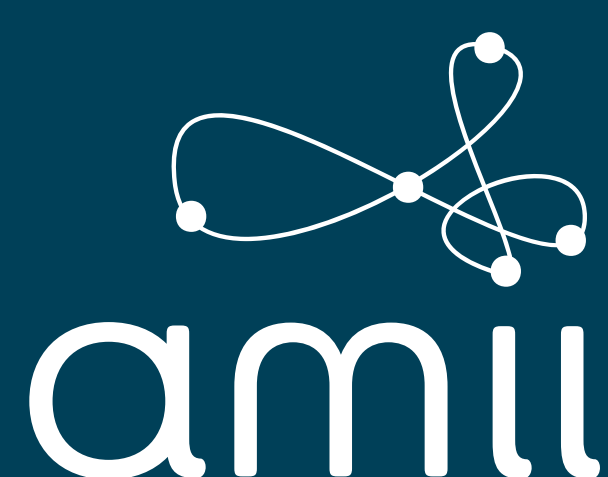


Suboptimal Search with Dynamic Distribution of Suboptimality

Mohammadreza Hami
University of Alberta

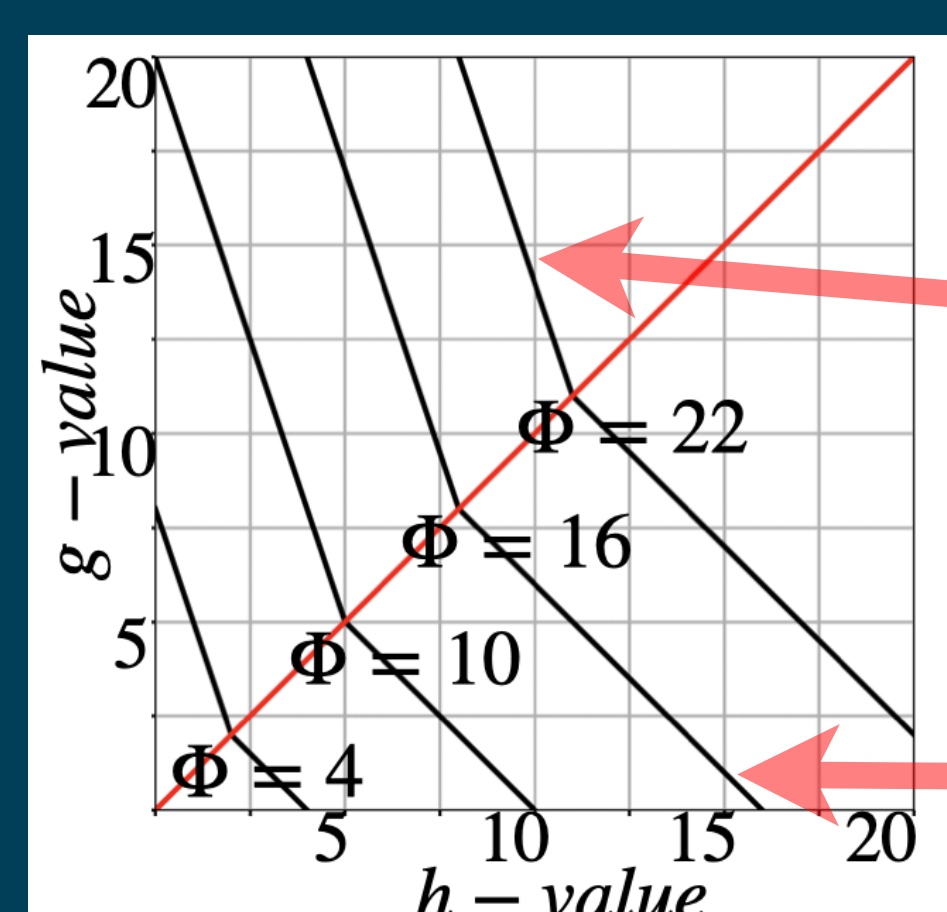
Nathan R. Sturtevant
University of Alberta, Alberta Machine Intelligence Institute (Amii)



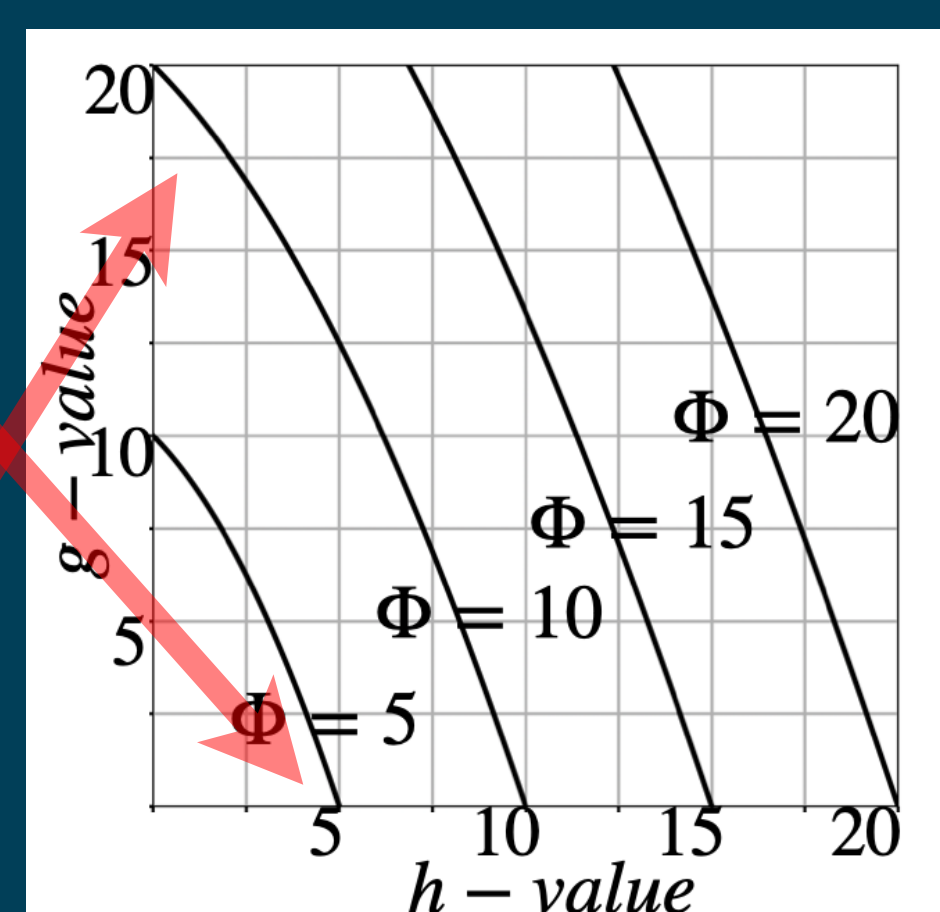
We modify **Weighted A*** to **re-distribute suboptimality at runtime.**

Motivation & Problem

- Weighted A* is in a class pathfinding of algorithms that do not need to perform re-expansions in order to find bounded-optimal solutions.
- Existing algorithms in the class must *a priori* distribute suboptimality.
- DSWA* can distribute suboptimality dynamically at runtime.



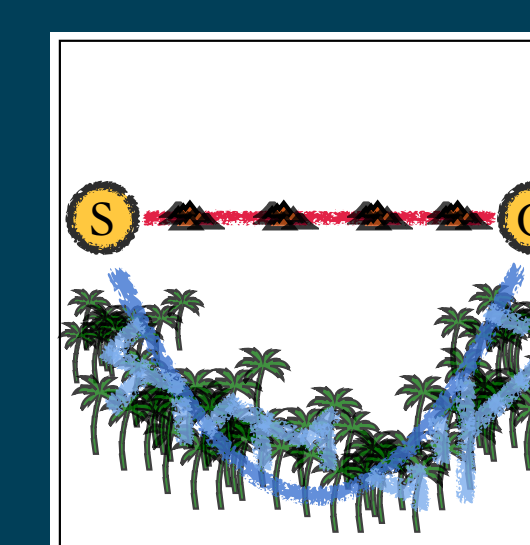
pwXD Priority $f = \begin{cases} g+h & g < h \\ \frac{1}{w}(g+(2w-1)h) & g \geq h \end{cases}$



XUP Priority $f = \frac{1}{2w}(g+h + \sqrt{(g+h)^2 + 4w(w-1)h^2})$

The slope of the isolines of the priority function control the suboptimality.

Suboptimality (where in path)



WA* uniform



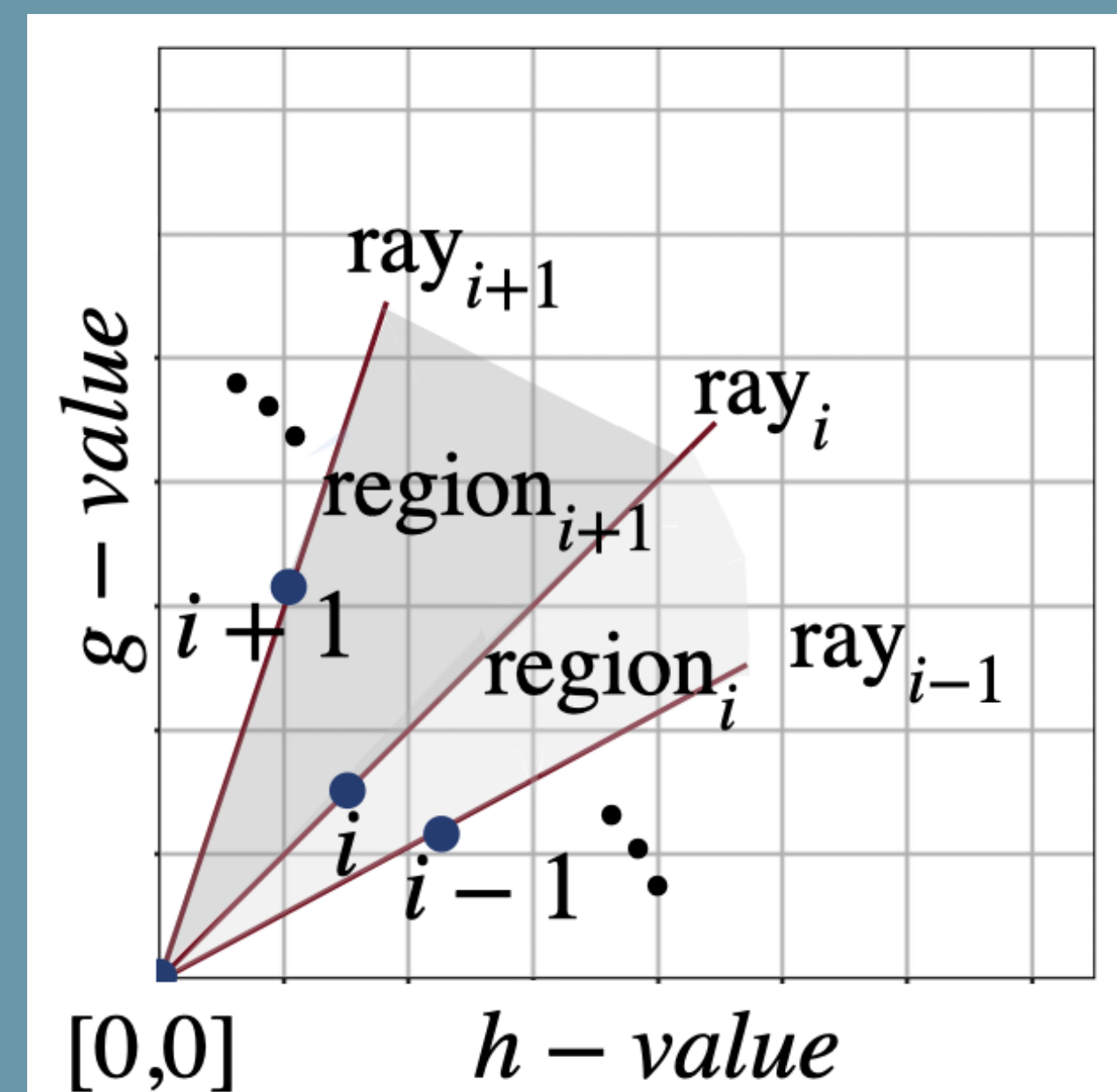
pwXD end



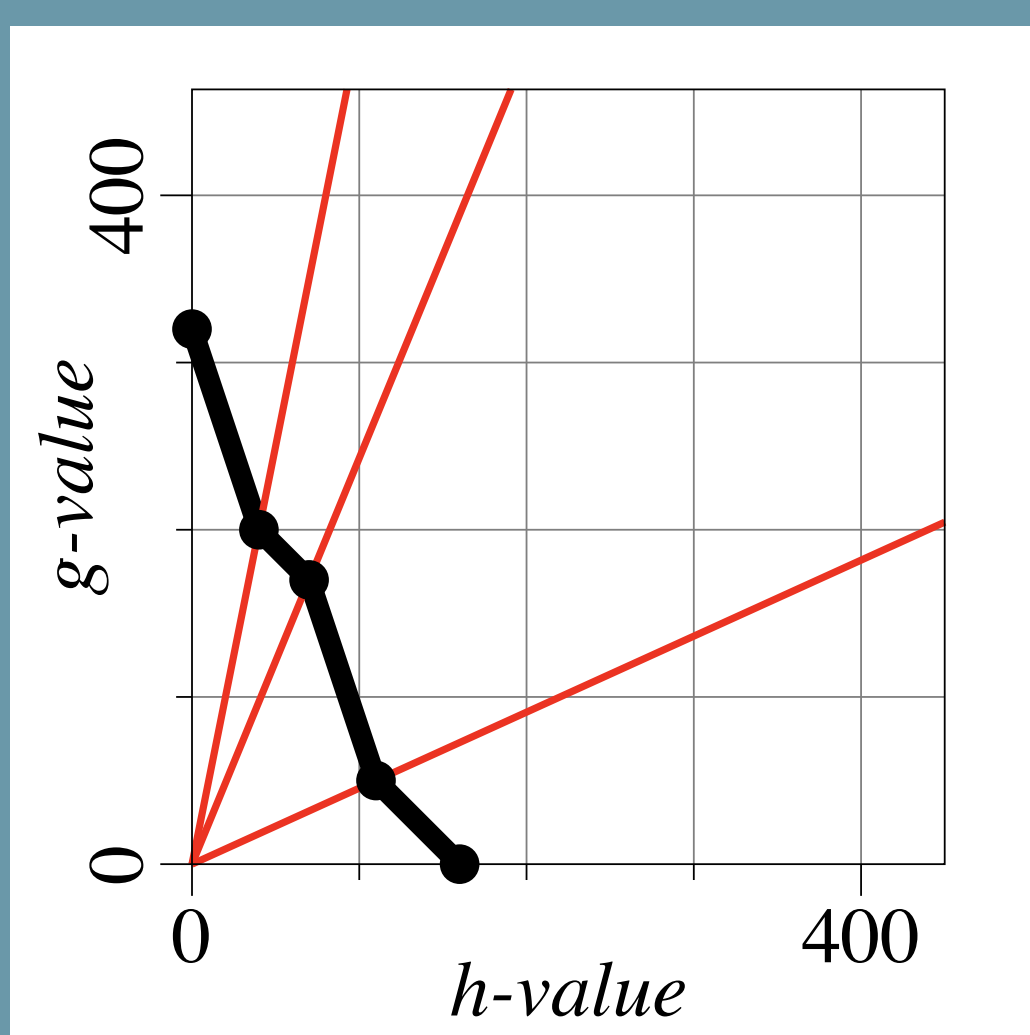
XUP beginning

Dynamic-Suboptimality WA*

- DSWA* splits the priority function into regions
- Weight (slope) of isolines aren't defined until needed during search



- The weight of each region is chosen at runtime by a policy [moving average (MAP), dynamic weight (DWP)]



Selected Results

- WA*
- PwXD
- PwXU
- XDP
- XUP
- DPS
- MAP
- DWP

