Computer Science 5400  
Artificial Intelligence

Spring 2022

Puzzle Assignment Set : Pengu

version 22.02.10



# Introduccion

The puzzle for this semester is "Pengu", a sliding piece game. The objective of the game is for Pengu the Penguin to navigate a frozen playing field picking up fish while avoiding bears and other hazards located inside the field. Pengu **dies** if it moves into the same location as any of the hazards.

# The Frozen Playing Field

The frozen playing field is a grid board where every cell location is either **ice**, **snow**, a **wall**, or a **hazard**. Ice and snow cells are called *open cells*. Ice cells may contain **fish**. Pengu occupies a single open cell and can move in any of the 8 basic cardinal directions. ( **north**, **northeast**, **east**, **southeast**. **south**, **southwest**, **west**, **northwest** ). When Pengu moves in any direction, he will *slide* across any ice cells in the moving direction and stop when he slides into a snow cell or a hazard cell, or hits a wall cell. If Pengu slides into a hazard cell, he dies. Pengu will pick any fish in the cells he slides across.



**Field 1** : A sample frozen playing field showing Pengu 🐧, ice cells ( *blank* ),   
snow cells ( ❄️ ) walls #️⃣ , hazards ( 🐻 🦈 ) and fish ( 🐟 ).

# The Game Turn

The game progresses by turns. Each turn involves a single movement from Pengu. The hazards **do not** move. Each turn progresses as follows:

1. Pengu makes a move.
2. Pengu slides in the chosen direction of the move.
   1. If Pengu slides into an ice cell, Pengu picks up any fish in that cell and continues sliding in the same direction.
   2. If Pengu slides into a snow cell, Pengu stops moving at that cell.
   3. If Pengu slides into a hazard cell, the game ends.
   4. If the next cell in Pengu's direction is a wall cell, pengu ends in the current cell.

Pengu's **score** is the number of fish he picks. The game continues taking turns until either Pengu **dies**, or pengu collects **all the fish**.

# Example Moves:

For the following examples, consider **Field 1** above as the initial playing field.

**Example 1:**Pengu moves North:



Pengu dies by sliding into the bear, with a final score of **1**.

**Example 2:**

Pengu moves Northeast:



Pengu stops by hitting a wall, score stays at **0**.

**Example 3:**

Pengu moves East:



Pengu slides across the board and picks up one fish for a score of **1**.

**Example 4:**

Pengu moves Southeast:



Pengu dies by sliding into the bear, with a final score of **0**. Notice that Pengu slides between the two diagonal wall cells.

**Example 5:**

Pengu moves South:



Pengu stops at the snow cell, score stays at **0**.

# General Notes:

* Every frozen playing field is completely surrounded by walls.
* Fish appear only over ice cells.
* Snow cells stay snow cells, even after Pengu steps on them.
* Moving directly into an adjacent wall is **not** considered a valid move   
  ( as it does not changes Pengu's position. )
* If there are no fish on the grid, **and** pengu is alive, the game ends with victory!.