Artificial Intelligence 5M - Loch Lomond Lake

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```
library(plyr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:plyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(data.table)
```

```
##
## Attaching package: 'data.table'
```

```
## The following objects are masked from 'package:dplyr':
##
##     between, first, last
```

```
library(tidyr)
library(ggplot2)
library(scales)
library(Hmisc)
```

```
## Loading required package: lattice
```

```
## Loading required package: survival
```

```
## Loading required package: Formula
```

```
##
## Attaching package: 'Hmisc'
```

```
## The following objects are masked from 'package:dplyr':
##
##     src, summarize
```

```
## The following objects are masked from 'package:plyr':
##
##     is.discrete, summarize
```

```
## The following objects are masked from 'package:base':
##
##     format.pval, units
```

```
library(kableExtra)
library(gridExtra)
```

```
##
## Attaching package: 'gridExtra'
```

```
## The following object is masked from 'package:dplyr':
##
##     combine
```

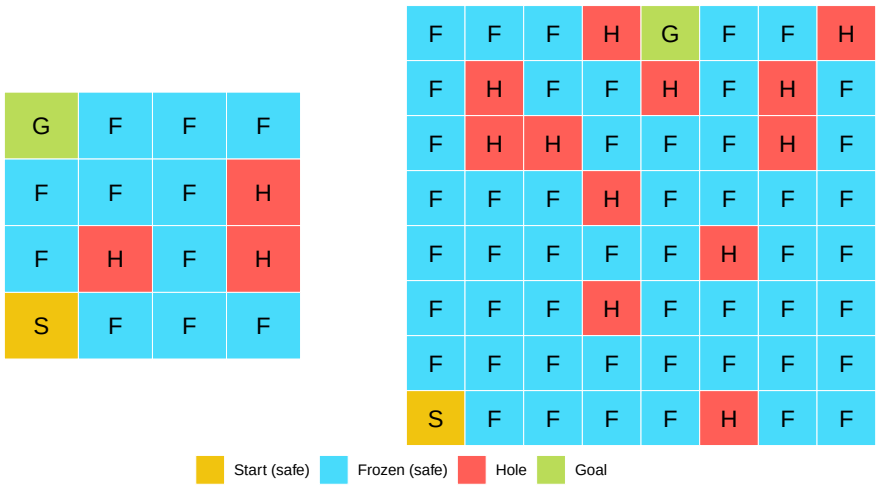
```
library(grid)
library(gtable)
library(gridExtra)
library(grid)
library(egg)
library(reshape2)
```

```
##
## Attaching package: 'reshape2'
```

```
## The following object is masked from 'package:tidyr':
##
##     smiths
```

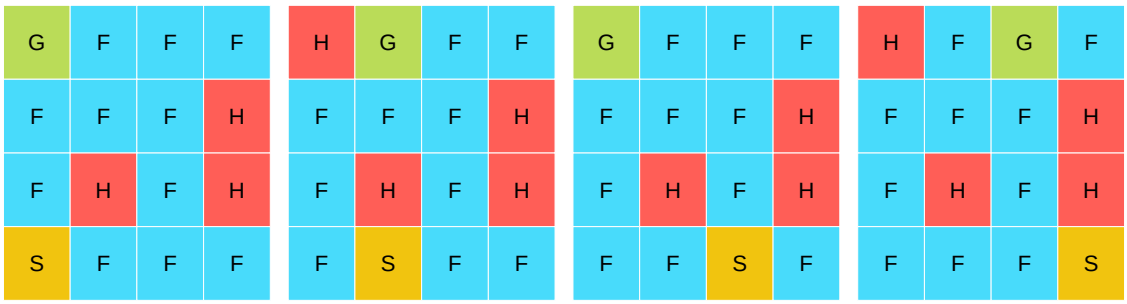
```
## The following objects are masked from 'package:data.table':
##
##     dcast, melt
```

```
library(grid)
```



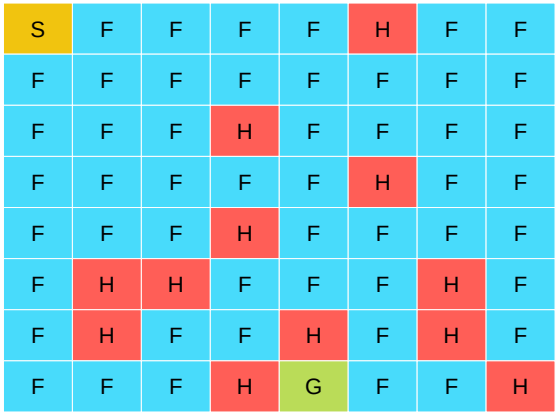

```
##  [1] S F F F F H F H F F F H G F F F
## Levels: S < F < H < G
##  [1] S F F F F H F H F F F H G F F F
```

```
## Levels: S < F < H < G
##  [1] S F F F F H F H F F F H G F F F
## Levels: S < F < H < G
##  [1] S F F F F H F H F F F H G F F F
## Levels: S < F < H < G
##  [1] S F F F F H F F F F F F F F F F F H F F F F F F F F H F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H G F F H
## Levels: S < F < H < G
##  [1] S F F F F H F F F F F F F F F F F H F F F F F F F F H F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H G F F H
## Levels: S < F < H < G
```

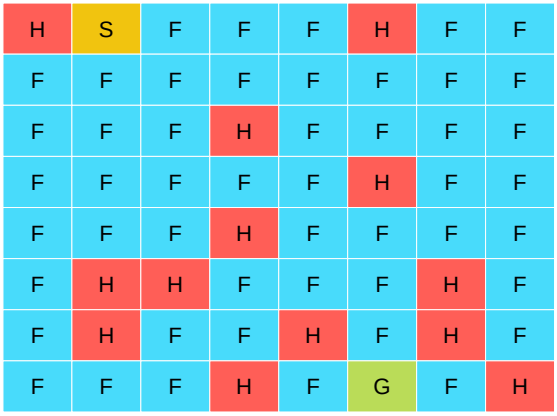


4x4 Grid Problem 0 | 4x4 Grid Problem 1 | 4x4 Grid Problem 2 | 4x4 Grid Problem 3

```
##  [1] S F F F F H F H F F F H G F F F
## Levels: S < F < H < G
##  [1] S F F F F H F H F F F H G F F F
## Levels: S < F < H < G
##  [1] F S F F F H F H F F F H H G F F
## Levels: S < F < H < G
##  [1] F S F F F H F H F F F H H G F F
## Levels: S < F < H < G
##  [1] F F S F F H F H F F F H G F F F
## Levels: S < F < H < G
##  [1] F F S F F H F H F F F H G F F F
## Levels: S < F < H < G
##  [1] F F F S F H F H F F F H H F G F
## Levels: S < F < H < G
##  [1] F F F S F H F H F F F H H F G F
## Levels: S < F < H < G
```

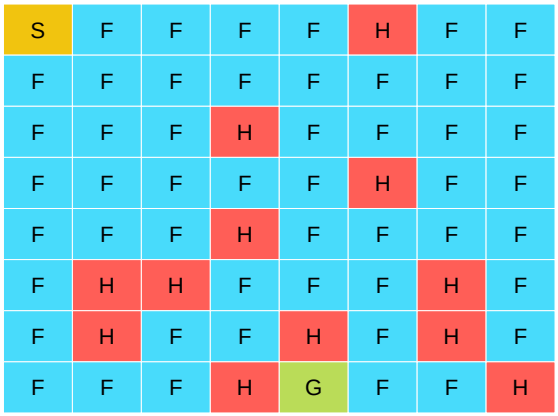


8x8 Grid Problem 0

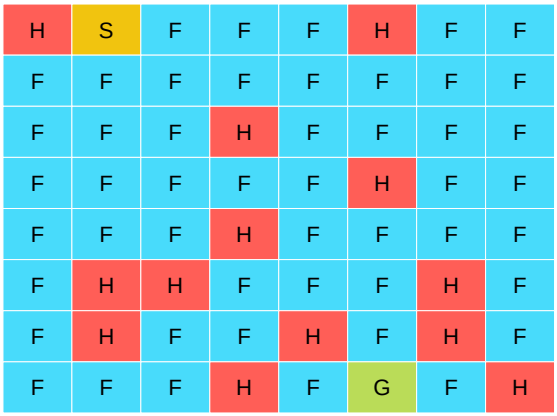


8x8 Grid Problem 2

```
##  [1] S F F F F H F F F F F F F F F F F F H F F F F F F F H F F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H G F F H
## Levels: S < F < H < G
##  [1] S F F F F H F F F F F F F F F F F F H F F F F F F F H F F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H G F F H
## Levels: S < F < H < G
##  [1] H S F F F H F F F F F F F F F F F F H F F F F F F F H F F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H F G F H
## Levels: S < F < H < G
##  [1] H S F F F H F F F F F F F F F F F F H F F F F F F F H F F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H F G F H
## Levels: S < F < H < G
```



8x8 Grid Problem 1



8x8 Grid Problem 2

```
##  [1] S F F F F H F F F F F F F F F F F F H F F F F F F F H F F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H G F F H
## Levels: S < F < H < G
##  [1] S F F F F H F F F F F F F F F F F F H F F F F F F F H F F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H G F F H
## Levels: S < F < H < G
##  [1] H S F F F H F F F F F F F F F F F F H F F F F F F F H F F F F F
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H F G F H
## Levels: S < F < H < G
##  [1] H S F F F H F F F F F F F F F F F F H F F F F F F F H F F F F F
```

```
## [36] H F F F F F H H F F F H F F H F F H F H F F F F H F G F H
## Levels: S < F < H < G
```

1 Introduction

The Loch Lomond Frozen Lake environment is a customized Open AI Gym derived from FrozenLake (https://gym.openai.com/envs/#toy_text).

The goal of this report is to design, implement and evaluate three diferent virtual agents which are able to navigate across the Loch Lomond Frozen Lake grid and retrieve the frisbee disc. Three different agents are analyzed: a senseless agent, a simple agent and a reinforcement agent.

2 Agents

2.1 Senseless Agent

2.1.1 Evaluation

2.2 Simple Agent

2.2.1 Evaluation

2.3 Reinforcement Learning Agent

2.3.1 Evaluation

3 Conclusions