UF UNIVERSITY of FLORIDA

MUSICAL DATA STRUCTURES

Class: 2 x 1.5-hour class meetings per week
Professor: Dr. Tina Tallon (tallonc@ufl.edu), she/hers
(please feel free to call me Tina!)
Office Hours: TBA

COURSE DESCRIPTION

In this seminar, we will engage with computational methods for the analysis and generation of musical materials and structures to better understand how humans produce and interact with them. Topics covered include music representation and encoding, feature extraction and music information retrieval, corpus studies, analytical and generative machine learning techniques, data sonification, and multimodal human-computer interaction. These techniques will be considered in the context of many different aesthetics, styles, genres, theoretical frameworks, and societal contexts.

Pre-requisites: *none*

COURSE OBJECTIVES

Throughout the course, students will develop skills to quantify aspects of music creation, distribution, and experiential processes using both heuristic and statistical computational techniques. They will explore the history of computing and artificial intelligence, as well as analyze the structure, content, and contexts of existing musical datasets. They will both generate and analyze musical materials using stochastic, rule-based, and machine learning tools. Students will also grapple with questions surrounding the role of automation as it relates to artistic labor, and consider opportunities and adversities afforded to artists by recent technological advancements in machine learning. Ultimately, students will develop basic proficiency with the Python programming language through coding assignments and a final project that assess their ability to work through a software development cycle to either create a new system or product, facilitate the performance of a creative work, or use computational means to analyze human engagement with sound.

REQUIRED MATERIALS

Textbooks

There are no required textbooks, and all readings, datasets, and example code will be posted on the course's Canvas page.

Software

The majority of the course will be taught using a programming language called Python, which can be downloaded for free here: https://www.python.org/downloads/. I recommend downloading Python 3.10.6, although we will develop skills to manage version control and package dependencies. Depending on your operating system, we may need to configure specific libraries and packages to ensure that everything runs smoothly. While we'll often be working through examples together using Jupyter notebooks and Google Colab (a way to distribute and work through code step-by-step), I'm always happy to work one-on-one with you to find a configuration that works for you and any projects/applications that you might dream up. You're also welcome to use other languages (R, MATLAB, C++, Julia, etc.) if you're familiar with them; at the end of the day, I'm much more interested in modes of

thinking and ways of solving problems than specific tools that we might use to accomplish our goals, and I'm happy to work with you to find something that fits your workflow/dataset/use cases.

Other pieces of software that you may find useful (and which may be referenced during the semester) include:

- Pure Data: http://msp.ucsd.edu/software.html (free)
- Reaper: https://www.reaper.fm/download.php (free)
- Sonic Visualiser: http://www.sonicvisualiser.org/ (free)
- Some sort of notation software (though pencil and paper is always useful!)

Hardware

Access to some sort of computing device will be crucial. If this is not possible, please let me know ASAP and we will try to work with the administration to get you what you need, including but not limited to loaner computers or computer labs. While no additional hardware is necessary outside of a computer, if you would like to purchase a microphone for high-quality recording of audio, we can talk about what options might suit your needs. Your projects may require access to a high-quality audio lab, in which case I will ensure that you have access to studios in the music building.

GRADING

Assignment Breakdown

The course will primarily consist of six small skill development assignments, a final project to be presented in class (the development of which will span much of the semester), and engagement/participation. The final project can take many forms depending on the students' areas of expertise, including by not limited to a composition, an analytical paper, a piece of software, a performance, curriculum design - if you have an idea, let's talk about how we can make it happen!

Skill Development Assignments (SDAs) (x6)		30%
Final Project		50%
-Prospectus	10%	
-Documentation	25%	
-Presentation	15%	
Engagement/Participation		20%

Assignment Submission

All projects are expected to be completed on time and submitted in their final designated form (this may vary from assignment to assignment) along with any accompanying source materials in a .zip folder in the appropriate folder on Canvas prior to class on the day that they are due. Files should use the naming convention "LastName_AssigmentName.zip" in order to make downloading and grading easier. Feedback will be given within 1 week of on-time assignment submission. While there are no penalties for late assignments, keep in mind that they may receive abbreviated (or no) feedback from the instructor if they are not submitted on time.

Attendance and Engagement/Participation Policy

Students are expected to attend and be engaged in every class in some way (preferably synchronously

when possible, though recordings will be made available for asynchronous viewing as soon as possible after the class is finished - which may depend on upload/processing speed). Because of the realities of living in an ongoing global pandemic, no doctors' notes are required for missed classes, and you do not need to notify me in advance if you will not be in class (though I will likely check in with you just to make sure you're okay and have what you need). In order to preserve a healthy and welcoming learning environment for everyone, you are encouraged to wear a mask or stay home if feeling unwell.

Because class discussions and in-class workshopping and experimentation will comprise an important part of the course, all members of the class are expected to have completed all relevant assignments and familiarize themselves with all required reference materials. There will be frequent opportunities to share/workshop the outcomes of skill development assignments in class, and so it is important to work on them early and often. In general, the first class period of each week will involve the introduction of new materials in a lecture-style format, whereas the second will be a more experiential, lab-style tutorial. All students and instructors are expected to treat each other with the utmost respect and professionalism, whether physically in the classroom, during office hours, or online. We are all here to learn, so please do not hesitate to ask questions or share your opinions or experiences. At some points during the course, challenging and/or uncomfortable subjects may be discussed. Students are in no way, shape, or form evaluated on their positionality with respect to these subjects, and are expected to form their own opinions based upon careful analysis of and reflection on relevant scholarship, data, and inquiry - whatever forms those may take. We will study a variety of sources, some of which will present viewpoints that differ from our own, but we are expected to evaluate them using all of the tools at our disposal in the spirit of developing our analytical toolbox and a deeper understanding of the world around us. However, discriminatory or threatening language will not be tolerated and anyone who creates a toxic work environment for any other members of the community will be asked to leave.

Grading Scale

Letter	%	General Grading Criteria (specific assignment rubrics TBD)
A	93 - 100%	Excellent. Well-prepared and thorough. Shows creativity, diligence, or insight beyond the basic requirements
A-	90 - 92.99%	
B+	87 - 89.99%	Good. Meets basic expectations. Demonstrates a basic understanding of the material, perhaps with minor flaws
B	83 - 86.99%	
B-	80 - 82.99%	
C+	77 - 79.99%	Fair. Completes the assignment, but demonstrates a less-than-firm grasp of the material; missing elements; multiple technical errors
C	73 - 76.99%	
C-	70 - 72.99%	
D+	67 - 69.99%	Poor. Demonstrates a lack of effort or understanding of the material. Multiple errors, missing elements, or failure to follow assignment instructions
D	63 - 66.99%	
D-	60 - 62.99%	
E	<60%	Fail. Missing, incomplete, plagiarized, or incoherent

Engagement/Participation Rubric

	Criteria: Present and Prepared	Criteria: Synthesis and Extension
Excellent	Student is present and participatory (either in class, or as the need arises, virtually) and shows evidence of having completed required course materials and assignments (either through in-class discussion or posting on the Canvas discussion board)	Student understands connections between required materials, and considers temporal, technological, and societal contexts in which materials are presented. Comments and questions show that the student is able to build upon insights gained from engagement with materials and connect it to their own experiences, as well as critically consider their own positionality to the material and how it may differ from others. Comments are respectful of others' viewpoints.
Satisfactory	Student is present and participatory (either in class, or as the need arises, virtually), shows evidence of having only superficially or incompletely engaged with required course materials and assignments, (either through in-class discussion or posting on the Canvas discussion board)	Student shows limited understanding of connections between required materials, and/or barely considers temporal, technological, and societal contexts in which materials are presented. Comments and questions are superficial and serve only to regurgitate points raised in the required materials without extending or providing any additional insight or context, or simply provide their experiences without considering positionality to the materials. Comments are respectful of others' viewpoints.
Unsatisfactory	Student is not present and/or does not participate (either in class, or as the need arises, virtually), and shows no engagement with required course materials nor assignment completion	Student makes no effort to connect required materials to each other, nor do they consider the context in which the required materials are presented. Student is inconsiderate of other points of view and/or creates a toxic environment for others in the class.

Academic Integrity

By submitting assignments, you certify that all work is your own (or that of your group, in the case of group assignments). If you use elements of someone else's work (such as audio/video samples, datasets, or code), please be sure to cite your sources the same as you would in a journal article or other academic publication. Please refer to UF's honor code to review criteria and consequences for plagiarism and other instances of academic misconduct. We will have in-depth discussions about intellectual property, labor, and automation, and the implications for scholarly and artistic work in the 21st century (particularly in the context of AI). Sometimes, the concept of authorship can be murky - and that's okay! We're here to explore those ambiguities together in the spirit of prioritizing consent and agency, and as long as we do our best to ensure that we are giving as much credit as we possibly can where credit is due, we shouldn't have any problems.

Because this is an AI course, I do not prohibit you from using generative AI tools outside the scope of those that we experiment and develop in class. In fact, I encourage you to use them - the only way that you can best evaluate their utility and limitations is to experiment with them and determine their relevance to your workflow. However, I do ask that you submit a short addendum that explains which tools you used and how you used them so that I can be informed when giving you feedback and/or assistance, and so that you can reflect on your use of these tools.

RESOURCES

At the end of the day, my first priority is for your physical and mental health. College can be an extremely difficult time - and especially so now. We are all exhausted, and we're all trying our best. If there is ever any way that I can best support you, please do not hesitate to reach out - open lines of communication are crucial in order to make sure that everyone can get the help they need in a timely manner. I will try my very best to respond to all emails within 24 hours during the week, but in the case that you are experiencing concerns, seeking help is a courageous thing to do for yourself and those who care about you. UF offers the following resources:

- UF Counseling & Wellness Center, 401 Peabody Hall, 352-392-1575, for personal and career counseling: https://counseling.ufl.edu/
- UF U Matter, We Care, 352-392-2273, for mental health and personal counseling: https://umatter.ufl.edu/
- UF Crisis and Emergency Response Center (CERC), 352-392-1575: https://counseling.ufl.edu/services/crisis/
- UF Career Connection Center, 352-392-1601, for career development assistance and counseling: https://career.ufl.edu/

Students Requesting Accommodations

I will do my very best to provide whatever accommodations I can to help you be successful, no questions asked. However, there may be cases where we both need support to set us up for success, and students requesting classroom accommodation through official means (which I do not require, though which may be helpful to have on record) should first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. To request classroom accommodations, you can start by visiting https://disability.ufl.edu/ or contacting the Assistant Dean of Students/Director of the Disability Resources Program at P202 Peabody Hall, or call 392-1261 (V), 392-3008 (TDD).

Evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance is available at https://gatorevals.aa.ufl.edu/students/. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via https://ufl.bluera.com/ufl/. Summaries of course evaluation results are available to students at https://gatorevals.aa.ufl.edu/public-results/.

If you ever have any questions, comments, or feedback about anything in class, please do not hesitate to send me an email and/or approach me after class! I am always looking for new ways to make the class more useful, relevant, and effective, so please share your experiences with me!

Thanks for reading, and I look forward to a great semester with all of you!

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Thanks for reading, and I look forward to a great semester with all of you!

WEEKLY CLASS SCHEDULE

NB: this schedule is likely to change as current events, student interest, and group pacing dictates. Thanks in advance for your flexibility!

(Note to reviewers: topics, assignments, and assigned materials will likely need to be updated by even next week to keep up with light-speed pace of AI. Specific pieces of music and media are not listed below (because they would take up way too much space!), but there is extensive amount of music and media studied in this course.)

WEEK 1: OVERVIEW AND INTRODUCTION

xx/xx/24 Review of syllabus; discussion of variety of ways of engaging with and representing sound; music encoding; a brief introduction to Python, pip, and Jupyter Notebooks/Google Colab
Info sheet Assigned
SDA 1a Assigned

Required reading:

- Matthes, E. (2022). Appendix A: Installation and Troubleshooting in *Python Crash Course: A Hands-On, Project-Based Introduction to Programming* (3rd ed.). No Starch Press.
- Tjoa, S. (2022). *Music Representations, 1. Sheet Music Representations - 6. Understanding Audio Features through Sonification*. Musicinformationalretrieval.com.
- The Selby (2011, Oct. 25). Christine Sun Kim - 10min on Vimeo [video]. *Vimeo*. https://vimeo.com/31083172
- Silpayamanant, J. (2022). Non-CWN Music Notation Software. *Mae Mai - Research Blog of Jon Silpayamanant*. https://silpayamanant.wordpress.com/music-notation-software/
- Costanza-Chock, S. (2020). Introduction: #TravelingWhileTrans, Design Justice, and Escape from the Matrix of Domination. Design Justice. https://designjustice.mitpress.mit.edu/pub/ap8rgw5e/release/1

WEEK 2: WHAT IS MUSIC? WHAT IS DATA?

xx/xx/24 Review of basic music cognition and ways of parametrizing sound; history of sonic measurement systems; path dependence and technological bias; auditory scene analysis (segmentation, integration, and segregation);
Info sheet Due
SDA 1b Assigned

Required reading:

- Bregman, A.S. (2004). Auditory scene analysis. In N.J. Smelzer & P.B. Baltes (Eds.) *International Encyclopedia of the Social and Behavioral Sciences*. Amsterdam: Pergamon (Elsevier)
- Wessel, D. L. (1979). Timbre Space as a Musical Control Structure. Computer Music Journal, 3(2), 45. https://doi.org/10.2307/3680283

- Youngblood, J. E. (1958). Style as Information. *Journal of Music Theory*, 2(1), 24. https://doi.org/10.2307/842928
- Tallon, T. (2019, Sept 3). A Century of "Shrill": How Bias in Technology Has Hurt Women's Voices. *The New Yorker.* https://www.newyorker.com/culture/cultural-comment/a-century-of-shrill-how-bias-in-technology-has-hurt-womens-voices

WEEK 3: MUSIC INFORMATION RETRIEVAL

xx/xx/24 Introduction to music information retrieval (MIR), feature extraction, and classification schema, including MFCCs, spectral centroid, chroma features; higher-order/hybrid platform-specific features such as danceability, valence, energy. Introduction to librosa and the Spotify API; intro to JSON
SDA (a&b) Due
SDA 2 Assigned

Required reading:
- Tjoa, S. (2022). *Introduction, 4. What is MIR?* musicinformationalretrieval.com
- Lamere, P. (2014). Installation and Getting Started. *Spotipy Documentation*. https://spotipy.readthedocs.io/en/2.21.0/#installation
- McFee, B. (2022). Installation, Tutorial, and Troubleshooting. *Librosa 0.9.2 Documentation*. https://librosa.org/doc/latest/index.html
- Platinga, B. (2018, April 28). What do Spotify's audio features tell us about this year's Eurovision Song Contest? 🤔. *Medium*.

WEEK 4: CORPUS STUDIES

xx/xx/24 Overview of musical corpus studies in many different genres and traditions; strategies for dataset construction, consent, representation, and crowdsourcing; dataset auditing
Final Project Prospectus Assigned

Required reading:
- Temperley, D., & Vanhandel, L. (2013). Introduction to the Special Issues on Corpus Methods. *Music Perception*, 31(1), 1–3. https://doi.org/10.1525/MP.2013.31.1.1
- Savage, P. E. (2022). An Overview of Cross-Cultural Music Corpus Studies. *The Oxford Handbook of Music and Corpus Studies*, C34.S1-C34.N2. https://doi.org/10.1093/OXFORDHB/9780190945442.013.34
- Ryakitimbo, R. (2021, December 10). A Gender Action Plan to Make Voice Technology More Inclusive. *Mozilla Foundation Blog*. https://foundation.mozilla.org/en/blog/a-gender-action-plan-to-make-voice-technology-more-inclusive/
- Bertin-Mahieux, T., Ellis, D. P. W., Whitman, B., & Lamere, P. (2011). The Million Song Dataset. *Proceedings of the 12th International Society for Music Information Retrieval Conference (ISMIR)*.

WEEK 5: STATISTICAL MODELS

xx/xx/24 Various approaches to statistical modeling and corpora analysis; random walks, Markov chains, Bayesian mechanics, entropy.
SDA 2 Due
SDA 3 Assigned

Required reading:

- Whorley, R. P., & Conklin, D. (2016). Music Generation from Statistical Models of Harmony. *Journal of New Music Research*, 45(2), 160–183. https://doi.org/10.1080/09298215.2016.1173708
- Huron, D. (2006). Chapter 5: Statistical Properties of Music. In *Sweet Anticipation: Music and the Psychology of Expectation*. MIT Press.

WEEK 6: ARTIFICIAL INTELLIGENCE I

xx/xx/24 A brief introduction to machine learning for classification and analysis; discussion of history of AI, general vs. narrow AI, basic architectures and functionality.
Final Project Prospectus Due

Required reading:

- Swafford, J. (2021, October 7). The Intelligence of Bodies: The philosophical and musical failings of "Beethoven X: The AI Project." *VAN Magazine*. https://van-magazine.com/mag/jan-swafford-beethoven-x/
- Palma, Mariojose (2021, December 28). A Brief History of Artificial Intelligence. Medium. https://medium.com/geekculture/a-brief-history-of-artificial-intelligence-2cb8d50eedab
- al-Jazari, Ibn al-Razzaz (1206). The Book of Knowledge of Ingenious Mechanical Devices (D. Hill, Trans), 46-51.
- Ather, S. Hussain (2022). A History of Artificial Intelligence. https://ahistoryofai.com/
- Hernandez-Orallo, J. (2000). Beyond the Turing Test. *Journal of Logic, Language, and Information*, 9(4), 447–466. http://www.jstor.org/stable/40180237

WEEK 7: ARTIFICIAL INTELLIGENCE II

xx/xx/24 Different neural network architectures (RNNs, GANs, LSTM, GRU); K-means clustering; transformer vs. diffusion models; applications in genre identification, sequence continuance, and latest advances in text-to-sound models.
SDA 3 Due
SDA 4 Assigned

Required reading:

- Gonfalonieri, A. (2019, February 13). How to Build A Data Set For Your Machine Learning Project. *Towards Data Science*. https://towardsdatascience.com/how-to-build-a-data-set-for-your-machine-learning-project-5b3b871881ac

- Roberts, A., Engel, J., Raffel, C., Simon, I., & Hawthorne, C. (2018, March 15). MusicVAE: Creating a palette for musical scores with machine learning. *Magenta Blog*. https://magenta.tensorflow.org/music-vae
- Kreuk, F., Synnaeve, G., Polyak, A., Singer, U., Défossez, A., Copet, J., Parikh, D., Taigman, Y., & Adi, Y. (2022). *AudioGen: Textually-Guided Audio Generation*. https://tinyurl.com/audiogen-text2audio
- Agostinelli, A., Denk, T. I., Borsos, Z., Engel, J., Verzetti, M., Caillon, A., Huang, Q., Jansen, A., Roberts, A., Tagliasacchi, M., Sharifi, M., Zeghidour, N., & Frank, C. (2023). MusicLM: Generating Music From Text (arXiv:2301.11325). arXiv. http://arxiv.org/abs/2301.11325

WEEK 8: ARTIFICIAL INTELLIGENCE III

xx/xx/24 AI-powered AU/VST plugin integration; training optimization; when to use a supercomputer, getting started with HiPerGator *(note for reviewers: will adjust for availability of high-powered computing resources at your institution)*

Required reading:

- Google Magenta Team. (2020, October 1). Tone Transfer — Magenta DDSP. Google Research. https://sites.research.google/tonetransfer
- UF Research Computing. (2022). From Zero to HiPerGator. In *Getting Started - UFRC*. Retrieved November 16, 2022, from https://help.rc.ufl.edu/doc/Getting_Started
- Future Music. (2022, January 28). 6 AI-powered intelligent plugins that could change the way you make music. *MusicRadar*. https://www.musicradar.com/news/6-ai-powered-intelligent-plugins-change-music
- Caillon, A., & Esling, P. (2021). RAVE: A variational autoencoder for fast and high-quality neural audio synthesis (arXiv:2111.05011). arXiv. http://arxiv.org/abs/2111.05011
- Garcia, H. F., Benetatos, C., Pardo, B., Aguilar, A., Cwitkowitz, F., & O'Reilly, P. (2023). HARP: Bringing Deep Learning to the DAW with Hosted, Asynchronous, Remote Processing. *audacitorch*. https://github.com/audacitorch/HARP

WEEK 9: INTELLECTUAL PROPERTY, COPYRIGHT, RESPONSIBLE DATA PRACTICES, AI ETHICS

xx/xx/24 Ownership of AI-generated artwork and code; responsible dataset construction, personality rights and consent, biometrics and privacy, climate impact of AI, algorithmic bias, government policy

Required reading:

- White House OSTP (2022). Blueprint for an AI Bill of Rights. *TheWhiteHouse.Gov*. https://www.whitehouse.gov/ostp/ai-bill-of-rights/
- Riofrancos, T. (2019, December 7). What Green Costs. *Logic*. https://logicmag.io/nature/what-green-costs/

- Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? 🦜. *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency*, 610–623. https://doi.org/10.1145/3442188.3445922
- Pulliam-Moore, C. (2023, November 18). SAG-AFTRA's new contract hinges on studios acting responsibly with AI. *The Verge*. https://www.theverge.com/2023/11/18/23962349/sag-aftra-tentative-agreement-generative-artificial-intelligence-vote
- David, E. (2023, September 21). Musicians are eyeing a legal shortcut to fight AI voice clones. The Verge. https://www.theverge.com/2023/9/21/23836337/music-generative-ai-voice-likeness-regulation
- Heikkilä, M. (2023, October 23). This new data poisoning tool lets artists fight back against generative AI. *MIT Technology Review*. https://www.technologyreview.com/2023/10/23/1082189/data-poisoning-artists-fight-generative-ai/

WEEK 10: PROTOTYPE WEEK

xx/xx/24 **CLASS 9:** presentation/workshopping of proof-of-concept for final projects
SDA 4 Due
SDA 5 Assigned

WEEK 11: PROCEDURAL MUSIC GENERATION I

xx/xx/24 History of algorithmic composition and computational creativity; common compositional algorithms; review of Pure Data; moving between different musical data structures in Pure Data and Python

Required reading:

- Arsenault, L. M. (2002). Iannis Xenakis's "Achorripsis": The Matrix Game. *Computer Music Journal*, *26*(1), 58–72. http://www.jstor.org/stable/3681400
- Gaskins, N. (2014). Hair Braiding is Technology. *Recess*. https://www.recessart.org/nettrice-gaskins-critical-writing/
- Cope, D. (2004). A Musical Learning Algorithm. *Computer Music Journal*, *28*(3), 12–27. https://doi.org/10.1162/0148926041790685
- Schlombs, C. (2022, December 8). Ada Lovelace's skills with language, music and needlepoint contributed to her pioneering work in computing. *The Conversation*. http://theconversation.com/ada-lovelaces-skills-with-language-music-and-needlepoint-contributed-to-her-pioneering-work-in-computing-193930
- Wang, L., Zhao, Z., Liu, H., Pang, J., Qin, Y., & Wu, Q. (2023). A Review of Intelligent Music Generation Systems (arXiv:2211.09124). arXiv. http://arxiv.org/abs/2211.09124

WEEK 12: PROCEDURAL MUSIC GENERATION II

xx/xx/24 Translating sonic data to other realms (video, lighting design, other immersive technologies) and vice versa; data sonification; accessibility and multimodality (incl. computer vision and haptics); data structures in Pure Data, Python, Arduino, and Processing/OpenCV
SDA 5 Due
SDA 6 Assigned

Required reading:

- Sawe, N., Chafe, C., & Treviño, J. (2020). Using Data Sonification to Overcome Science Literacy, Numeracy, and Visualization Barriers in Science Communication. *Frontiers in Communication*, 5, 46.
- Cairo, A., McGrory, H., & Rogers, S. (2019). TwoTone Data Sonification. *twotone.io*. https://twotone.io/about/
- TEDx Talks. (2017, July 17). Unnatural selection: Survival in the digital age | Sile O'Modhrain | TEDxLondonBusinessSchool. https://www.youtube.com/watch?app=desktop&v=ZrjHURQiffA
- Dixon, John & Tallon, Tina (2024). PIANISSIMO: An Educational Tool Using Sonification to Improve Accessibility of Spectroscopic Data. *Astronomy Education Journal.* (pre-print).

WEEK 13: MACHINE IMPROVISATION

xx/xx/24 Types of input streams; real-time and low-latency parametrization schema; higher-order learning schema; encoding memory
SDA 6 Due

Required reading:

- Surges, G., & Dubnov, S. (2013). Feature Selection and Composition using PyOracle. *Association for the Advancement of Artificial Intelligence*.
- Lewis, G. (2000). Too Many Notes: Computers, Complexity and Culture in "Voyager." *Leonardo Music Journal*, *10*, 33–39. https://www.jstor.org/stable/1513376
- Hall, E. T. R., & Pearce, M. T. (2021). A model of large-scale thematic structure. *Journal of New Music Research*, 50(3), 220–241. https://doi.org/10.1080/09298215.2021.1930062

WEEK 14: FINAL PROJECT PRESENTATIONS I

xx/xx/24 **CLASS 14:** Presentations

WEEK 15: FINAL PROJECT PRESENTATIONS II

xx/xx/24 **CLASS 15:** Presentations

(Note: weeks 14 & 15 dependent on size of class)