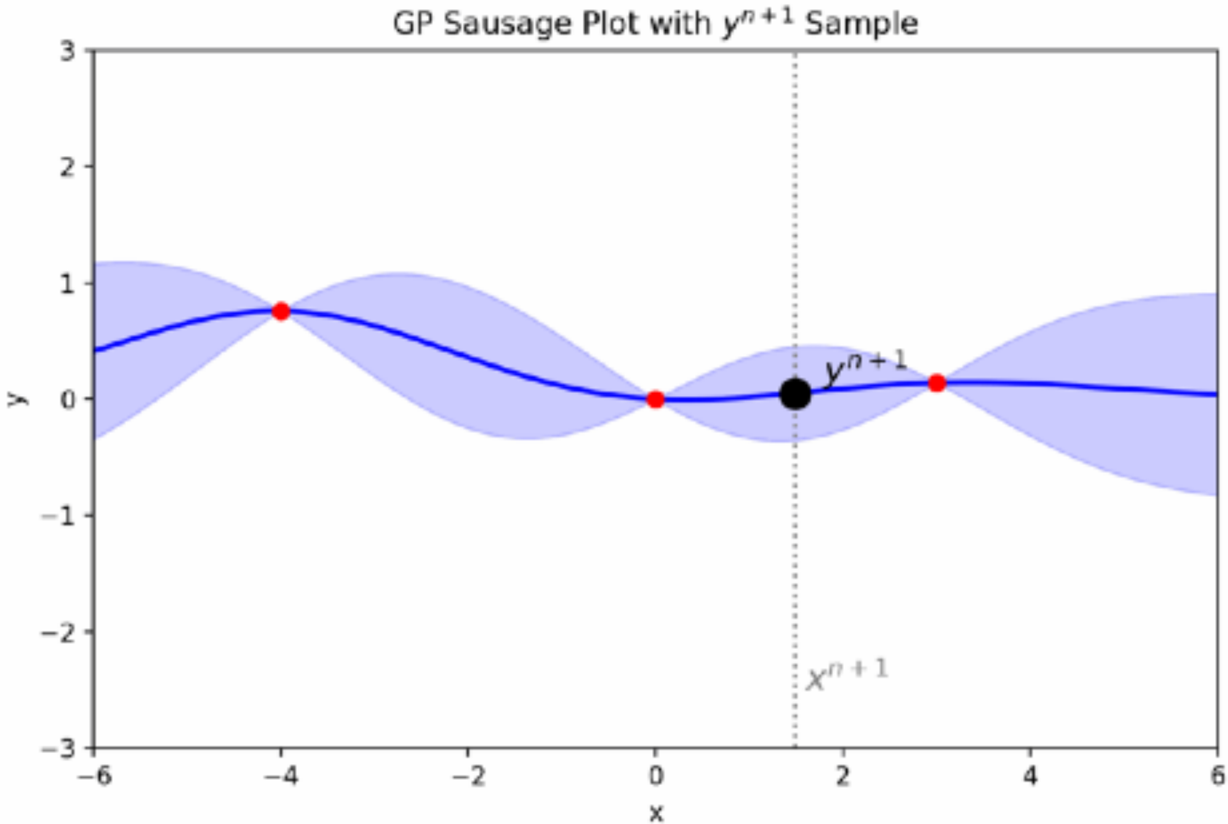
According to our GP we may have many realizations of y^{n+1}

$$\sqcap$$


GP Sausage Plot with y^{n+1} Sample
3
2
1
0
−1
−2
−3
y
−6
−4
−2
0
2
4
6
x
y^{n+1}
x^{n+1}

Formal Definition

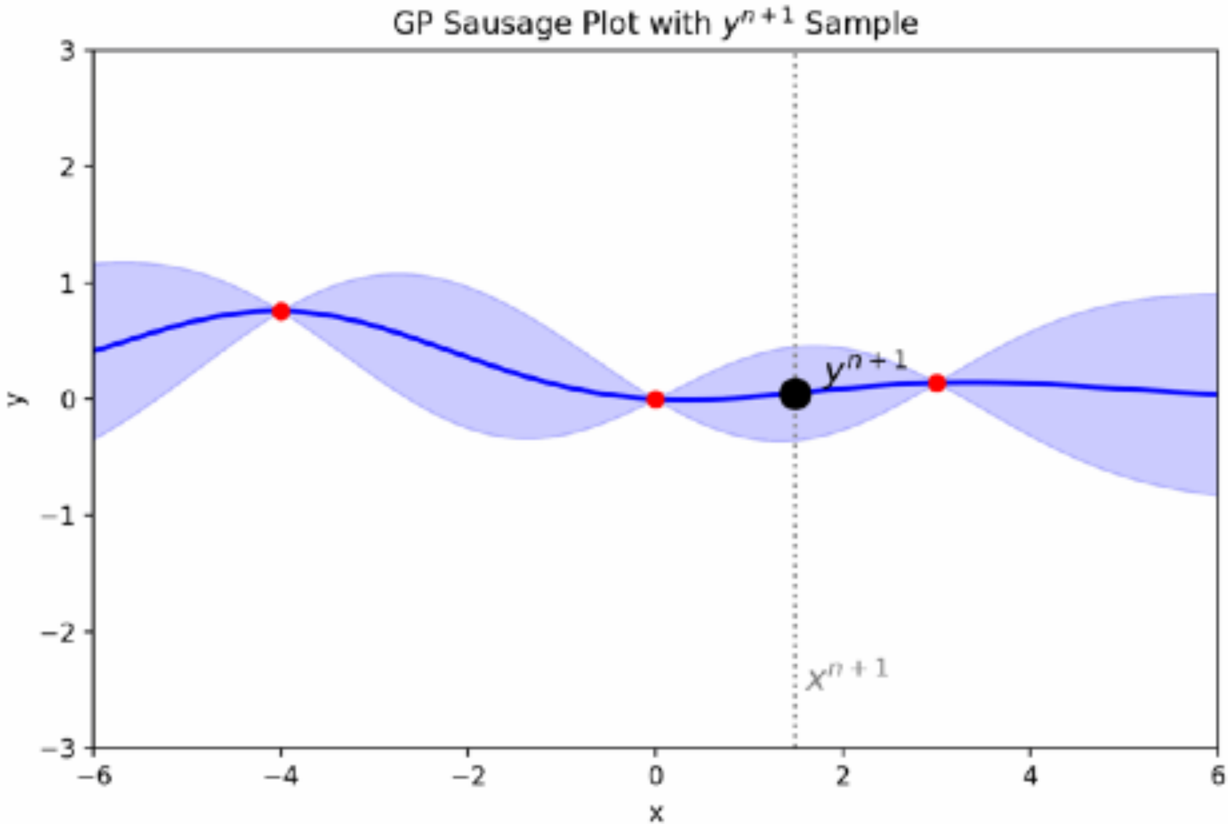
$$\mathrm{KG}(x) = \mathbb{E}\left[\max_{x'' \in \mathcal{X}} \{\mu_y^{n+1}(x'')\} - \max_{x' \in \mathcal{X}} \{\mu_y^n(x')\} \;\middle|\; x^{n+1} = x \right].$$

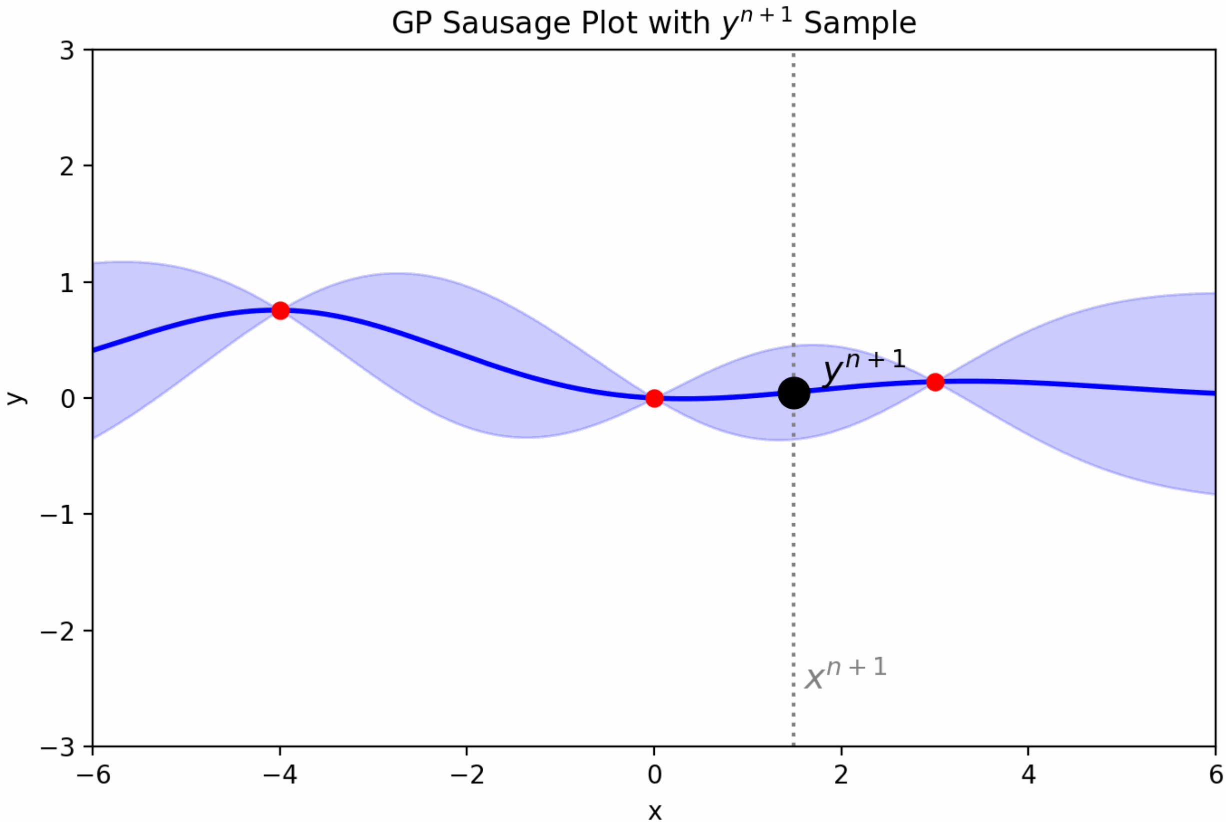
Lets hypothise that we sample at x

The maximum of the new posterior after getting updated with y^{n+1}

The maximum of the old posterior

3


GP Sausage Plot with y^{n+1} Sample
3
2
1
0
−1
−2
−3
y
−6
−4
−2
0
2
4
6
x
y^{n+1}
X^{n+1}



GP Sausage Plot with y^{n+1} Sample
3
2
1
0
−1
−2
−3
y
y^{n+1}
x^{n+1}
−6
−4
−2
0
2
4
6
x

Formal Definition

The maximum of the old posterior

$$\mathrm{KG}(x) = \mathbb{E}\left[\max_{x''\in\mathcal{X}}\{\mu_y^{n+1}(x'')\} - \max_{x'\in\mathcal{X}}\{\mu_y^{n}(x')\}\ \middle|\ x^{n+1} = x\right].$$

The maximum of the new posterior after getting updated with y^{n+1}

Monte Carlo Sampling - 1

WuandFrazier2017