Discretization and Linear-Envelope -6

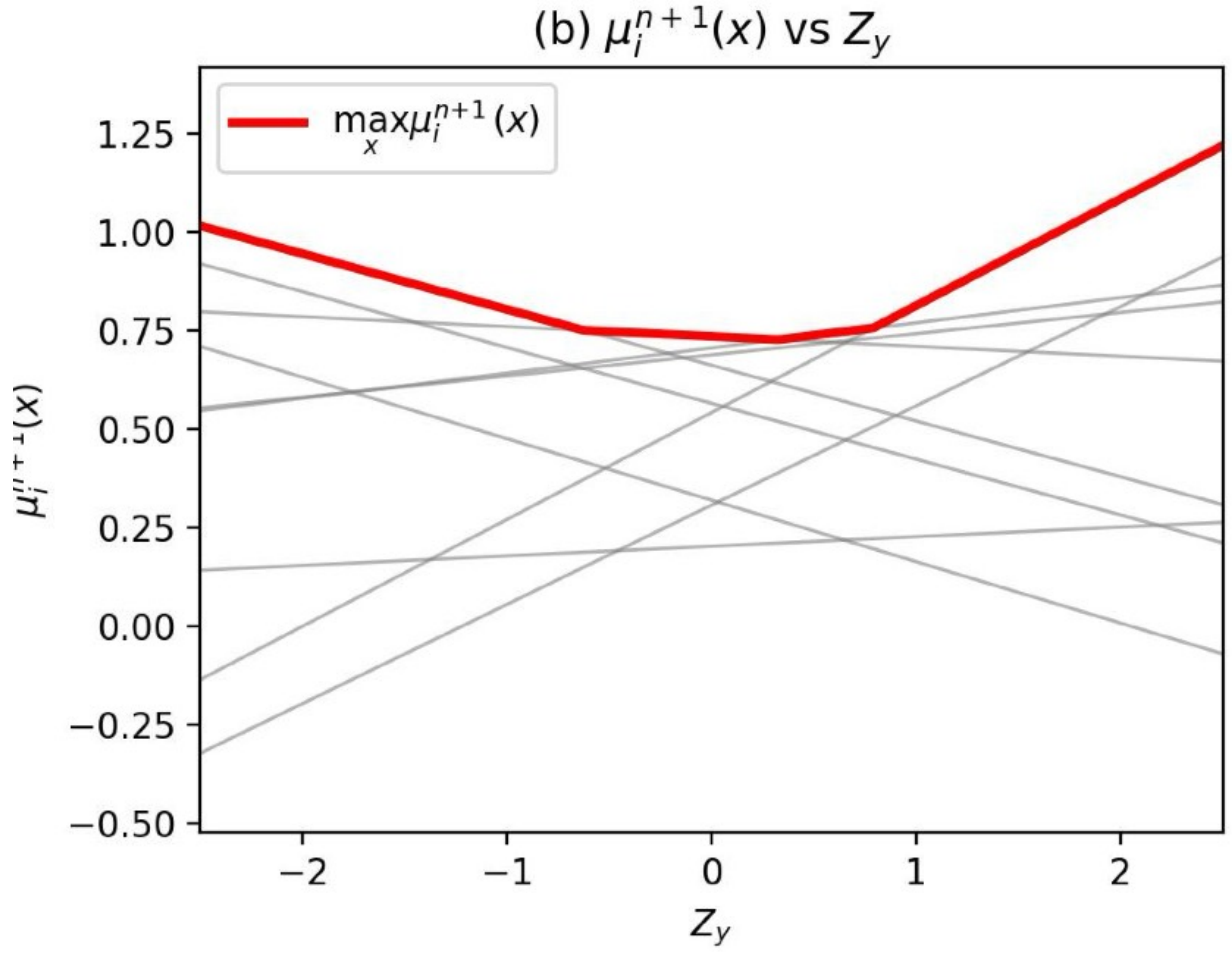
Scott et al 2011

The linear envolope $\max_{x' \in \mathcal{X}_d} \{\mu_y^{n+1}(x')\}$ is parametirized by Z_y which is the probability of that maximum happening.

We can integrate this linear envolope with respect to Z_y to obtain $\mathbb{E}_{Z_y}\left[\max_{x' \in \mathcal{X}_d} \{\mu_y^{n+1}(x')\}\right]$.

Above quantity allows us to compute KG since the max of the old posterior can be taken out of the expectation.

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



High Value Linear Envelope - 1

Pearce et al. [2020]

- Fixed discretization grows with number of dimensions
- Many of the points don't contribute to the max
- Pearce et al. propose a different way of discretazing the domain where all discretization points contribute to the max and number of points don't grow with number of dimensions