General Game Playing

Preface

Team

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Hello. And welcome to this introductory course on General Game Playing. I am Michael Genesereth from Stanford University. I am the primary developer of this course, but I am not the only one involved. Some of the material is due to Michael Thielscher, a professor at the University of New South Wales and a one-time winner of the International Game Playing Competition. And there is Sam Schreiber, another winner of the International General Game Playing Competition and developer of the game playing software used in the course. Credit is also due to Alex Landau and Peter Pham and Bertrand Decoster and other teaching assistants who have helped to refine the material over the years. Before we get started, I want to make some general remarks about the course.

Introduction to General Game Playing

(1) Theory of GGP and GGP technologies

(2) Create and test GGP programs

(3) Glimpse of Real-World Applications

First of all, a few words about content. This course is an elementary introduction to General Game Playing (GGP). (1) It presents the theory of General Game Playing and leading GGP technologies. (2) It shows how to create and test GGP programs capable of competing against other programs and humans. (3) And it offers a glimpse of some of the real world applications of General Game Playing.

Background

Symbolic Logic
- Game Descriptions written in Logic

Ability to read simple computer programs
- Examples written in Javascript

Optional - Ability to develop computer programs
- Modify standard components
- Create your own player

Although the course is elementary, it does assume some basic background. (1) First of all, you should be familiar with Symbolic Logic. Game descriptions are written in the language of Symbolic Logic, and it helps to be able to read and write such descriptions. (2) Second, you should be familiar the concepts of computer programming. At the very least, you should be able to read and understand program fragments written in modern programming languages. We use Javascript in all of our examples. Javascript is fairly simple. If you are familiar with languages like Java and C, you should be able to read Javascript without any further training. If not, you might want to spend some time learning the language so that you can understand the examples. With these two elements you should be able to understand the presentation and you should even be able to configure a player to compete in competitions (using software components provided by the instructors). (Optional) If you are adept at programming, you may wish to modify the standard components or even build your own player from scratch. There is no restriction on what language to use in building your player, so long as it abides by the GGP communication protocol (which we describe later). The ability to write your own general game playing program is desirable but is not required.

Materials

Videos with Interactive Exercises

Notes with Interactive Exercises

Problems and Programming Assignments

Background Readings

Forum

Like other online courses, all of the material of this course is accessible via the course homepage. The material includes online videos. Many of these videos include interactive exercises. These exercises do not count toward your grade, but they are very useful in ensuring that you understand the material being presented. There are also written notes for each lesson. These are basically transcriptions of the videos, but there is some supplementary material as well. There are online problems and programming assignments, which we use to evaluate your understanding of the material. These count toward your grade, which is important if you want a certificate at the end of the course. There is some background reading. This material is optional but very useful. And there is a community forum, within which you can discuss general game playing with the instructors and other students.

Building a General Game Player

Building a General Game Player highly recommended

One important difference from many other online courses is that completion of this course requires that you develop a computer program and test it by having it compete with the programs developed by other students. In particular, we want you to develop a general game playing system of your own and see how it does in playing games against the general game playing programs developed by others. You can learn a lot about general game playing by simply listening to the videos and doing the exercises. You can learn even more by participating as a player in general game playing matches. It is our belief that it is even better if you develop a general game playing program of your own. We believe that this not only increases the fun of the course but also facilitates and deepens your understanding of the material.

Building a General Game Player

Building a General Game Player highly recommended

Approach #1: Build your own player
- Javascript versions in lectures and notes
- Java Code Base

For those of you with programming experience, especially those of you who know javascript or java, this should be relatively straightforward. In the lectures, we present javascript versions of all of the techniques discussed in the course. And online we provide a code base for a high performance player written in Java. You can create a player simply by running this code, and you can improve its performance by modifying it as you see fit.

Building a General Game Player

Building a General Game Player highly recommended

Approach #1: Build your own player
- Javascript versions in lectures and notes
- Java Code Base

Approach #2: Configure the parametric player

For those of you who are not programmers or who are not familiar with Java, we offer an alternative approach. We have created a "parametric player", i.e. a general game player whose behavior is based on the values of various configuration parameters. There is a graphical user interface that allows you to specify different options for these parameters and thereby create general game players with different capabilities. You just start the program and use your browser to configure the player.

Building a General Game Player

Building a General Game Player highly recommended

Approach #1: Build your own player
- Javascript versions in lectures and notes
- Java Code Base

Approach #2: Configure the parametric player

Player Evaluation
- Programming Assignments each week
- Final Competition at the end of the course

Whichever approach you use, your job will be to test your player by having it compete against other players on games of increasing complexity as the course progresses. There will also be a final competition at the end of the course to determine an overall winner. And, if you like, you will be able to enter your programs into next year's International Game Playing competition.

Software Compatibility

Browsers tested:
- Safari
- Chrome
- Firefox

Java Code Base Compatibility
- Any machine with Java Virtual Machine support

One requirement for this all to work is that our webpages and our code must run on your computer. The webpages work in most browsers (Safari, Chrome, Firefox for sure). The Java code base and the parametric player are fairly portable and run on most machines. If you encounter problems, we can provide some support. However, with a course this large, it is not possible to provide individual service to everyone. There are instructions on the website on how to test your browsers and how to download and test the code base. You should follow these instructions right up front so that you can determine early whether or not our webpages and code are compatible with your system.

Collaboration

Yes!!

One frequently asked question is whether you are permitted to collaborate with others in building your general game players. The answer is a resounding "yes". In fact, it is pedagogically valuable for you to work with others in building your players. If you do form a team, we ask only that you identify your teammates so that we know you are all working on the same player. If you do form a team, you will all get the same grade on all problems that test your player.

Player Name

Player name
alphanumeric ASCII characters + underscore

Samples:
djava_unchained
red_hot_chili_peppers
resolutionaries
michael_genesereth

In any case, whether you work alone or in a team, one of the first things you need to do is to invent a unique and hopefully interesting name for your player. Anything goes do long as it is a sequence of ASCII characters restricted to letters, numbers, and the underscore character. Here are some of the names used in the past. There are the winners of the International Competition. But there are many more. djava_unchained, red_hot_chili_peppers. resolutionaries. michael_genesereth - no that was not mine, just some students who figured that I would not want to see that particular player lose. And so forth. Be creative. But be careful - once you pick your player name, you are stuck with it for the duration of the course.

Score

Components:

- Weekly Problems
- Weekly Programming Assignments
- Performance in Final Competition

Certificate

- Overall score of at least 70% of possible maximum

Your score for the course as a whole will be based on your performance on the weekly problems, the programming assignments, and the performance of your player in the final competition at the end of the course. We will issue certificates of completion for all students who attain an overall score of 70% on these components.

Plea for Patience

New Experience for all of us
- First time taught online
- First time with tens of thousands of students

Request
- Use the Forum to raise awareness of problems
- Use the Forum to suggest solutions
- Patience with us as we work through problems

Let me close with a plea for patience on your part. Although we have taught this course many times in the classroom, this is the first time we are offering the course online. And it is the first time we are teaching it to so many students. We think we have worked out all of the kinks in the system, but as we go along we may encounter problems. Please use the forum to let us know of any problems you encounter and suggest solutions. And, please, if you can, be patient with us as we work through any problems that arise.

Okay. That is all for this introduction. As soon as you are ready, click on the Video link for the first lesson.

That is all for this introduction. As soon as you are ready, click on the Video link for the first lesson and let's get started.