

Music Information Retrieval

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MPATE-GE 2623 Music Information Retrieval
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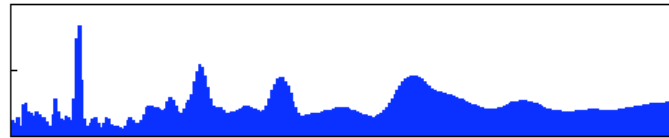
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- Personal webpage: <https://files.nyu.edu/jb2843/public/Home.html>
- This course: <http://www.nyu.edu/classes/bello/MIR.html>

Music Information Retrieval

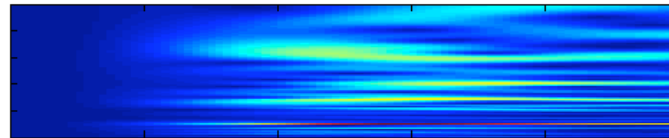
- Aims at extending the understanding and usefulness of **music data**, through the research, development and application of computational approaches and tools.
- Grounded in the combined use of theories, concepts and techniques from music, computer science, signal processing and cognition.
- **Music information:** bibliographical, surveys, tags, scores, MIDI, audio, etc.
- This course focuses on the analysis of audio signals (a very rich source of music information)
- Content or audio-based MIR? Music Signal Processing? Machine Listening?

For example ...

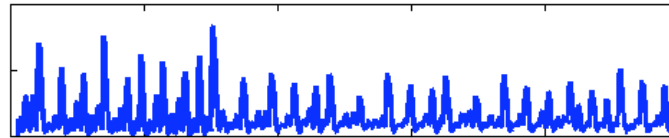
BPM histogram



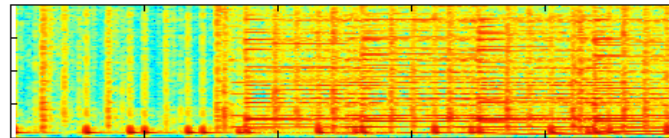
Tempogram



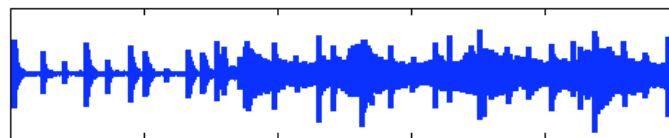
Detection Function



Spectrogram



Audio Signal



Electronica

Arousing

Fast

Folk

David Gray

Please Forgive me

Singer-songwriter

British

MIR Industry (a few examples)

- Audio Identification: [Shazam](#), [Gracenote](#)
- Score Following: [Rock Prodigy](#), [SmartMusic](#), [Rockband](#)
- Automatic Music Transcription: [Zenph](#)
- Recommendation, Playlisting: [Google Music](#), [Last.fm](#)
- Machine Listening: [Echonest](#) (BBC, MTV and many more)

MIR Research community

- Organized into the International Society for Music Information Retrieval and its conference (ISMIR)
- Last Conference: Utrecht, The Netherlands (<http://ismir2010.ismir.net/>)
- Next Conference: Miami, USA, October 24-28 (<http://ismir2011.ismir.net/>)
- Highly multidisciplinary: Library and Information Science, Computer Science, Music/Musicology, Electronic Engineering, Psychology, Law, etc.
- + Papers and sessions at ICASSP, NIPS, SMT, ICMC, SMC, DAFx, SIGIR

MIR Research community

- ISMIR home and mailing list: <http://www.ismir.net/>
- Cumulative list of **all** ISMIR papers: <http://www.ismir.net/all-papers.html>
- MIR-related PhD theses: <http://www.pampalk.at/mir-phds/>
- MIR Evaluation eXchange (MIREX): http://www.music-ir.org/mirex/wiki/MIREX_HOME
- Million Song Dataset: <http://labrosa.ee.columbia.edu/millionsong/>

Calendar: Lectures

- [Week 1-2](#) Time-frequency representations
- [Week 3](#) Novelty: onset detection
- [Week 4-5](#) Periodicity: pitch and beat tracking
- [Week 6](#) Low-level features: timbre analysis
- [Week 7](#) Harmony: alignment, chord and key recognition
- [Week 8](#) Structure: form analysis, segmentation
- [Week 9-10](#) Sound classification: autotagging, artist and instrument ID
- [Week 11-12](#) Similarity: fingerprinting, query-by-example, visualization

Assessment

- Assignments: 50% (best 5 out of 6): announced in class/website, due a week after posting, penalties will apply to delays of up to 2 days.
- Projects: 40% (groups of 2 + 2 from Entrepreneurship for the Music Industry)
 - Proposal (10.31) + presentation (10.28): 10%
 - Final project + presentation (12.19): 30%
- Class Participation: 10% (readings + discussions, attendance, interest and enthusiasm)

Calendar: Important dates Fall 2011

- 9.4 - Labour day
- 9.30 - (Friday 4-6pm) MBus/MTech meet and greet
- 10.10 - Columbus day
- 10.28 - (Friday 10am-2pm) MBus/MTech Innovation day
- 12.12 - (Wednesday on monday schedule) - Catch up
- 12.19 - Final project submission and presentation

Tutoring/Resources

- TA: Tae Min Cho (tmc323@nyu.edu), Tuesdays 3-5pm, Room 623
- TA: Jon Forsyth (jpf211@nyu.edu), Thursdays 3-5pm, Room 623
- USE THE OFFICE HOURS (Wednesdays 2-5pm)
- All relevant information is (or will be published) on the class website - Please read it carefully and keep checking for updates.

- <http://www.nyu.edu/classes/bello/MIR.html>

Recommended Reading

- Zölzer, U. (Ed.). “DAFx: Digital Audio Effects”. John Wiley & Sons (2003)
- Klapuri, A. and Davy, M. (Eds.) “Signal Processing Methods for Music Transcription”. Springer (2006)
- Müller, M. “Information Retrieval for Music and Motion”. Springer (2007)
- Smith, J.O. “Mathematics of the Discrete Fourier Transform (DFT)”. 2nd Edition, W3K Publishing (2007)
- Witten, I. and Frank, E. “Data Mining: Practical Machine Learning Tools and Techniques”. Morgan Kaufmann (2005)
- Further reading will be recommended as the course progresses.

To do

- INSTALL MATLAB ASAP!
- Matlab documentation, tutorials, examples: www.mathworks.com/access/helpdesk/help/techdoc/matlab.html
- Signal Processing Toolbox documentation, tutorials, examples: www.mathworks.com/access/helpdesk/help/toolbox/signal/
- Matlab file exchange: www.mathworks.com/matlabcentral/fileexchange/loadCategory.do
- START LOOKING FOR PROJECT TOPIC: Visit MIR Community links, talk to current members of the MARL-MIR group (meets wednesdays 10am in 6th floor conference room), Attend the Friday seminars.