Online Prediction on Large Diameter Graphs
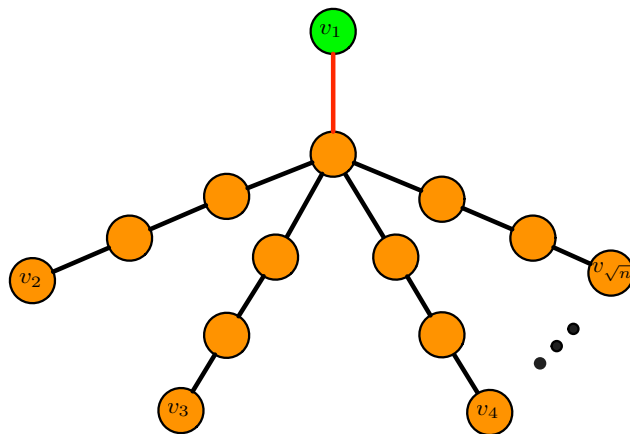
Mark Herbster, Guy Lever, Massimiliano Pontil
University College London

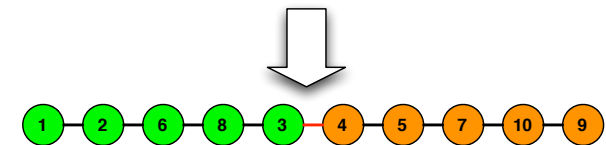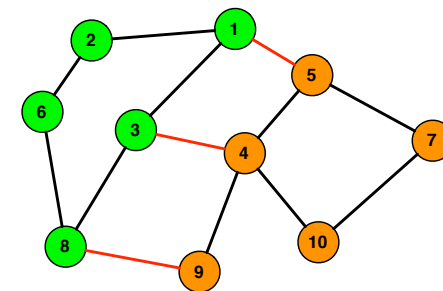**Overview:** Laplacian min semi-norm interpolant versus "prediction via spine"

Laplacian min semi-norm interpolant

Prediction via graph's spine

Octopus with "cut size" $k = 1$

Graph is embedded into path graph

- 1 octopus : $\Omega(\sqrt{n}) \leq$ Mistakes
- k joined octopi: $\Omega(\sqrt{kn}) \leq$ Mistakes

- 1-NN on path is now Bayes optimal
- Mistakes $\leq O(k \log(\frac{n}{k}) + k)$

$$\Omega(\sqrt{kn}) \geq O(k \log(\frac{n}{k}) + k)$$

Conclusion: Spine is a minimax improvement over semi-norm interpolant