

# Slamming Toads And Frogs

– Aditya D. Bhat

Under Guidance of  
Prof. Urban Larsson

# Toads & Frogs – Normal Version

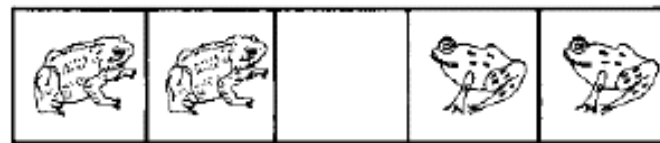
Recap : Game played on Day-1



# Modified Game Rule Set

- ▶ Game – Slamming Toads and Frogs
- ▶ Game setup – Normal Play Toads and Frogs
- ▶ Additional Rules – No jumps allowed
- ▶ Instead,  
Toads Lift and Slam Frogs  
& vice versa.





- ▶ Here, we see the game tree for the normal version...
- ▶ Game Value is \*

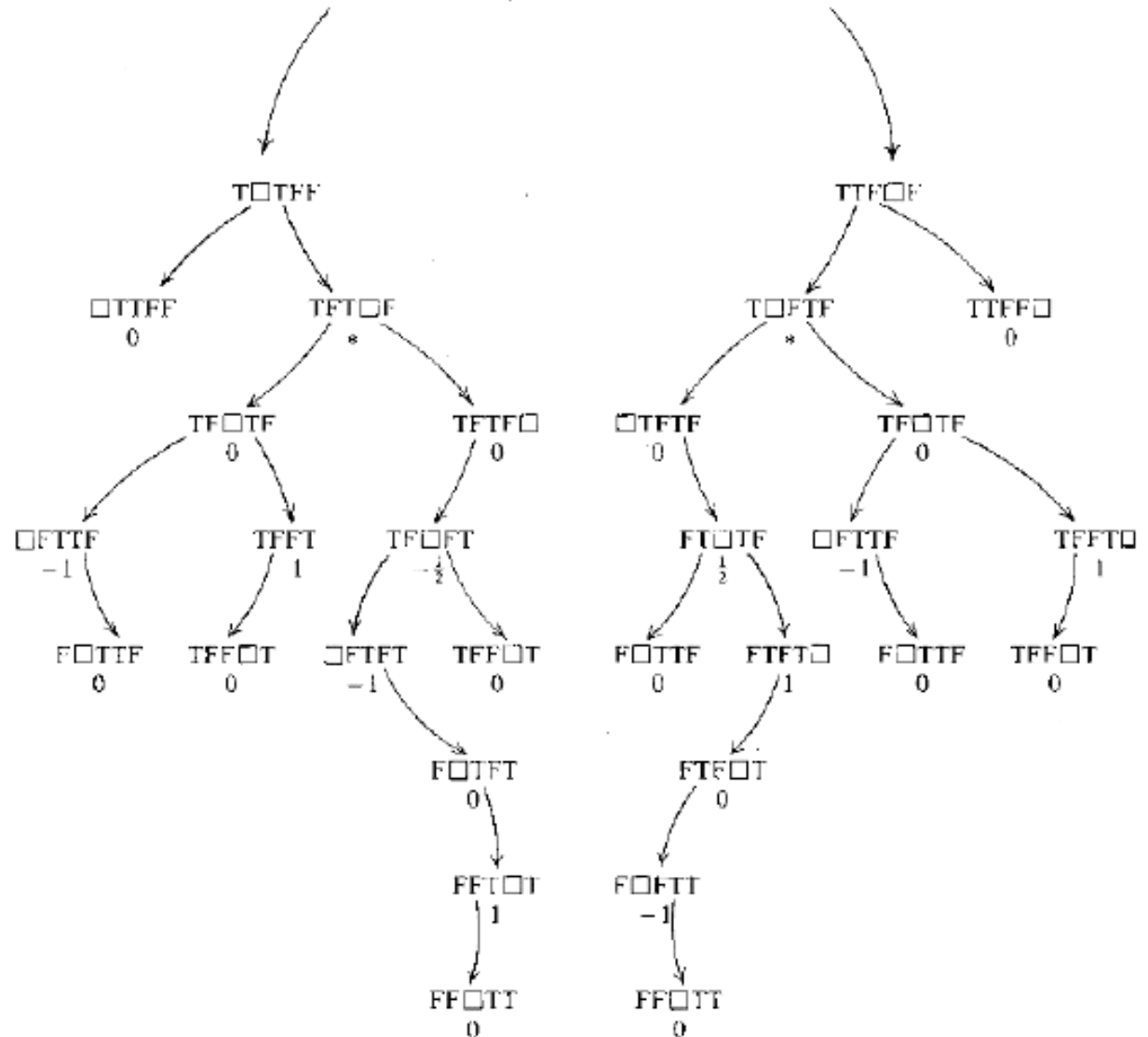
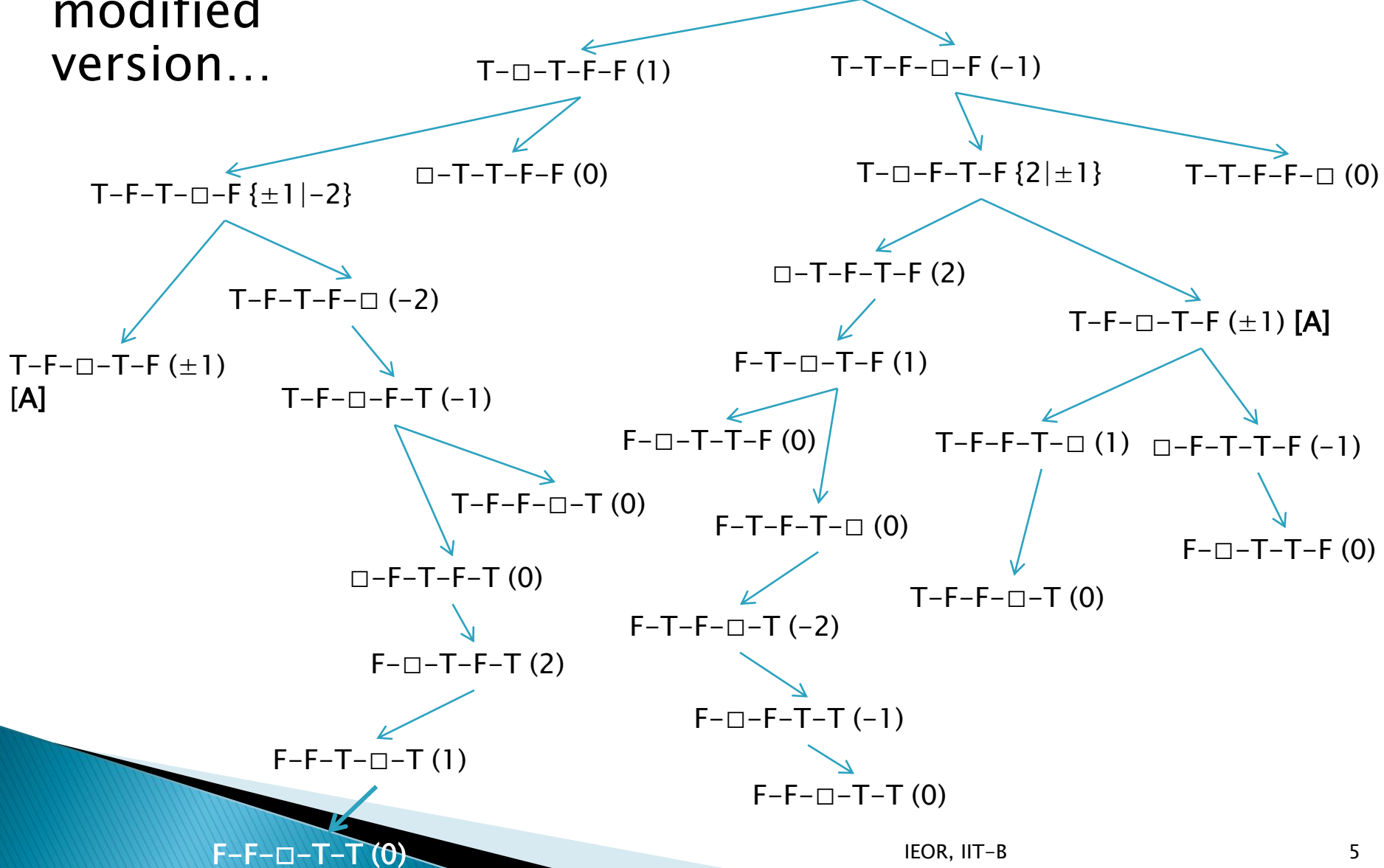


Figure 8. Anatomy of Toads-and-Frogs.

▶ And here, we see the game tree of the modified version...



# Comparing Game Positions

- ▶ We attempt to compare few simple game positions in both versions of the game
- ▶ Methodology –
  1. Generate position
  2. Using CGSuite, generate game values in normal version & modified version for comparison Generate
  3. Generated game tree manually
  4. Tabulate data for comparison

# Comparing Positions

Sr No	Game Position	Value in Normal Version	Value in Slamming Version
1	T□F	*	$\pm 2$
2	□TF□	0	$\pm 2$
3	TT□□FF	*	0
4	TTT□□□FFF	0	$\pm(1^*)$
5	TTTT□□□□FFFF	0	0
6	TTTTT□□□□□FFFFFF	*	$\pm\{3 2\}$
7	TT□FF	*	$\pm 1$
8	TTT□FFF	*	$\pm 2$
9	□T□F□	*	0
10	□□TT□□FF□□	0	$\pm 1$
11	□□□TTT□□□FFF□□□	*	$\pm(2_{-1})$

# Comparing Positions

Sr No	Game Position	Value in Normal Version	Value in Slamming Version
1	TT□FF	*	$\pm 1$
2	□TFT□	1	4
3	TT□□FF	*	0
4	FT□□TF	1	6
5	F□T□FT	$-1/2$	2
6	T□F□TF	*	-1
7	□FTTF□	-1	-1
8	□FTF□T	-1	-4
9	□F□TFT	-2	0
10	□TFFT□	0	$\pm 2$
11	T□F□TF	*	-1



# Simplifying Positions

- ▶ CGSuite program is generated for evaluating game positions
- ▶ However, for larger positions [15+ tiles], CGSuite computation takes longer times
- ▶ Rules/ Steps for simplifying and evaluating large positions to be generated

# Further Scope

1. Finding Positions with infinitesimal values
  2. Positions with value  $\{0|0\}$  or  $*$  not found during initial computations
  3. Original Jump vs. Slam – How does it really affect in terms of other properties?...
    - Value of Move “Slam” = 2
- a. Comparing game trees – In progress using CGSuite
  - b. Winning Strategy with change of rules or indicating the “next best move” – Yet to be done

# References

- ▶ [Berlekamp et al. 1982] Elwyn Berlekamp, John Conway, and Richard Guy, *Winning Ways for your Mathematical Plays*, Academic Press, New York, 1982
- ▶ [Jeff Erickson, 1996] Jeff Erickson, *New Toads and Frogs Results*, *Games of No Chance*, Volume 29, 1996  
[<https://jeffe.cs.illinois.edu/pubs/pdf/toads.pdf>]

# Fin.

- ▶ Questions, clarifications, if any..!

