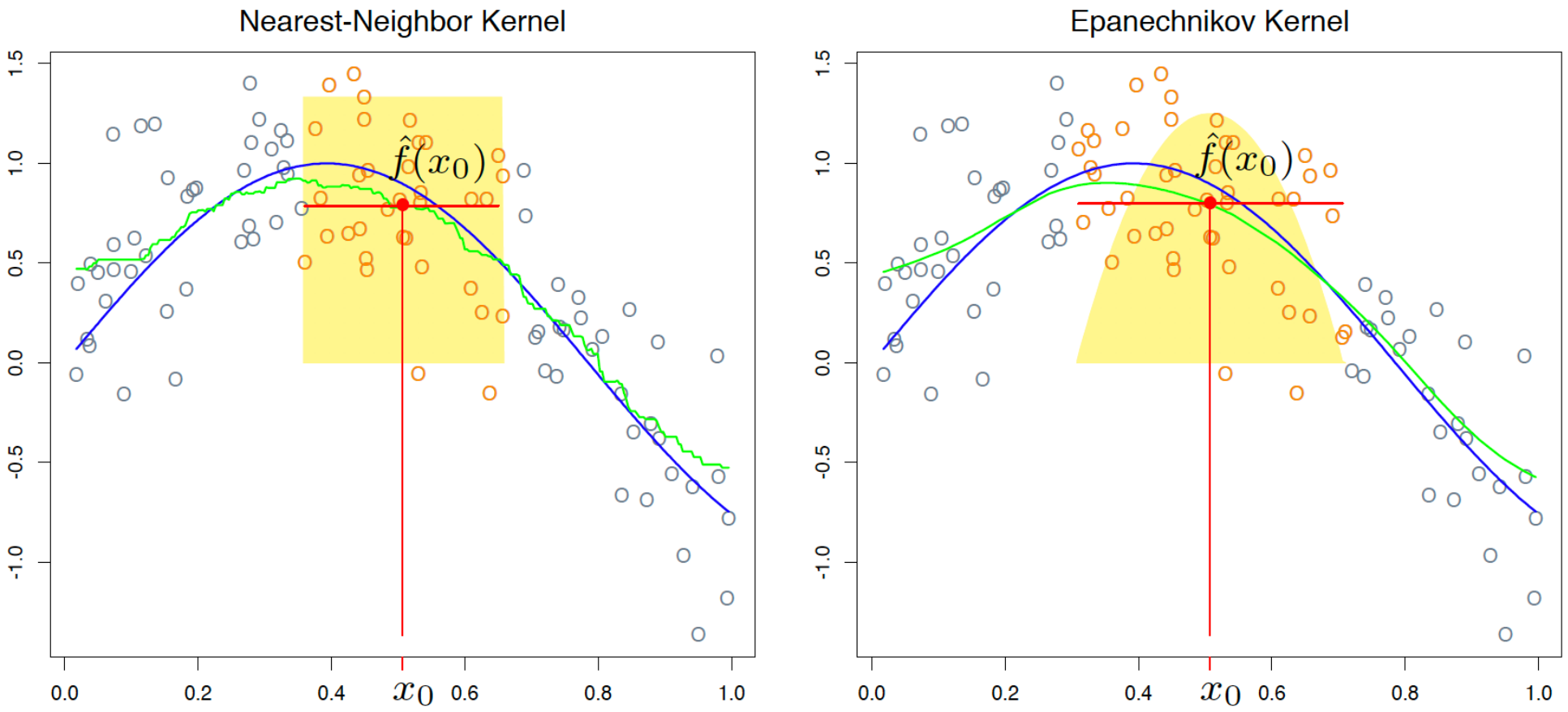
Nearest-Neighbor Kernel
Epanechnikov Kernel
$\hat{f}(x_0)$
x_0
0.0
0.2
0.4
0.6
0.8
1.0
-1.0
-0.5
0.0
0.5
1.0
1.5

Fig 6.2

A comparison of three popular kernels for local smoothing.

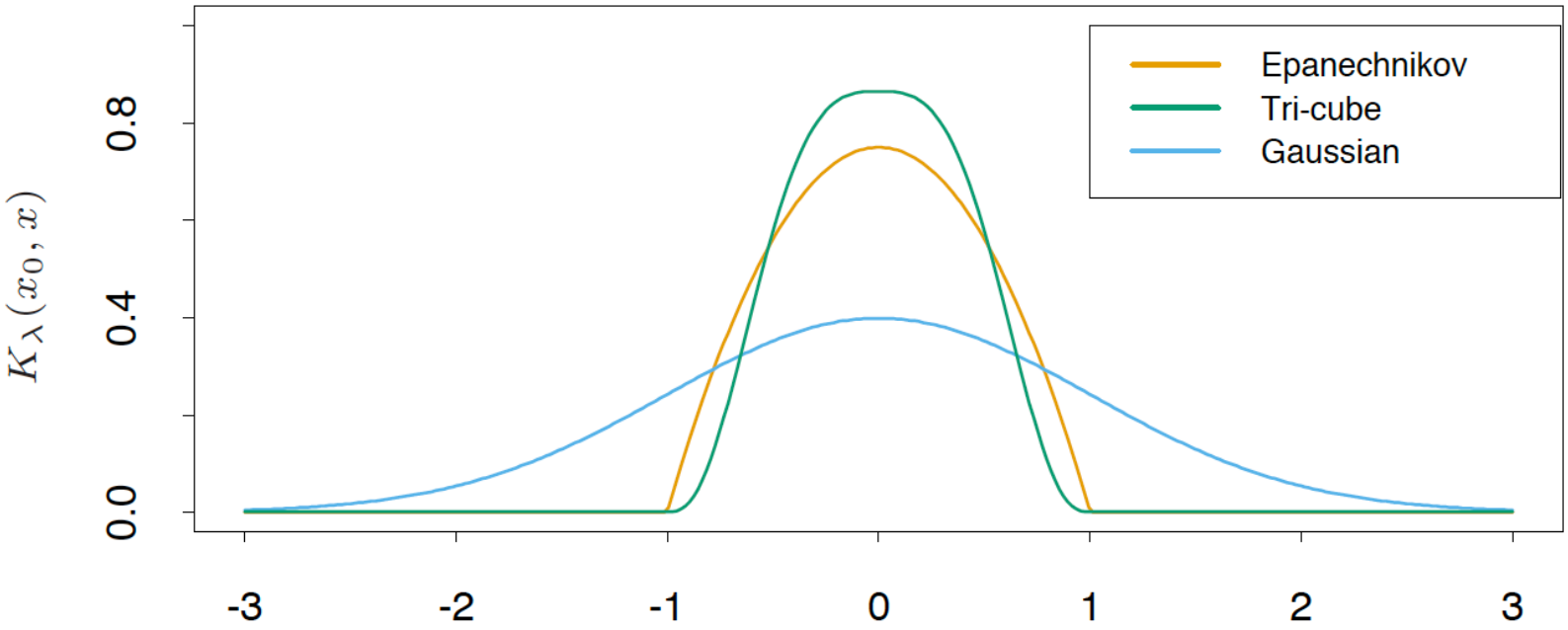

Fig 6.3

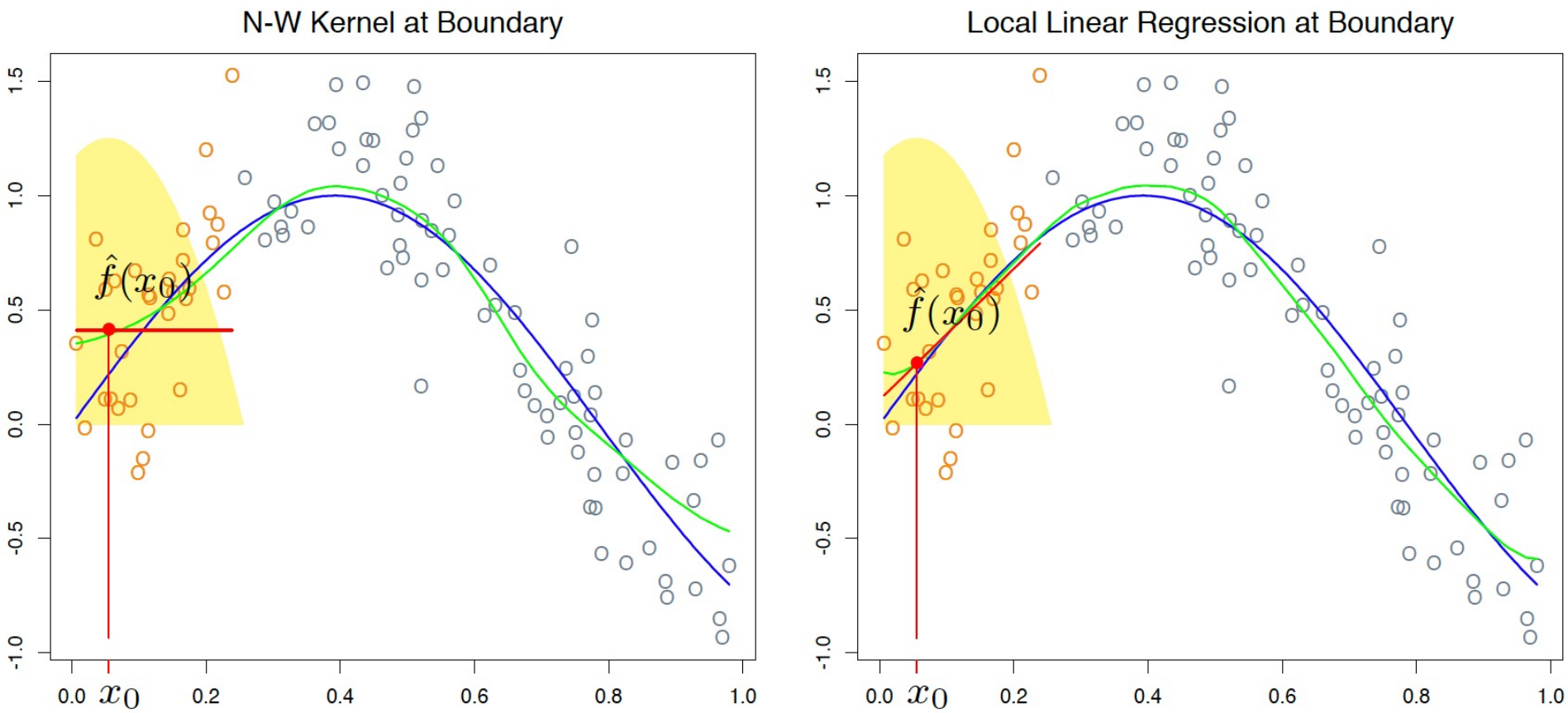
N-W Kernel at Boundary
Local Linear Regression at Boundary
$\hat{f}(x_0)$
x_0
0.0
0.2
0.4
0.6
0.8
1.0
-1.0
-0.5
0.0
0.5
1.0
1.5

Fig 6.5

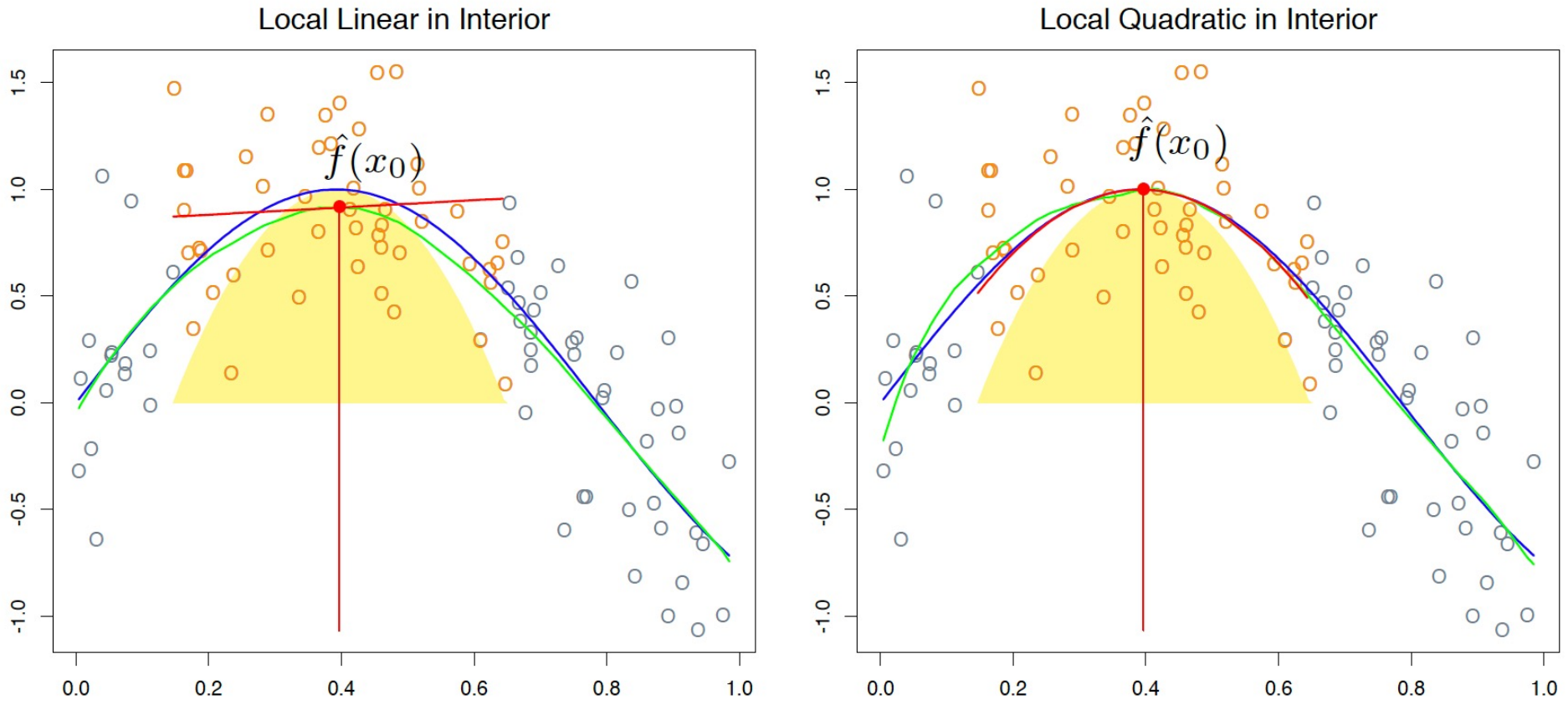

FIGURE 6.5. *Local linear fits exhibit bias in regions of curvature of the true function. Local quadratic fits tend to eliminate this bias.*

Fig 6.6 Bias-variance trade off

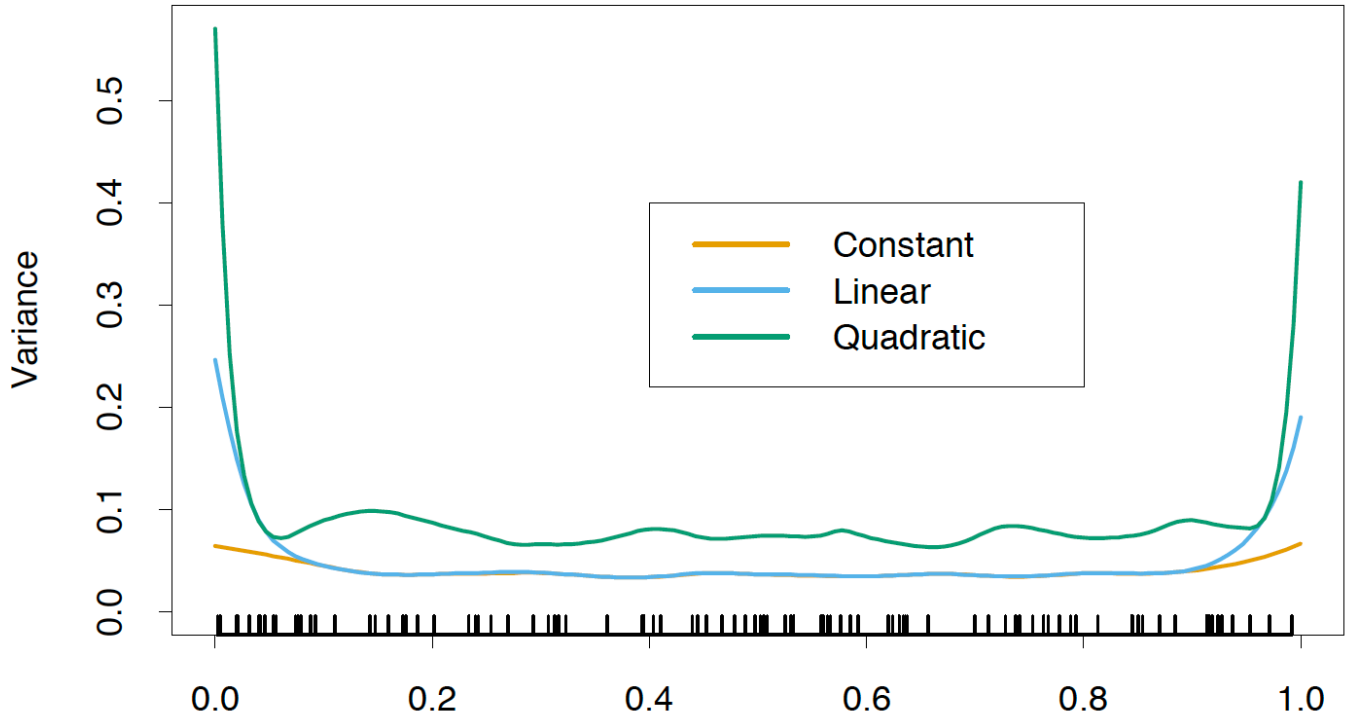

FIGURE 6.6. *The variances functions* $||l(x)||^2$ *for local constant, linear and quadratic regression, for a metric bandwidth* ($\lambda = 0.2$) *tri-cube kernel.*

Fig 6.16

Upper: Gaussian radial basis functions with fixed width can leave holes
Lower: renormalized radial functions avoid holes