HOW TO SURVIVE POST-ELECTION AMERICA

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sf16_ds4 investigation 2

HOW TO SURVIVE POST-ELECTION AMERICA

- Option 1. Invent a time-machine...
- Option 2. Canada...
- Option 3. ?

STOP WORRYING

AND

LEARN TO LOVE

BAYESIAN

memegenerator.net

BAYES' RULE

$$p(f|\mathcal{D}) = \frac{p(\mathcal{D}|f)p(f)}{p(\mathcal{D})}$$

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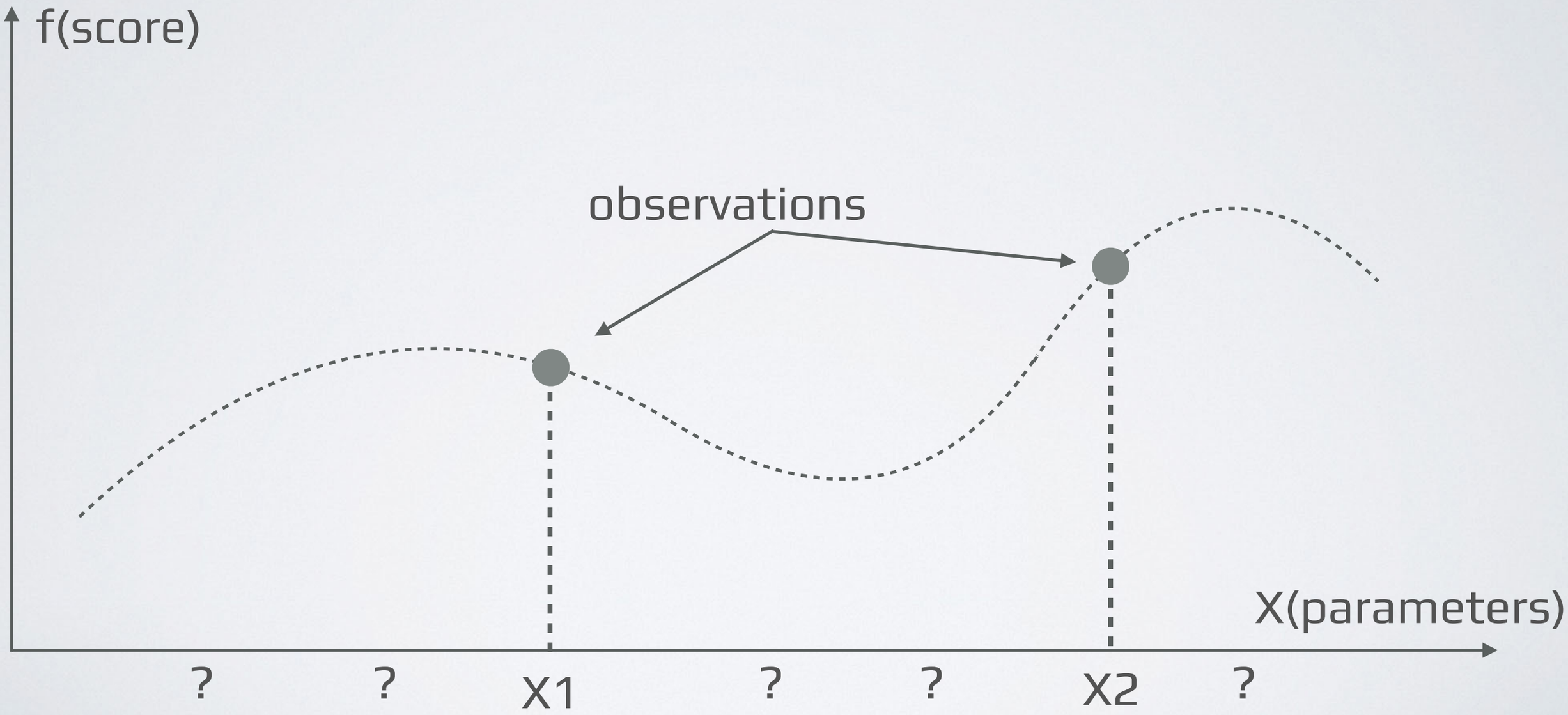
$$\frac{0.99 \text{ X } 0.0001}{0.01 \text{ X } 0.9999 \text{ + } 0.99 \text{ X } 0.0001} = 0.98\%$$

hyperparameter tuning scenario

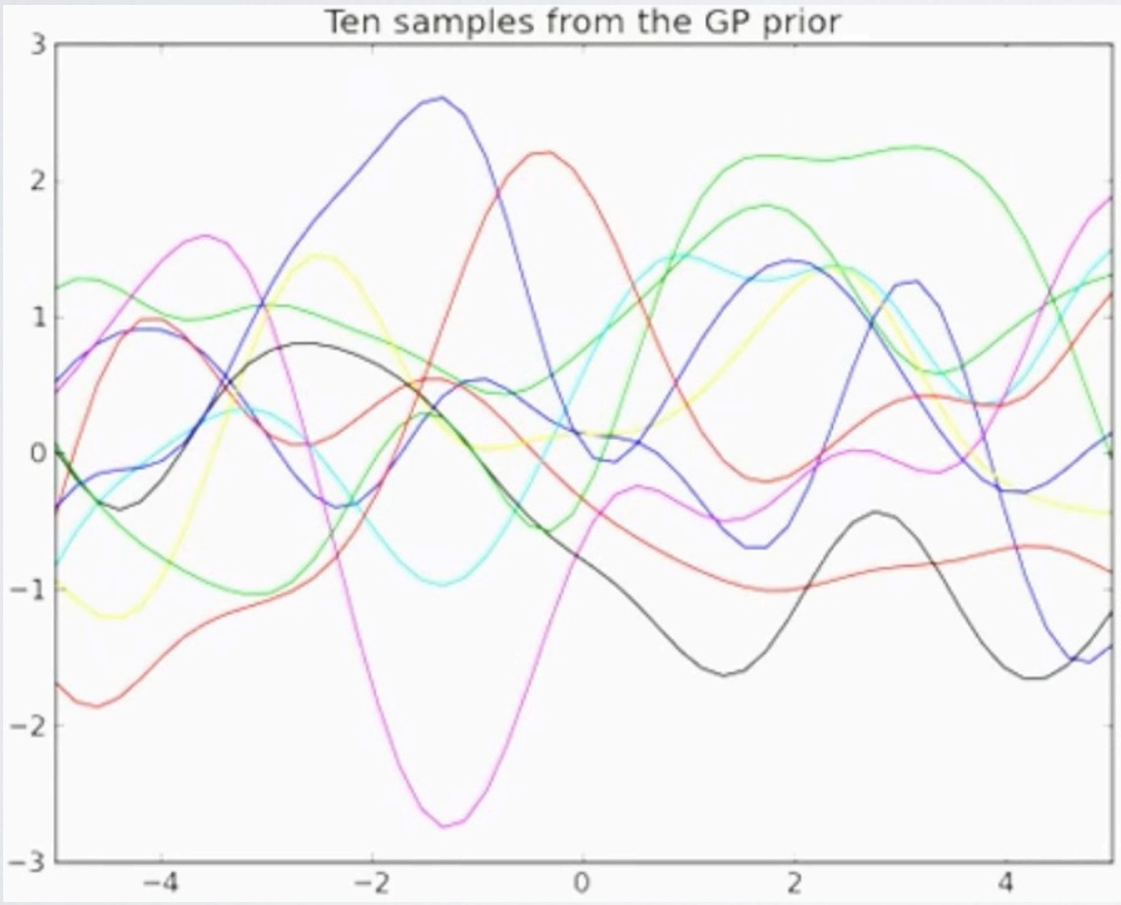
- Extremely large parameter space
- Each evaluation takes a long time to finish (days)
- Smart way to find the next point to evaluate ?

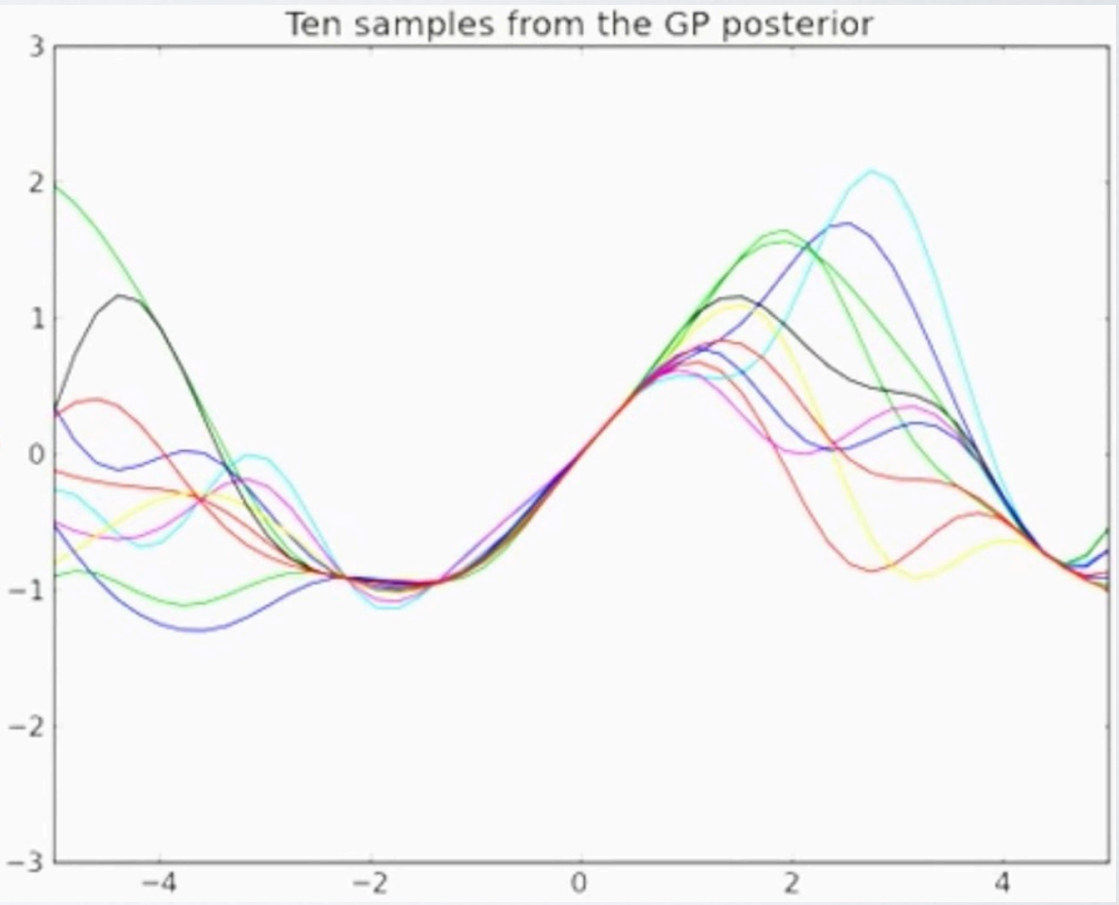


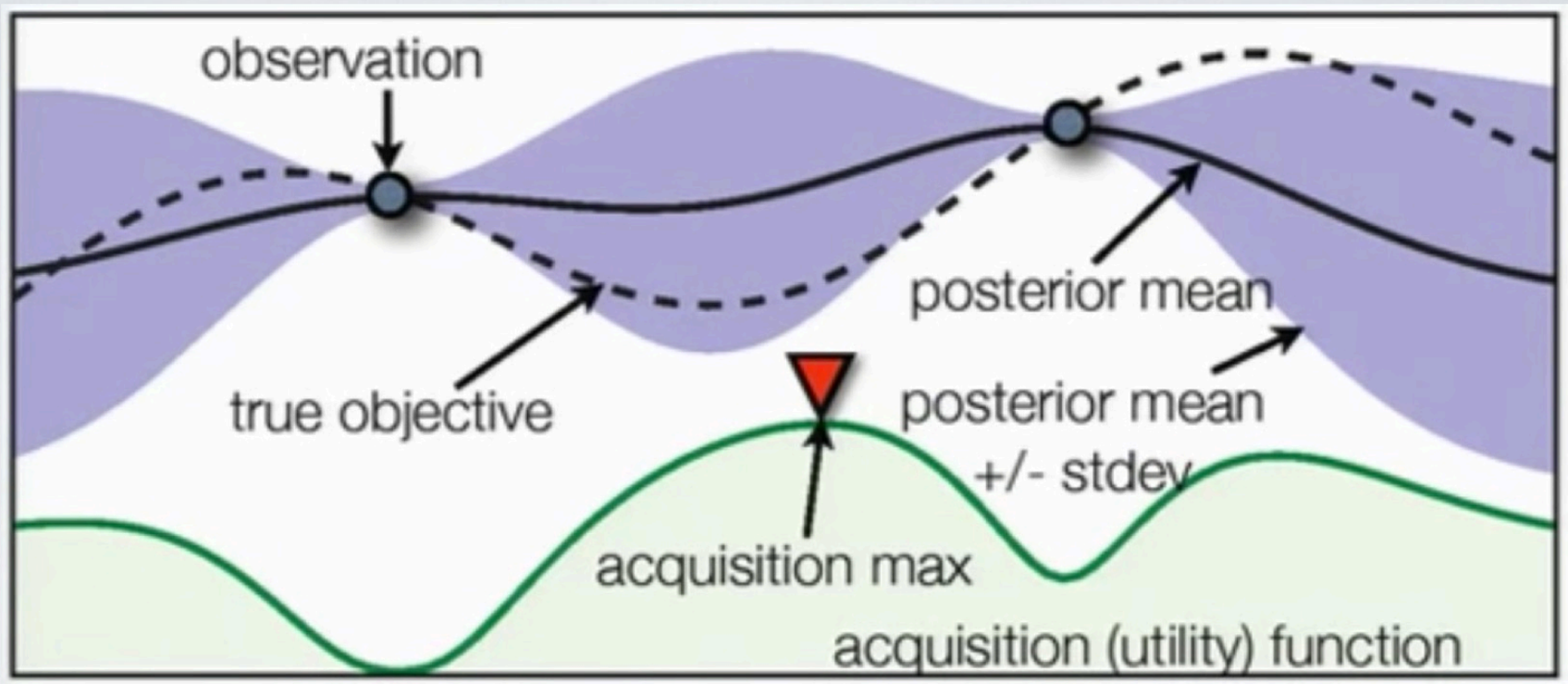
Prior belief p(f)
a multivariate
normal(Gaussian)
distribution

Updated belief
using Bayesian theory

$$p(f|\mathcal{D}) = \frac{p(\mathcal{D}|f)p(f)}{p(\mathcal{D})}$$

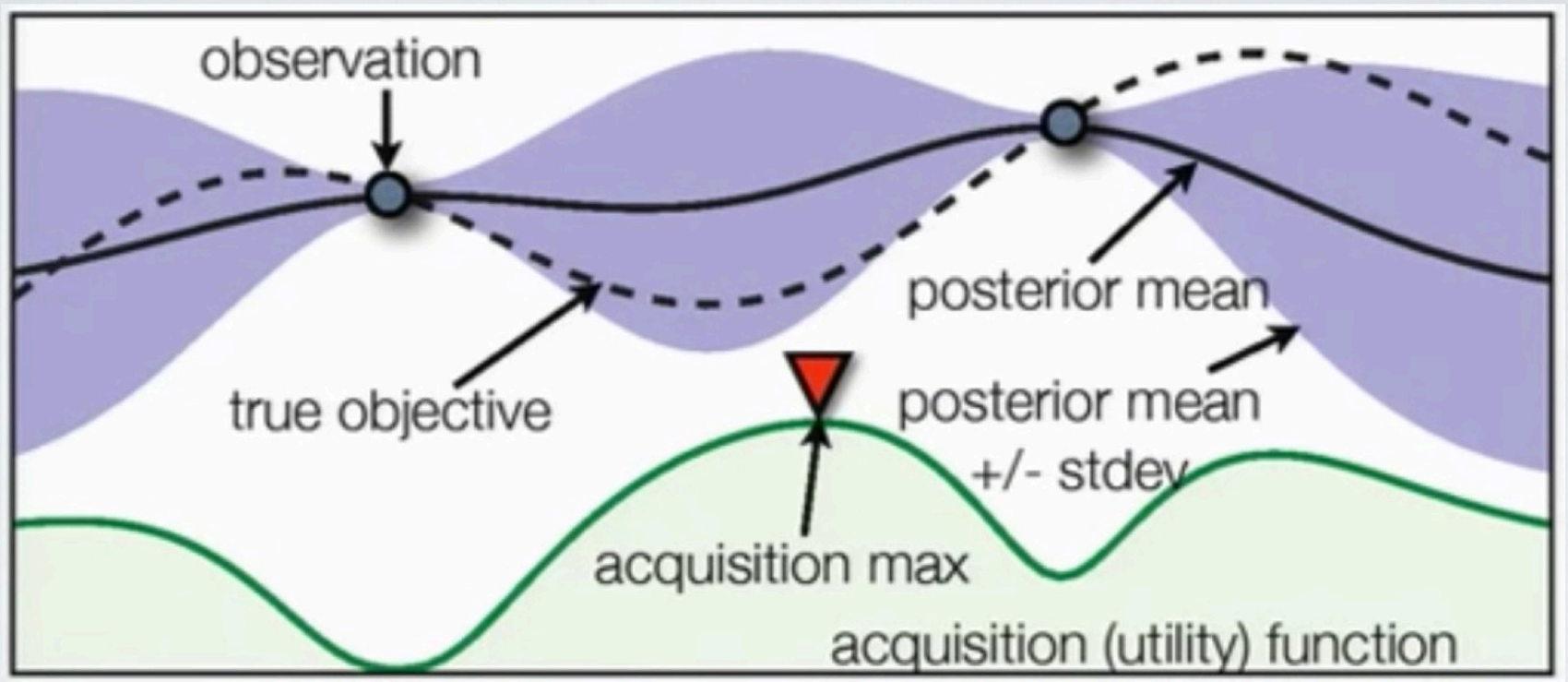




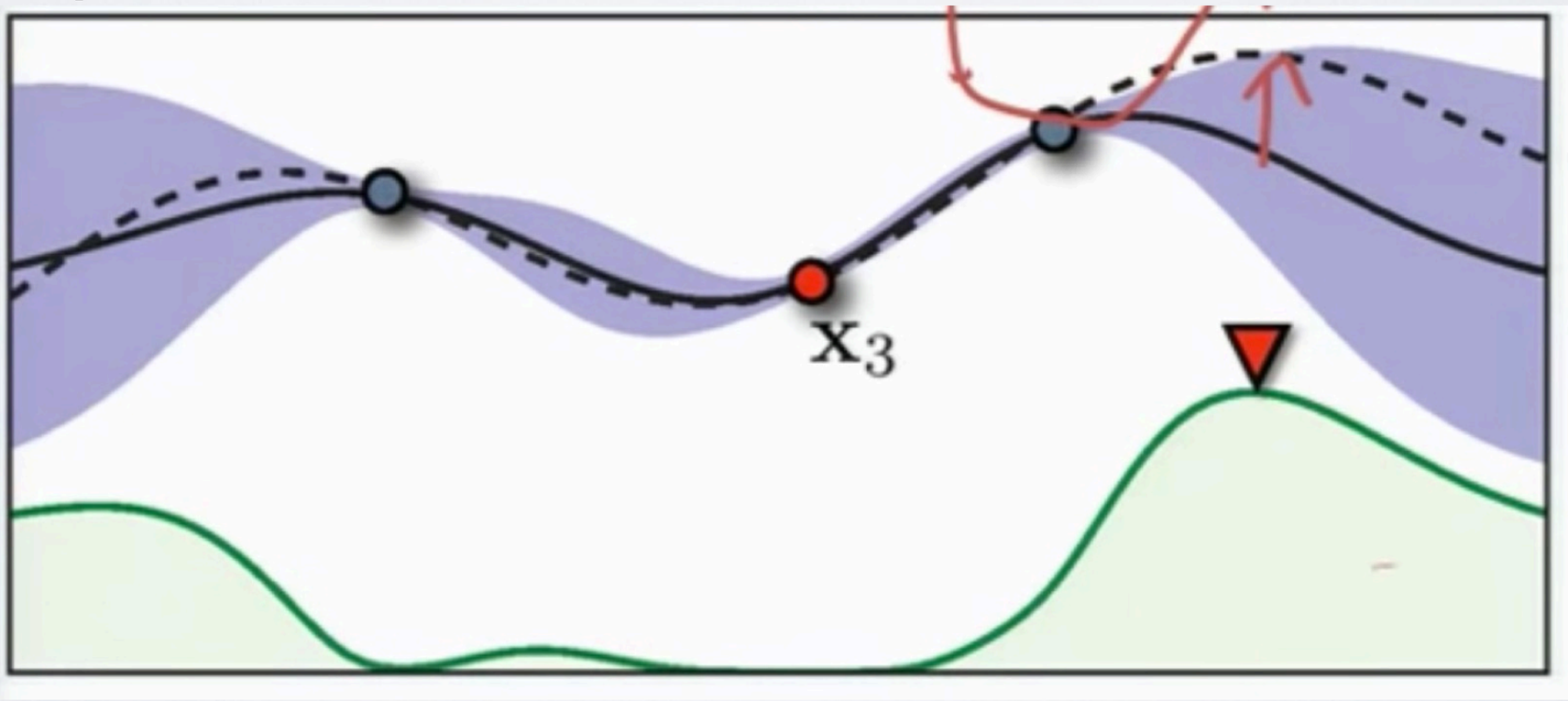


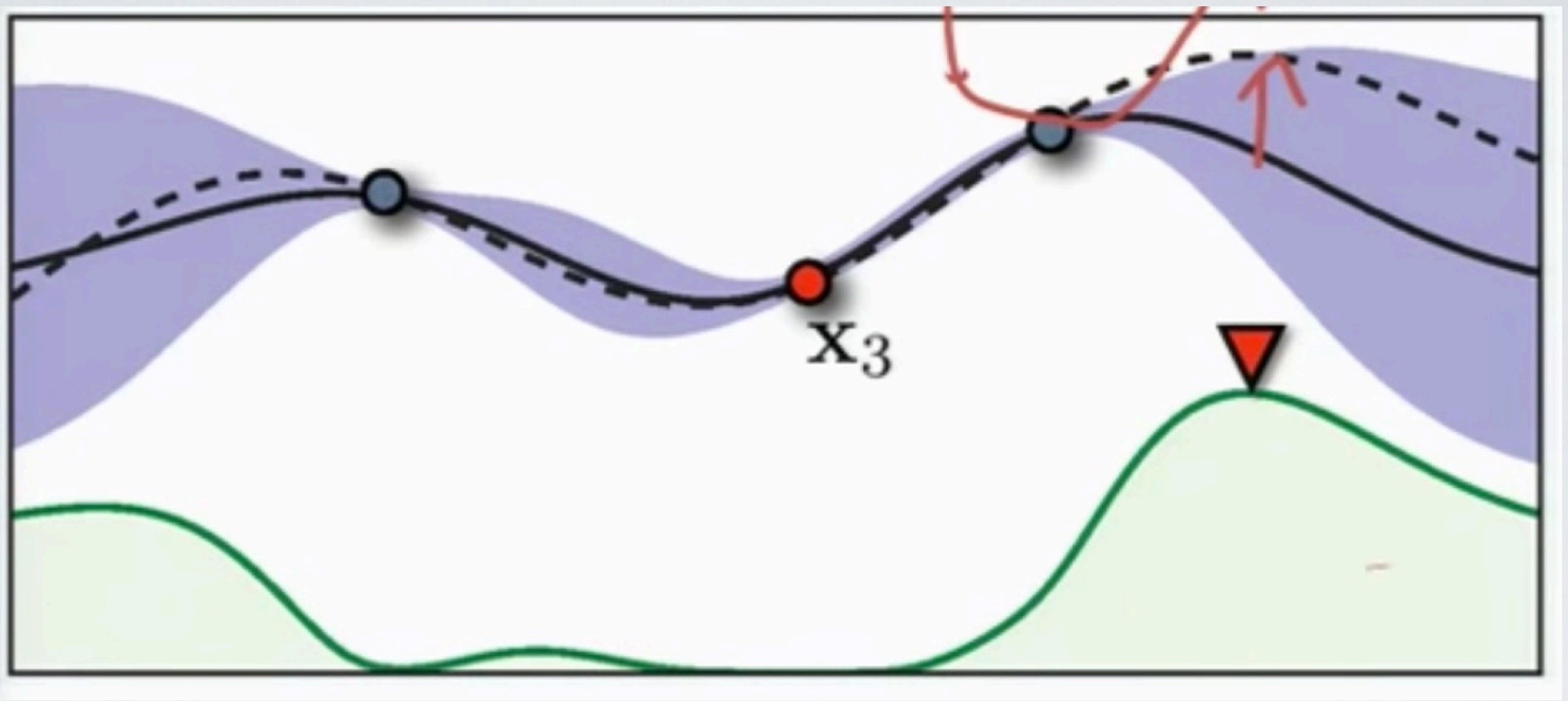
Introducing acquisition(utility) function

- measures the **chance** of hitting a higher score for every X
- many different ways to construct (chance of improvement)
- updates after each observation
- provides a systematical way to approach max score

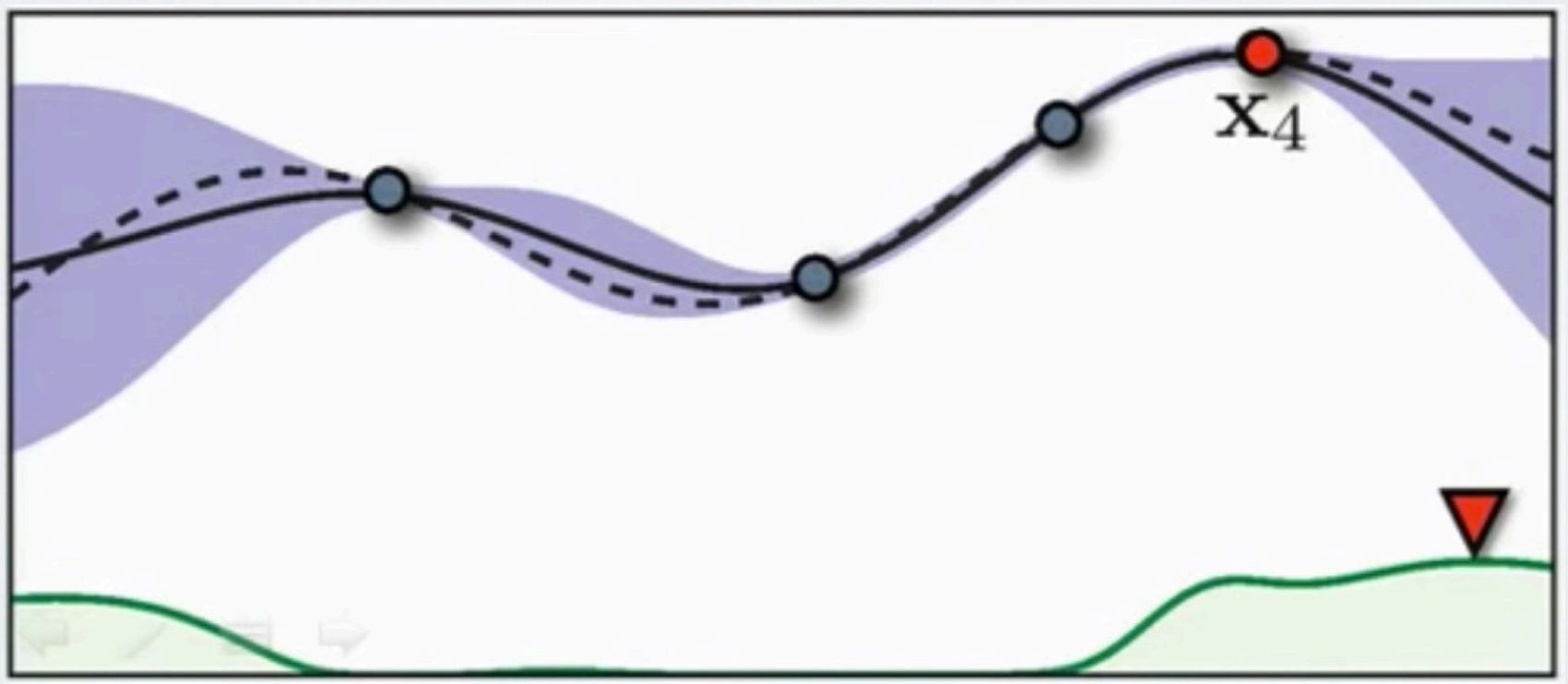


Updates after observation X3





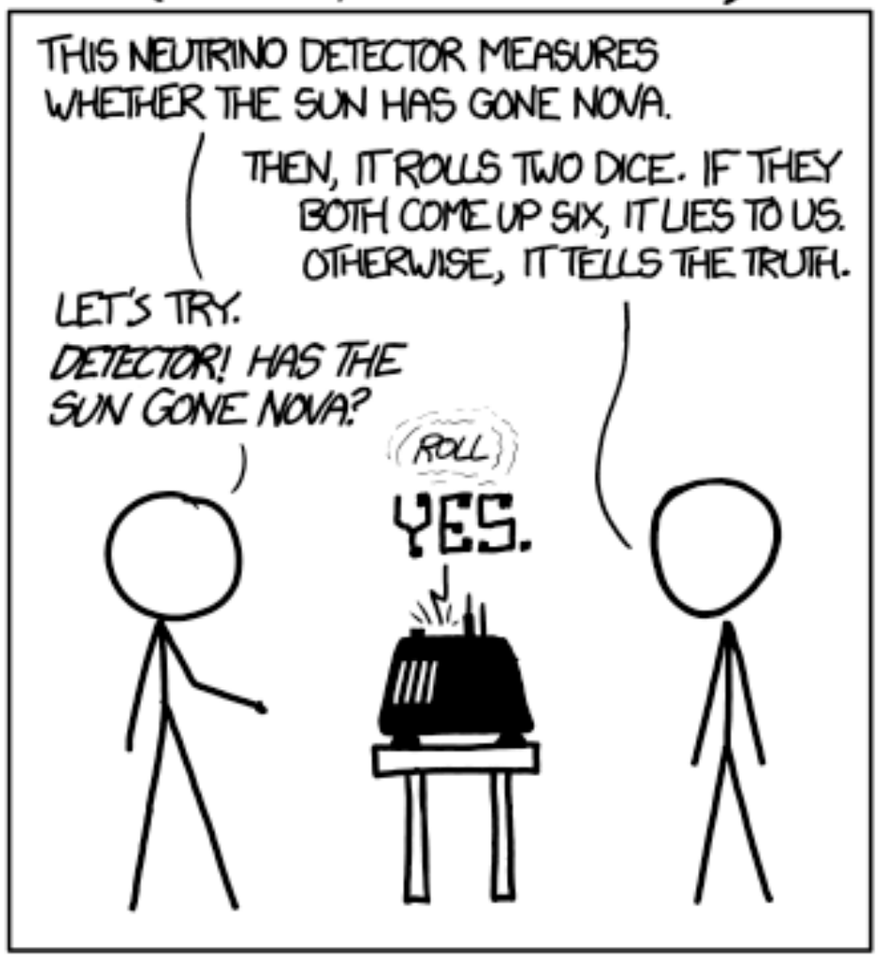
Updates after observation X4



Gaussian Process Bayesian Optimization

- Smarter
- Uses collective information
- “model of the results”
- Advantage over humans in high-dimensional space
- Systematic approach with no bias toward a particular model

DID THE SUN JUST EXPLODE?
(IT'S NIGHT, SO WE'RE NOT SURE.)



FREQUENTIST STATISTICIAN:

BAYESIAN STATISTICIAN:

References

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- http://www.jmaxkanter.com/static/papers/DSAA_DSM_2015.pdf
- https://en.wikipedia.org/wiki/Bayesian_optimization
- http://papers.nips.cc/paper/5872-efficient-and-robust-automated-machine-learning.pdf
- https://www.youtube.com/watch?v=cWQDeB9WqvU
- https://www.youtube.com/watch?v=vz3D36VXefI
- https://xkcd.com/1132/

Thank you