

Faculty of Mathematics and Physics  
Charles University in Prague  
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UT2004 bots made easy!

# Pogamut 3

Lecture 10 – CTF



# Warm Up!



- Fill the short test for this lessons
  - 8 minutes limit
  - <http://alturl.com/vyyr6>
  - [https://docs.google.com/forms/d/1VTe2jiXMfU5HomtVgrKFDvQvNwfLDZhous\\_U\\_pHbXnc/viewform](https://docs.google.com/forms/d/1VTe2jiXMfU5HomtVgrKFDvQvNwfLDZhous_U_pHbXnc/viewform)

# Today's menu



1. **Navigation Tips**
2. Capture the Flag (CTF)

# Navigation Tips

## Useful classes



- **MyCollections**

```
Item targetItem = MyCollections.getRandomFiltered(  
    items.getSpawnedItems(UT2004ItemType.Category.  
    WEAPON), myIFilter  
);
```

- **fwMap**

```
fwMap.getNearestFilteredItem(...)
```

- **DistanceUtils**

- **Heatup**

- **Cooldown**

# Navigation Tips

## Anti-stuck I



- **Always handle STUCK event!**
  - Use TabooSets to temporarily filter items/navpoints you were stuck going to
    - This prevents your bot to cycle in 1) pick the same item, 2) run towards it, 3) stuck

```
TabooSet<Item> tabooItems = new TabooSet<Item>(bot);
this.navigation.addStrongNavigationListener(

    new FlagListener<NavigationState>() {
        @Override
        public void flagChanged(NavigationState changedValue){
            switch (changedValue) {
                case STUCK:
                case PATH_COMPUTATION_FAILED:
                    tabooItems.add(targetItem, 30);
                break;
            }
        }
    }
);
```

# Navigation Tips

## Anti-stuck II



- Then don't forget to use your taboo set to filter the items you are picking from!

```
if (!this.navigation.isNavigating()) {  
    targetItem = MyCollections.getRandom(  
        tabooItems.filter(items.getSpawnedItems().values())  
    );  
    this.navigation.navigate(targetItem);  
}
```

# Navigation Tips

## yaPOSH



- In yaPOSH, a good place to register navigation state listeners, TabooSets and weapon preferences is in the constructor of bot context class, e.g.:

```
public AttackBotContext(UT2004Bot bot) {  
    super("AttackBotContext", bot);  
    // IMPORTANT: Various modules of context must be initialized.  
    initialize();  
  
    // INITIALIZE CUSTOM MODULES  
    getWeaponPrefs()...;  
    ...  
}
```

# Navigation Tips

## aStar – plugging the path to navigation



1. Get starting point

```
NavPoint from =  
    navigation.getNearestNavPoint(  
        info.getLocation()  
    );
```

2. Get target point

```
NavPoint to =  
    MyCollections.getRandom(  
        navPoints.getNavPoints().values()  
    );
```

3. Find the path

```
IPathFuture pf =  
    aStar.computePath(from, to);
```

4. Execute it

```
this.navigation.navigate(pf);
```



# Today's menu



1. Navigation Tips
2. **Capture the Flag (CTF)**

# Capture the Flag (CTF)

## Rules



- Players/bots are divided into two teams (red and blue).
- Each team has a flag in his base.
- The goal of the team is to capture the flag of the opposite team and bring it to their home base.
- When managed, the team scores 1 point.
  - Team can only bring opposite flag home and score a point, if the team flag is in team home base!
- If the flag is dropped it will be returned to home base after some time.



# Pogamut CTF support

## Bases & game status



- **CTF module**
  - `this.ctf`
- **Where are the bases?**
  - `this.ctf.getOurBase();`
  - `this.ctf.getEnemyBase();`
- **Whats the game status?**
  - `this.ctf.canOurTeamScore();`
  - `this.ctf.canEnemyTeamScore();`
- **Am I winning?**
  - `game.getTeamScores();`
  - `info.getTeamScore();`

# Pogamut CTF support II

## Flags



- **I want my flag!**
  - Flag is represented by **FlagInfo** object.
  - `this.ctf.getOurFlag();`
  - `this.ctf.getEnemyFlag();`
- **Is someone messing with my flag?**
  - `this.ctf.isOurFlagHome();`
  - `this.ctf.isOurFlagHeld();`
- **How about enemy flag?**
  - `this.ctf.isEnemyFlagHome();`
  - `this.ctf.isEnemyFlagHeld();`

# Pogamut CTF support II

## Flags



- How to set team for my bots?

```
static int botCount = 0;

@Override
public Initialize getInitializeCommand() {
    return new Initialize()
        .setName("CTFBot")
        .setTeam((botCount++ % 2 == 0) ?
            AgentInfo.TEAM_BLUE :
            AgentInfo.TEAM_RED);
}

public static void main(String[] args) throws PogamutException
{
    new UT2004BotRunner(DuelBotLogic.class, "CTFBot")
        .setMain(true)
        .setLogLevel(Level.WARNING)
        .startAgents(4);
}
}
```

# Pogamut CTF support III

## (Crude) Team communication



- Use **SendMessage** command.

```
this.act.act(  
    new SendMessage()  
  
        .setTeamIndex(info.getTeam()) .setText("Help  
")  
);
```

- Listen to team message with **TeamChat** event.

```
@EventListener(eventClass = TeamChat.class)  
public void teamChat(TeamChat event) {  
    ...  
}
```

- OLD AND SLOW

# Capture The Flag

## The Strategy



- Divide area to HOME | MID | ENEMY
  - Find shortest-paths between NavPoint and the home/enemy base, assess their ratio
  - At HOME => So called DEFENDER
  - At MID => So called ROAMER
  - At ENEMY => So called ATTACKER
- Find “different paths” between HOME/ENEMY base
  - Find shortest path
  - Use `AStar` to find other paths (distance between navpoint and existign paths must be greater than N)
  - Use `UT2004Draw` to visualize found path
    - E.g. debug this code separately from the bot’s code

# Assignment

(or Homework)



- Create **CTFBot** in **yaPOSH**
  - Arm yourself before going into action!
  - Try to get enemy flag!
  - Try to get your flag, if it is stolen!
  - Use map CTF-LostFaith
  - Play at least 4v4
    - *But first debug your bot in 1v0 or 1v1!*
  - You do not have to include team cooperation at this point
    - *Even though you may prepare your code for it ;)*



# Assignment

## Cheatsheet



- **Locations of interest**
  - `this.ctf.getOurBase();`
  - `this.ctf.getEnemyBase();`
- **Useful info about the game (could be senses)**
  - `this.ctf.canOurTeamScore();`
  - `this.ctf.canEnemyTeamScore();`
  - `this.ctf.isEnemyFlagHome();`
  - `this.ctf.isOurFlagHeld();`
  - `this.ctf.isBotCarryingEnemyFlag();`
    - Our bot
- Flag is represented by FlagInfo object
  - `this.ctf.getOurFlag();`
    - Can check `isVisible()`...

# Send us finished assignment



Via e-mail:

- *Subject*
  - "Pogamut homework 2015 – Assignment X"
    - Replace 'X' with the assignment number and the subject has to be without quotes of course
    - ...or face **-2 score penalization**
- *To*
  - [jakub.gemrot@gmail.com](mailto:jakub.gemrot@gmail.com)
    - Jakub Gemrot (Tuesday practice lessons)
- *Attachment*
  - Completely zip-up your project(s) folder except 'target' directory and IDE specific files (or face **-2 score penalization**)
- *Body*
  - **Please send us information about how much time it took you to finish the assignment + any comments regarding your implementation struggle**
    - *Information won't be abused/made public*
    - *In fact it helps to make the practice lessons better*
  - Don't forget to mention your full name!

# Questions?

I sense a soul in search of answers...



- We do not own the patent of perfection (yet...)
- In case of doubts about the assignment, tournament or hard problems, bugs don't hesitate to contact us!
  - Jakub Gemrot (Tuesday practice lessons)
    - [jakub.gemrot@gmail.com](mailto:jakub.gemrot@gmail.com)