INTRODUCTION TO COMPUTER MUSIC

AIST2010 Lecture 1
AIST2010: INTRODUCTION TO COMPUTER MUSIC

AIST2010 is a new course

- Thank you to be part of this!

As said in the subtitle:

- “From Analysis to Algorithmic Music”
- This is planned to be a project-based course for engineers to develop an understanding in building music software technologies
Course Logistics

Course Meetings
- Lectures: T2 @ERB804, H8-9 @LHC101
- Labs: Either T4 or T5 @SHB123 (CSE lab)
  - Due to a number of students’ scheduling conflicts, let’s have a vote after class to fit everyone!

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Course Tutor
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SPECTRUM OF KNOWLEDGE: COMPUTER VS MUSIC

Programmer

Audio Engineer

Electronic Musician

Musician
WHAT IS IN THIS COURSE?

Basic concepts of **digital audio**

Programming experience
- **MATLAB**: sound analysis
- **Csound**: sound synthesis
- **Python**: MIR
- **MaxMSP**: music programming
- **Magenta**: music with AI
- **Euterpea**: algorithmic music

We can never teach you the complete picture in one course
- Explore into one (or more!) of the topics via the course project

**Basic programming skills** (of any language) is necessary
- And be prepared for the adventures
WHAT IS NOT IN THIS COURSE?

How can I compose music?
How to use vocaloid?
How to typeset music scores?
How to set up my Hi-Fi?
How to buy good earphones?
What is the best audio compression codec?
Which synthesizer should I choose?
How to use GarageBand?
...

Yet, some technical fundamentals in this course may be helpful for you to these questions!
RELATED COURSES

Technical

IERG4190
Multimedia Coding and Processing

CSCI3280
Introduction to Multimedia Systems

Musical

AIST2010
Introduction to Computer Music

UGEB2149
Music, Mind and Artificial Intelligence

MUSC2333
Music Information Technology

MUSC3383
Electronic Music
<table>
<thead>
<tr>
<th>Week</th>
<th>Lectures</th>
<th>Lab</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction, Real-life vs. Digital Music</td>
<td>No lab</td>
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<tr>
<td>2</td>
<td>Analysis and Visualization</td>
<td>Audacity / SoundVisualizer</td>
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<td>3</td>
<td>Music Information Retrieval</td>
<td>MATLAB</td>
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<td>4</td>
<td>Audio Synthesis</td>
<td>Csound</td>
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<td>5</td>
<td>DSP and Filters</td>
<td>No lab (public holiday)</td>
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<td>6</td>
<td>More on MIR</td>
<td>Python</td>
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<td>7</td>
<td>Web Audio, <strong>Midterm Exam</strong></td>
<td>TBC</td>
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<tr>
<td>8</td>
<td>MaxMSP and SuperCollider</td>
<td>MaxMSP</td>
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<td>9</td>
<td>Machine Learning</td>
<td>TBC</td>
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<td>10</td>
<td>TensorFlow / Magenta</td>
<td>Magenta</td>
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<td>11</td>
<td>Functional Programming and Music</td>
<td>Haskell / Eutrepea</td>
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<td>12 &amp; 13</td>
<td><strong>Project Presentation</strong></td>
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COURSE ASSESSMENT

Labs (20%)
- Submit the ~8 required lab exercises weekly

Midterm Exam (20%)
- Textbook knowledge from analysis, synthesis to MIR

Project (40%)
- Propose your own topic, explore and share with your classmates

Extensive project report (20%)
- A careful elaboration on the journey of project exploration
THE PROJECT

Work **individually** or in a group of **2 students**
- The amount of work would be assessed

Explore further on one of the topics covered in this course, e.g.
- Implement some music apps/games (synthesis/analysis)
- Data mining on music/audio data
- Understand, extend and improve some open-source projects

- Present and demo to class in the last lecture(s)

**Individual writeup of the exploration journey (instead of final exam)**
- Excellent projects may be escalated to a “conference” level for submission!
EQUIPMENT FOR YOUR USE

Most of the software we use are open-source or licenced to CUHK
- Audacity, CSound, PureData, …
- MATLAB: refer to ITSC for installation instructions

The only exception: MaxMSP
- This is a software for music programming, to be introduced in October
- CSE purchased licences are available on several lab machines only
- But you may use the “demo” version for 3 months
EQUIPMENT FOR YOUR USE

A capable laptop is good enough for the course, in general

- You may use your mobile devices for controlling too

MIDI controllers may be useful for some projects

- For our course we have two **Roli Seaboard Block**!
- 5D polyphonic MIDI control
- You may borrow it for your course project!
Here are some useful books/sites that you may read for reference!

COURSE CONTACT

Blackboard site
- Publishing of lecture and lab materials
- Announcements
- https://blackboard.cuhk.edu.hk/ultra/courses/_117895_1/cl/outline

Slack
- Casual Q&A and discussion
- https://tinyurl.com/join-aist2010
THE WORLD OF COMPUTER MUSIC

Still a highly active research area

- Many questions yet to solve, e.g.
  - The interaction between human and computer on artistic touches
  - More efficient and effective ways for music information retrieval
  - Machine composition and improvisation

Important research labs, e.g.

- IRCAM (Paris, France)
- CCRMA (Stanford University)

Important conferences, e.g.

- ICMC
- ISMIR
- NIME
- See: [http://conferences.smcnetwork.org](http://conferences.smcnetwork.org)

Let’s explore together in the upcoming 13 weeks!