Extensive Form Games solved using Backward Induction - Simulations

Git link:

Simulation Results

Game 1

Extensive Form Game Solver using Backward Induction (SPNE)

Enter number of rounds (must be even): 50 Do you want random payoffs? (yes/no): yes

Game Tree: Player turns: 1 2 1 2 ...

- (L1=-2,R1=-6)
- (L2=-2,R2=9)
- (L3=2,R3=-10)
- (L4=-9,R4=-7)
- (L5=7,R5=-6)
- (L6=8,R6=7)
- (L7=-5,R7=0)
- (L8=9,R8=-8)
- (L9=-8,R9=-2)
- (L10=6,R10=-10)
- (L11=-2,R11=5)
- (L12=6,R12=-5)
- (L13=-8,R13=-4)
- (L14=9,R14=-5)
- (L15=-4,R15=-7)
- (L16=2,R16=7)
- (L17=-3,R17=-9)
- (L18=8,R18=6)
- (L19=7,R19=-2)
- (L20=-1,R20=6)
- (L21=4,R21=-3)
- (L22=-4,R22=-4)
- (L23=-7,R23=9)
- (L24=-9,R24=0)
- (L25=-7,R25=8)
- (L26=-6,R26=-1)
- (L27=2,R27=-4)
- (L28=2,R28=3)
- (L29=-7,R29=-1)

- (L30=-3,R30=9)
- (L31=6,R31=-9)
- (L32=-8,R32=0)
- (L33=3,R33=3)
- (L34=-2,R34=-7)
- (L35=-5,R35=-8)
- (L36=-8,R36=5)
- (L37=9,R37=2)
- (L38=1,R38=-1)
- (L39=-3,R39=1)
- (L40=2,R40=0)
- (L41=-8,R41=7)
- (L42=-1,R42=-1)
- (L43=-4,R43=8)
- (L44=-7,R44=0)
- (L45=3,R45=0)
- (L46=-9,R46=-7)
- (L47=1,R47=7)
- (L48=3,R48=-8)
- (L49=0,R49=0)
- (L50=7,R50=-6)

Solution by Backward Induction: The game stops at - Round 1 by Player 1
Final payoffs: Player 1 = -2, Player 2 = -6

Optimal decisions (Stop/Continue) for each round:

- Round 1 (Player 1): Stop
- Round 2 (Player 2): Stop
- Round 3 (Player 1): Continue
- Round 4 (Player 2): Continue
- Round 5 (Player 1): Continue
- Round 6 (Player 2): Stop
- Round 7 (Player 1): Continue
- Round 8 (Player 2): Continue
- Round 9 (Player 1): Continue
- Round 10 (Player 2): Continue
- Round 11 (Player 1): Continue
- Round 12 (Player 2): Continue
- Round 13 (Player 1): Continue
- Round 14 (Player 2): Continue
- Round 15 (Player 1): Continue
- Round 16 (Player 2): Stop
- Round 17 (Player 1): Continue
- Round 18 (Player 2): Stop
- Round 19 (Player 1): Stop
- Round 20 (Player 2): Stop

- Round 21 (Player 1): Stop
- Round 22 (Player 2): Continue
- Round 23 (Player 1): Stop
- Round 24 (Player 2): Stop
- Round 25 (Player 1): Continue
- Round 26 (Player 2): Stop
- Round 27 (Player 1): Stop
- Round 28 (Player 2): Continue
- Round 29 (Player 1): Continue
- Round 30 (Player 2): Stop
- Round 31 (Player 1): Stop
- Round 32 (Player 2): Continue
- Round 33 (Player 1): Stop
- Round 34 (Player 2): Stop
- Round 35 (Player 1): Stop
- Round 36 (Player 2): Stop
- Round 37 (Player 1): Stop
- Round 38 (Player 2): Continue
- Round 39 (Player 1): Stop
- Round 40 (Player 2): Continue
- Round 41 (Player 1): Continue
- Round 42 (Player 2): Continue
- Round 43 (Player 1): Stop
- Round 44 (Player 2): Stop
- Round 45 (Player 1): Continue
- Round 46 (Player 2): Continue
- Round 47 (Player 1): Continue
- Round 48 (Player 2): Continue
- Round 49 (Player 1): Continue
- Round 50 (Player 2): Stop

Game 2

Extensive Form Game Solver using Backward Induction (SPNE)

Enter number of rounds (must be even): 10 Do you want random payoffs? (yes/no): yes

Game Tree: Player turns: 1 2 1 2 ...

- (L1=-10,R1=8)
- (L2=-1,R2=-2)
- (L3=3,R3=4)
- (L4=-8,R4=-9)
- (L5=-8,R5=-8)
- (L6=0,R6=-4)
- (L7=2,R7=9)

- (L8=-8,R8=9)
- (L9=-7,R9=-2)
- (L10=4,R10=-4)

Solution by Backward Induction: The game stops at - Round 3 by Player 1
Final payoffs: Player 1 = 3, Player 2 = 4

Optimal decisions (Stop/Continue) for each round:

- Round 1 (Player 1): Continue
- Round 2 (Player 2): Continue
- Round 3 (Player 1): Stop
- Round 4 (Player 2): Continue
- Round 5 (Player 1): Continue
- Round 6 (Player 2): Continue
- Round 7 (Player 1): Stop
- Round 8 (Player 2): Stop
- Round 9 (Player 1): Continue
- Round 10 (Player 2): Stop

Game 3

Extensive Form Game Solver using Backward Induction (SPNE)

Enter number of rounds (must be even): 6 Do you want random payoffs? (yes/no): yes

Game Tree: Player turns: 1 2 1 2 ...

- (L1=9,R1=2)
- (L2=6,R2=3)
- (L3=0,R3=1)
- (L4=5,R4=-3)
- (L5=-5,R5=-10)
- (L6=6,R6=-6)

Solution by Backward Induction: The game stops at - Round 1 by Player 1
Final payoffs: Player 1 = 9, Player 2 = 2

Optimal decisions (Stop/Continue) for each round:

- Round 1 (Player 1): Stop
- Round 2 (Player 2): Stop
- Round 3 (Player 1): Continue
- Round 4 (Player 2): Stop
- Round 5 (Player 1): Continue
- Round 6 (Player 2): Stop

Game 4

Extensive Form Game Solver using Backward Induction (SPNE)

Enter number of rounds (must be even): 8 Do you want random payoffs? (yes/no): yes

Game Tree: Player turns: 1 2 1 2 ...

- (L1=-5,R1=-4)
- (L2=1,R2=-7)
- (L3=-10,R3=0)
- (L4=7,R4=-3)
- (L5=-3,R5=-8)
- (L6=4,R6=-8)
- (L7=-8,R7=-7)
- (L8=-9,R8=1)

Solution by Backward Induction: The game stops at - Round 4 by Player 2
Final payoffs: Player 1 = 7, Player 2 = -3

Optimal decisions (Stop/Continue) for each round:

- Round 1 (Player 1): Continue
- Round 2 (Player 2): Continue
- Round 3 (Player 1): Continue
- Round 4 (Player 2): Stop
- Round 5 (Player 1): Stop
- Round 6 (Player 2): Continue
- Round 7 (Player 1): Stop
- Round 8 (Player 2): Stop

Game 5

Extensive Form Game Solver using Backward Induction (SPNE)

Enter number of rounds (must be even): 16 Do you want random payoffs? (yes/no): yes

Game Tree: Player turns: 1 2 1 2 ...

- (L1=7,R1=4)
- (L2=-10,R2=2)
- (L3=-4,R3=-10)
- (L4=4,R4=-8)
- (L5=-4,R5=0)
- (L6=1,R6=-5)
- (L7=-9,R7=4)
- (L8=-8,R8=2)
- (L9=-8,R9=-2)
- (L10=-9,R10=-7)
- (L11=-8,R11=9)
- (L12=2,R12=5)
- (L13=7,R13=-3)

- (L14=4,R14=2)
- (L15=7,R15=-10)
- (L16=4,R16=9)

Solution by Backward Induction: The game stops at - Round 1 by Player 1
Final payoffs: Player 1 = 7, Player 2 = 4

Optimal decisions (Stop/Continue) for each round:

- Round 1 (Player 1): Stop
- Round 2 (Player 2): Continue
- Round 3 (Player 1): Continue
- Round 4 (Player 2): Continue
- Round 5 (Player 1): Continue
- Round 6 (Player 2): Continue
- Round 7 (Player 1): Continue
- Round 8 (Player 2): Continue
- Round 9 (Player 1): Continue
- Round 10 (Player 2): Continue
- Round 11 (Player 1): Continue
- Round 12 (Player 2): Stop
- Round 13 (Player 1): Stop
- Round 14 (Player 2): Stop
- Round 15 (Player 1): Stop
- Round 16 (Player 2): Stop

Game 6

Extensive Form Game Solver using Backward Induction (SPNE)

Enter number of rounds (must be even): 16 Do you want random payoffs? (yes/no): yes

Game Tree: Player turns: 1 2 1 2 …

- (L1=9,R1=8)
- (L2=8,R2=2)
- (L3=8,R3=-10)
- (L4=1,R4=-5)
- (L5=-7,R5=3)
- (L6=-5,R6=-10)
- (L7=-5,R7=1)
- (L8=4,R8=6)
- (L9=4,R9=-4)
- (L10=1,R10=7)
- (L11=-7,R11=8)
- (L12=-9,R12=-8)
- (L13=1,R13=-8)
- (L14=-1,R14=2)

- (L15=-8,R15=4)
- (L16=-3,R16=-2)

Solution by Backward Induction: The game stops at - Round 1 by Player 1
Final payoffs: Player 1 = 9, Player 2 = 8

Optimal decisions (Stop/Continue) for each round:

- Round 1 (Player 1): Stop
- Round 2 (Player 2): Stop
- Round 3 (Player 1): Stop
- Round 4 (Player 2): Continue
- Round 5 (Player 1): Continue
- Round 6 (Player 2): Continue
- Round 7 (Player 1): Continue
- Round 8 (Player 2): Stop
- Round 9 (Player 1): Stop
- Round 10 (Player 2): Continue
- Round 11 (Player 1): Stop
- Round 12 (Player 2): Stop
- Round 13 (Player 1): Stop
- Round 14 (Player 2): Stop
- Round 15 (Player 1): Continue
- Round 16 (Player 2): Stop

Game 7

Extensive Form Game Solver using Backward Induction (SPNE)

Enter number of rounds (must be even): 16 Do you want random payoffs? (yes/no): yes

Game Tree: Player turns: 1 2 1 2 ...

- (L1=8,R1=-3)
- (L2=-8,R2=-10)
- (L3=5,R3=8)
- (L4=0,R4=7)
- (L5=-3,R5=-4)
- (L6=9,R6=4)
- (L7=1,R7=-1)
- (L8=-7,R8=2)
- (L9=1,R9=5)
- (L10=-8,R10=-2)
- (L11=7,R11=-9)
- (L12=-4,R12=-1)
- (L13=-7,R13=7)
- (L14=7,R14=-8)
- (L15=7,R15=9)

- (L16=4,R16=-10)

Solution by Backward Induction: The game stops at - Round 1 by Player 1
Final payoffs: Player 1 = 8, Player 2 = -3

Optimal decisions (Stop/Continue) for each round:

- Round 1 (Player 1): Stop
- Round 2 (Player 2): Continue
- Round 3 (Player 1): Stop
- Round 4 (Player 2): Stop
- Round 5 (Player 1): Continue
- Round 6 (Player 2): Stop
- Round 7 (Player 1): Stop
- Round 8 (Player 2): Continue
- Round 9 (Player 1): Stop
- Round 10 (Player 2): Stop
- Round 11 (Player 1): Stop
- Round 12 (Player 2): Continue
- Round 13 (Player 1): Continue
- Round 14 (Player 2): Continue
- Round 15 (Player 1): Stop
- Round 16 (Player 2): Stop

Game 8

Extensive Form Game Solver using Backward Induction (SPNE)

Enter number of rounds (must be even): 16 Do you want random payoffs? (yes/no): yes

Game Tree: Player turns: 1 2 1 2 ...

- (L1=-8,R1=4)
- (L2=2,R2=3)
- (L3=-1,R3=-10)
- (L4=3,R4=0)
- (L5=-7,R5=-10)
- (L6=-5,R6=7)
- (L7=-10,R7=-5)
- (L8=8,R8=8)
- (L9=5,R9=1)
- (L10=-10,R10=-8)
- (L11=-10,R11=-1)
- (L12=-5,R12=0)
- (L13=7,R13=0)
- (L14=7,R14=7)
- (L15=-3,R15=-4)
- (L16=-8,R16=1)

Solution by Backward Induction: The game stops at - Round 8 by Player 2
Final payoffs: Player 1 = 8, Player 2 = 8

Optimal decisions (Stop/Continue) for each round:

- Round 1 (Player 1): Continue
- Round 2 (Player 2): Continue
- Round 3 (Player 1): Continue
- Round 4 (Player 2): Continue
- Round 5 (Player 1): Continue
- Round 6 (Player 2): Continue
- Round 7 (Player 1): Continue
- Round 8 (Player 2): Stop
- Round 9 (Player 1): Stop
- Round 10 (Player 2): Continue
- Round 11 (Player 1): Continue
- Round 12 (Player 2): Stop
- Round 13 (Player 1): Stop
- Round 14 (Player 2): Stop
- Round 15 (Player 1): Stop
- Round 16 (Player 2): Stop