



AI SOLITAIRE

Instructor :Dr. Mohammad Taher Pilevar

Mohammad Amin Mortezaie

Mohammad Sanaye Abbasi

SIMULATING AI IN BOARD/CARD GAMES

In a solitaire board game or card game there are no present human opponents, nor is there a computer there to toss hordes of troops at you.



THE DESIGNER'S CHALLENGE

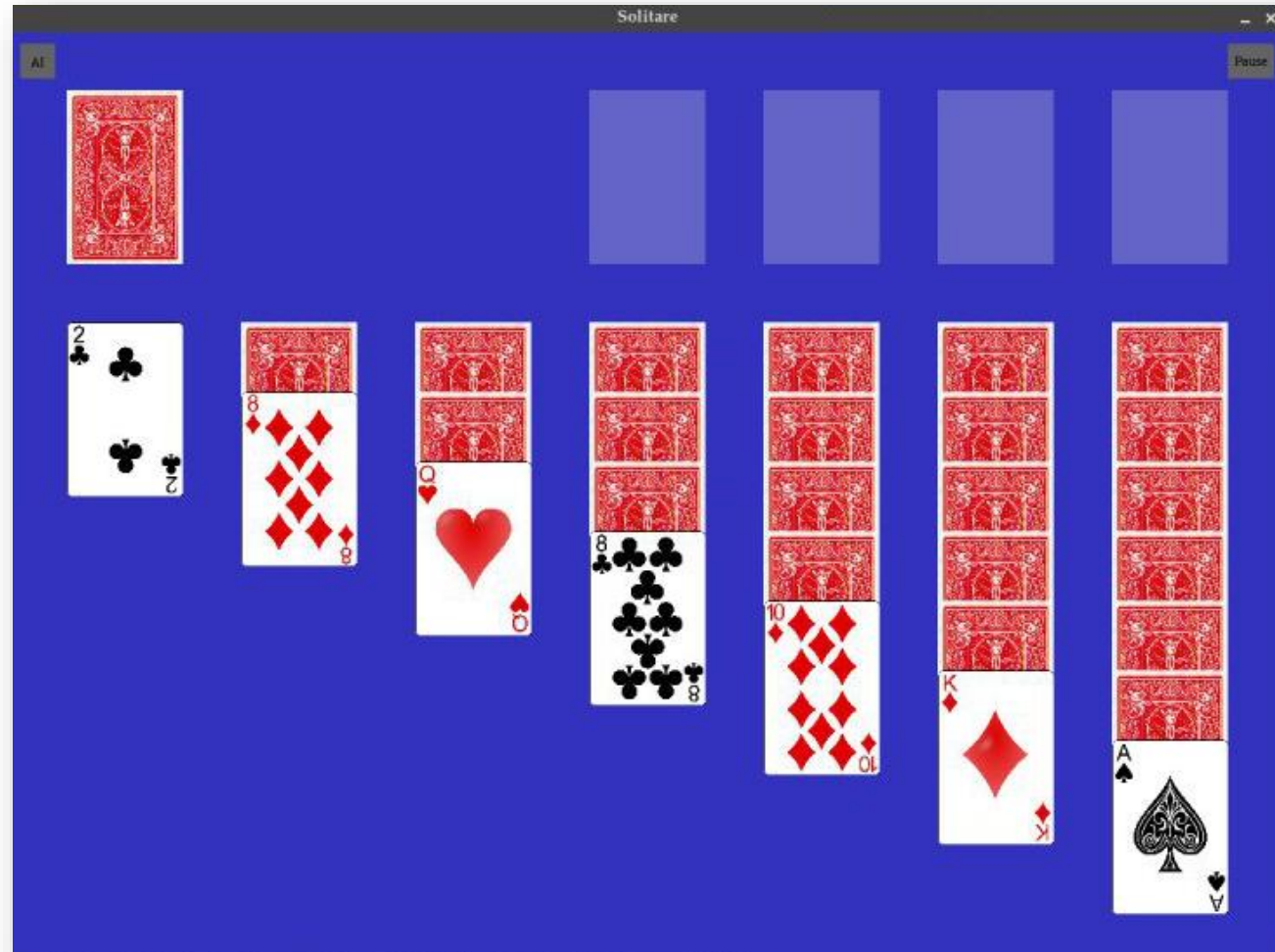
The designer's challenge is to create all the decisions the enemy — *or virus* — will make to oppose you, and then box it up and ship it to you.

WHAT'S SOLITAIRE?

Solitaire is any tabletop game which one can play by oneself. The term "solitaire" is also used for single-player games of concentration and skill using a set layout of tiles, pegs or stones rather than cards

And what we play is **Klondike!**

Klondike Rules



PROBABILITY OF WINNING

About 79% of the games are theoretically winnable, but in practice, human players do not win 79% of games played, due to wrong moves that cause the game to become unwinnable.

AND MAYBE OUR AI HAS SOME WRONG MOVES!

WE'RE NOT PERFECT!!

MOST IMPORTANT THING | CHALLENGES |



WINNING STRATEGIES

We use expectimax algorithm for solving this issue.

WHY?

Note that we can call winning Strategies:

| EVALUATION FUNCTION |



WINNING STRATEGIES

Rule No.1

Always play an Ace or Deuce wherever you can immediately.

WINNING STRATEGIES

Rule No.2

Always make the play or transfer that frees (or allows a play that frees) a downcard, regardless of any other considerations.

WINNING STRATEGIES

Rule No.3

When faced with a choice, always make the play or transfer that frees (or allows a play that frees) the downcard from the *biggest* pile of downcards.

WINNING STRATEGIES

Rule No.4

Transfer cards from column to column *only* to allow a downcard to be freed or to make the columns smoother.

WINNING STRATEGIES

Rule No.5

Don't clear a spot unless there's a King IMMEDIATELY waiting to occupy it.

WINNING STRATEGIES

Rule No.6

Only play a King that will benefit the column(s) with the biggest pile of downcards, unless the play of another King will at least allow a transfer that frees a downcard.

WINNING STRATEGIES

Rule No.7

Build your Ace stacks (with anything other than an Ace or Deuce)

WHEN ?

WINNING STRATEGIES

Rule No.7.A

NEXT CARD PROTECTION

WINNING STRATEGIES

Rule No.7.B

Allow a play or transfer that frees (or allows a play that frees) a downcard

WINNING STRATEGIES

Rule No.7.C

Open up a space for a same-color card pile transfer
that allows a downcard to be freed

WINNING STRATEGIES

Rule No.7.D

Clear a spot for an IMMEDIATE waiting King
(it **cannot** be to simply clear a spot)

WINNING STRATEGIES

Rule No.8

Don't play or transfer a 5, 6, 7 or 8!

UNLESS?!

WINNING STRATEGIES

Rule No.8.A

It is smooth with it's next highest even/odd partner in the column

WINNING STRATEGIES

Rule No.8.B

It will allow a play or transfer that will IMMEDIATELY
free a downcard

WINNING STRATEGIES

Rule No.8.C

There have not been any other cards already played to the column.

WINNING STRATEGIES

Rule No.8.D

You have **ABSOLUTELY** no other choice to continue playing (this is not a good sign).

WINNING STRATEGIES

Rule No.9

Only play OTHERS to Foundation

When

| NO OTHER RULES COULD BE FOLLOWED |

HOPE FOR BEST WISHES!

IUST AI COURSE

Autumn - Winter 97

