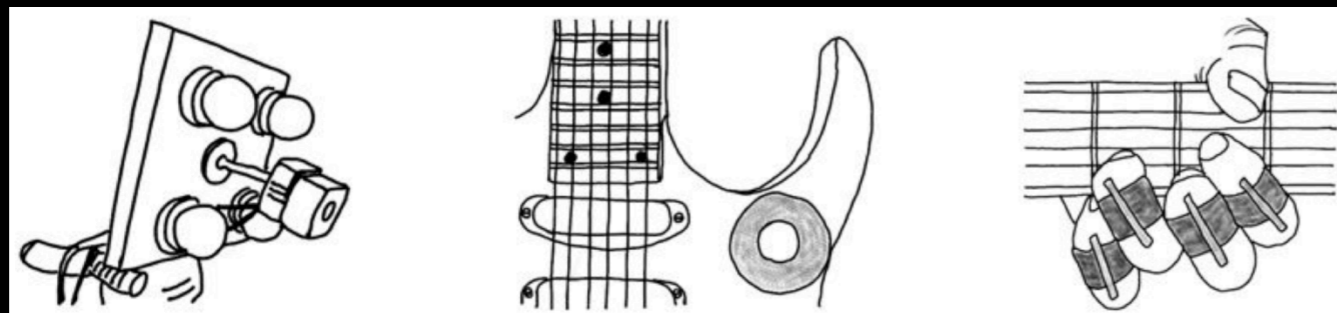
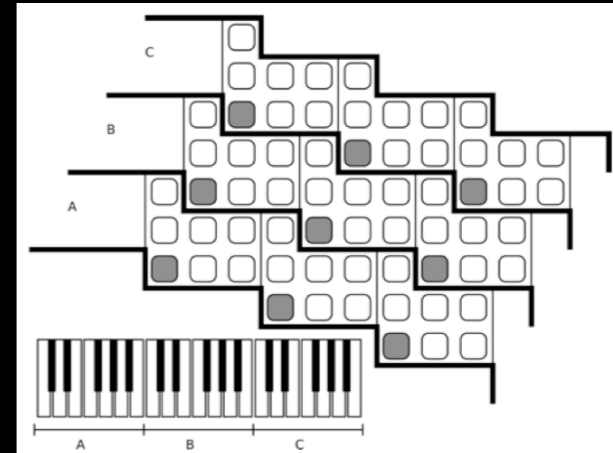
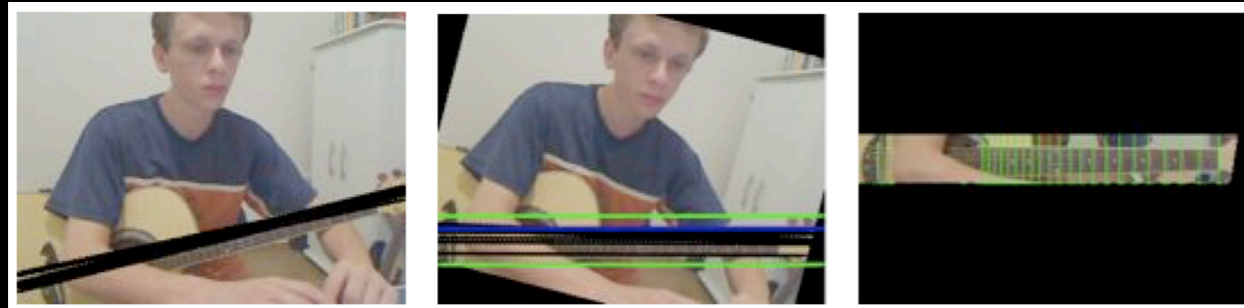
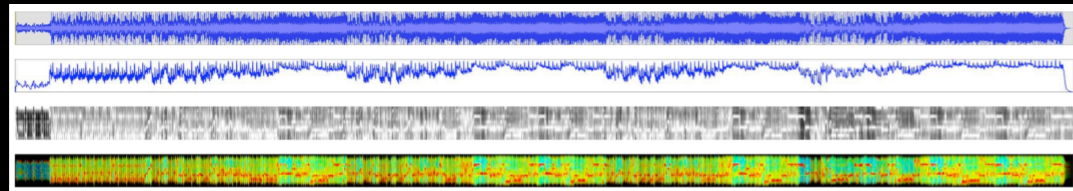


Code-Assisted Music Composition with Python and Logic Pro X

Marcelo Cicconet, IMPA, Feb 2019

Background



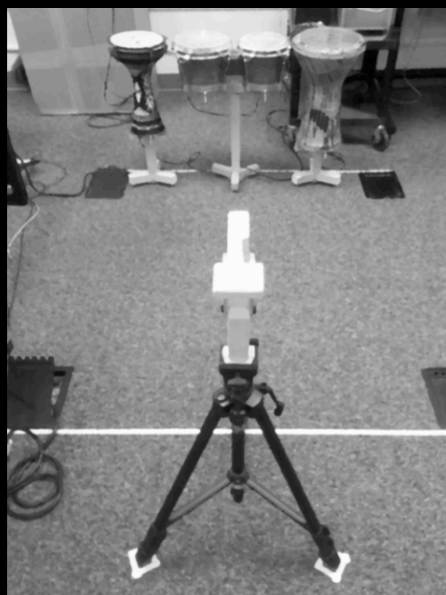
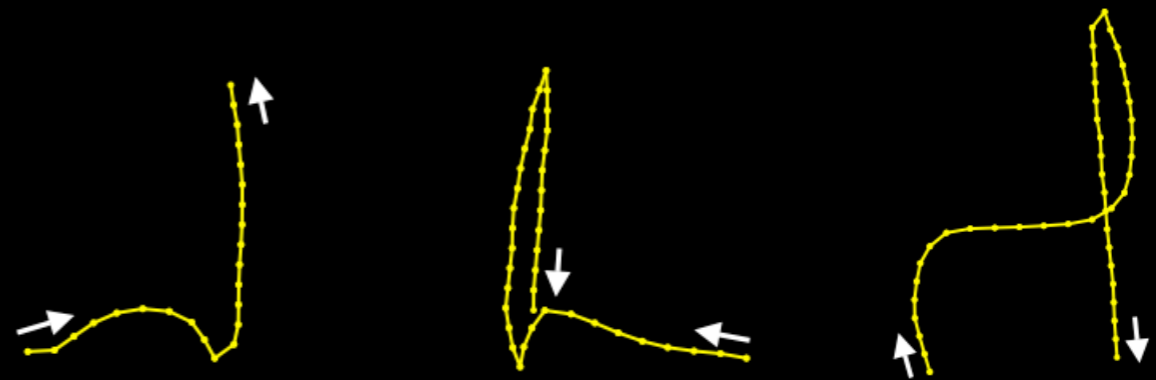
IMPA, 2007-2010

Background



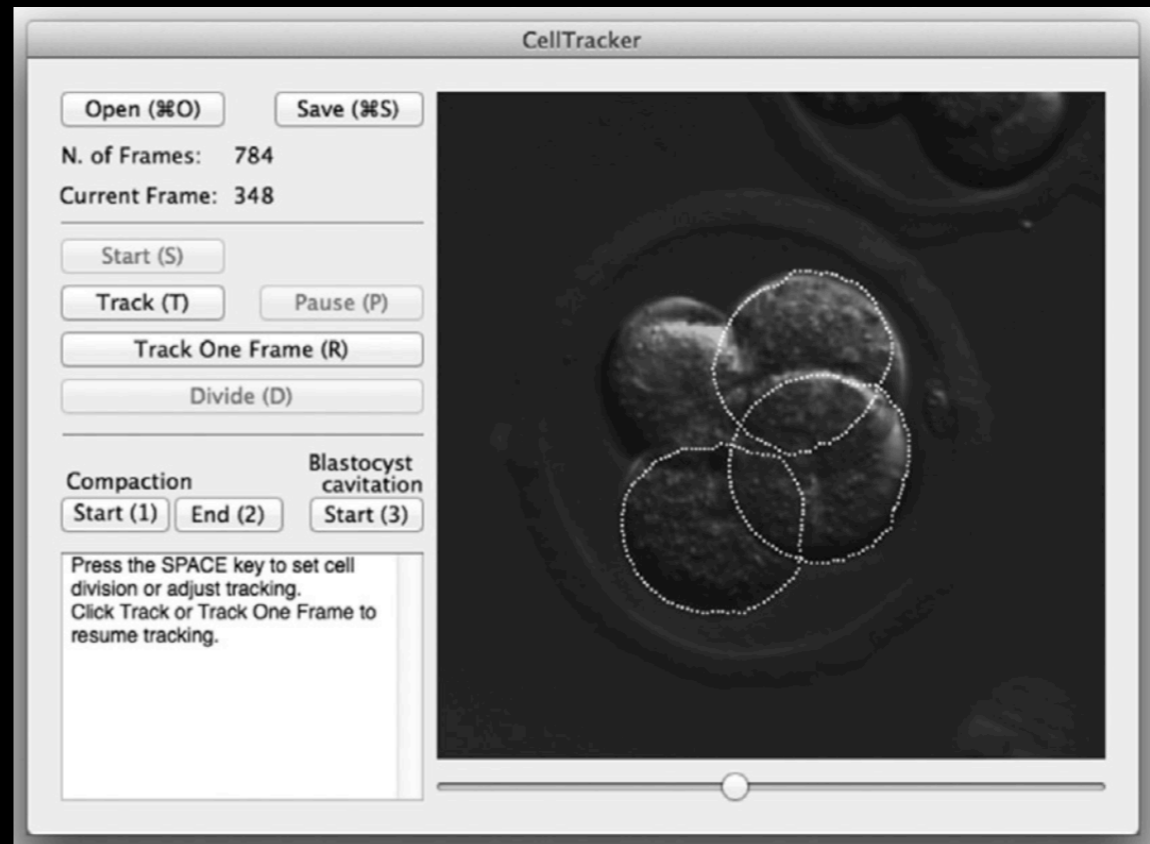
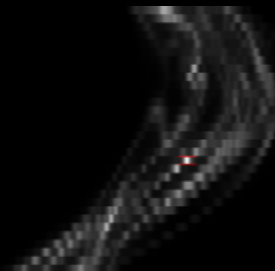
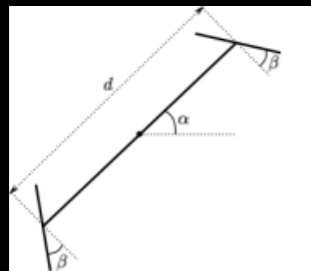
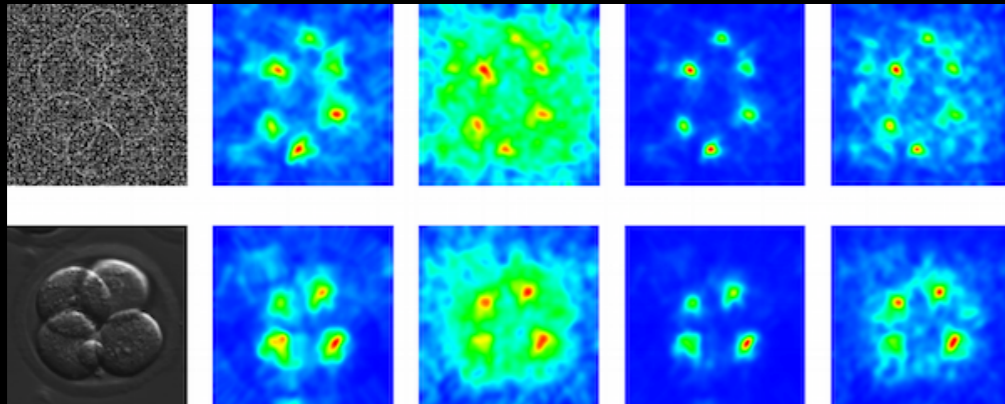
M. Cicconet, P.C. Carvalho
IVAPP 2010

Background



Georgia Tech, 2011

Background



NYU, 2012-2016

Meanwhile...

The screenshot displays a music production software interface with the following components:

- Top Bar:** Project name "Introspection - Detour - Tracks", tempo "140 KEEP", time signature "4/4", and key signature "B^b maj".
- MIDI Piano Roll:** Shows tracks 1 through 49. Tracks 32-34 and 46-48 contain MIDI notes labeled "Classi", "Deep", "Smart String", "Smart Strings", "Female Cha", and "Clas".
- EQ Control Panel:** Located at the bottom, showing a frequency response curve with a peak at 1k Hz. The x-axis is logarithmic, ranging from 20 to 20k Hz. The y-axis represents gain, ranging from -60 to +30 dB.
- Left Panel:** Contains track settings for "Boom - Pile Driver" and "Stereo Out", including options for Mute, Loop, Quantize, and various processing modules like Envelope, Compressor, and Limiter.

Goals

- Use known programming language to compose various musical elements
- Output to professional DAW for easy editing / production

Approach

- Python / Mido / Jupyter Notebook
- Logic Pro X / MIDI Input & Clock Synch

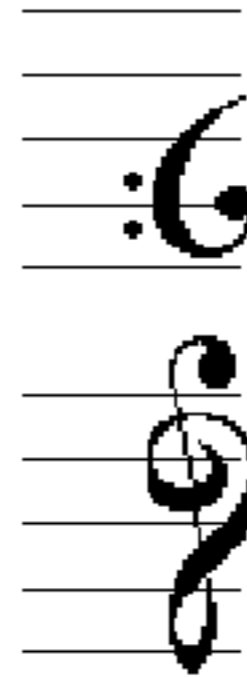
Result

The image displays a screenshot of a digital audio workstation (DAW) interface, showing a piano roll with various musical elements. The interface includes a top toolbar with options like 'Functions', 'View', 'Snap: Smart', and 'Drag: No Overlap'. The piano roll is organized into measures, with time markers at 1, 17, 33, 49, 65, 81, and 97. The piano roll contains several tracks, each with a list of instruments and their corresponding notes. The instruments listed on the left include: Outer...Synth, Orbiti...upiter, Plectrum Pad, Big Saw Bass, Metall...Tines, Boom...Driver, Impa...utura, Titani...them, Gran...Choir, Phant...Lead, Screamlead, Pop Strings, Big R...| Kick, Big R...Snare, Deep...(Soft), Deep...harp, Dept...Whip, and Deep Tech. The notes are represented by green rectangular blocks, with labels such as 'Pop String', 'Big Saw Ba', 'Seismic', 'Steinway G', 'Big Room', and 'Deep Tech'.

Instrument	Start Measure	End Measure	Label
Outer...Synth	49	97	Pop String
Orbiti...upiter	49	65	Pop String
Plectrum Pad	49	65	Pop String
Big Saw Bass	1	17	Big Saw Ba
Big Saw Bass	17	33	Big Saw Ba
Big Saw Bass	33	49	Big Saw Ba
Big Saw Bass	49	65	Big Saw Ba
Big Saw Bass	65	81	Big Saw Ba
Big Saw Bass	81	97	Big Saw B
Metall...Tines	65	81	Big Saw Ba
Metall...Tines	81	97	Big Saw B
Seismic	49	65	Seismic
Seismic	65	81	Seismic
Pop Strings	49	65	Pop String
Pop Strings	65	81	Pop String
Pop Strings	81	97	Pop String
Steinway G	65	81	Steinway G
Steinway G	81	97	Steinway
Steinway G	49	65	Steinwa
Steinway G	65	81	Steinway G
Steinway G	81	97	Steinway
Pop Strings	1	17	Pop String
Pop Strings	17	33	Pop String
Pop Strings	33	49	Pop String
Pop Strings	49	65	Pop String
Pop Strings	65	81	Pop String
Pop Strings	81	97	Pop String
Big R... Kick	33	49	Big Room
Big R... Kick	49	65	Big Room
Big R...Snare	49	65	Big
Big R...Snare	65	81	Bi
Big R...Snare	33	49	Big Room
Big R...Snare	65	81	Big Room
Big R...Snare	81	97	Big Room
Deep...(Soft)	33	49	Deep Tech
Deep...(Soft)	49	65	Deep Tec
Deep...(Soft)	65	81	Deep Tech
Deep...(Soft)	81	97	Deep Tech
Deep...harp	33	49	Deep Tech
Deep...harp	49	65	Deep Tec
Deep...harp	65	81	Deep Tech
Deep...harp	81	97	Deep Tech
Dept...Whip	33	49	Depth Cha
Dept...Whip	49	65	Depth Cha
Dept...Whip	65	81	Dept
Dept...Whip	81	97	De
Deep Tech	65	81	Deep Tec
Deep Tech	81	97	Deep Tech
Deep Tech	81	97	Deep Tech
Deep Tech	81	97	Deep Tech

MIDI

MIDI number	Note name	Keyboard	Frequency Hz	Period ms
21	A0		27.500	36.36
23	B0		30.868	32.40
24	C1		32.703	30.58
26	D1		36.708	27.24
28	E1		41.203	24.27
29	F1		43.654	22.91
31	G1		48.999	20.41
33	A1		55.000	18.18
35	B1		61.735	16.20
36	C2		65.406	15.29
38	D2		73.416	13.62
40	E2		82.407	12.13
41	F2		87.307	11.45
43	G2		97.999	10.20
45	A2		110.00	9.091
47	B2		123.47	8.099
48	C3		130.81	7.645
50	D3		146.83	6.811
52	E3		164.81	6.068
53	F3		174.61	5.727
55	G3		196.00	5.102
57	A3		220.00	4.545
59	B3		246.94	4.050
60	C4		261.63	3.822
62	D4		293.67	3.405
64	E4		329.63	3.034
65	F4		349.23	2.863
67	G4		392.00	2.551
69	A4		440.00	2.273
71	B4		493.88	2.025
72	C5		523.25	1.910
74	D5		587.33	1.703
76	E5		659.26	1.517
77	F5		698.46	1.432
79	G5		783.99	1.276
81	A5		880.00	1.136
83	B5		987.77	1.012
84	C6		1046.5	0.9556
86	D6		1174.7	0.8513
88	E6		1318.5	0.7584
89	F6		1396.9	0.7159
91	G6		1568.0	0.6378
93	A6		1760.0	0.5682
95	B6		1975.5	0.5062
96	C7		2093.0	0.4778
98	D7		2349.3	0.4257
100	E7		2637.0	0.3792
101	F7		2793.0	0.3580
103	G7		3136.0	0.3189
105	A7		3520.0	0.2841
107	B7		3951.1	0.2531
108	C8		4186.0	0.2389



J. Wolfe, UNSW

(Live Demo)

References / Influences

- EDM: Black Water, Genix & Sunny Lax, Anjunabeats Vol. 12
- Epic: Pegasus, Thomas Bergersen, Vanquish
- Logic / Dance Music: Armin van Buuren's Masterclass

Thanks!

- Track: <https://soundcloud.com/user-375018090/summerinrio>
- Code: <https://github.com/cicconet/JupyterLogic>