
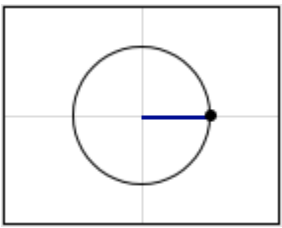
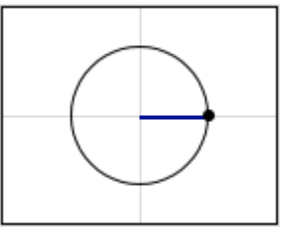
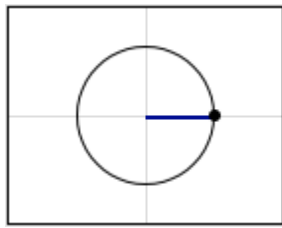
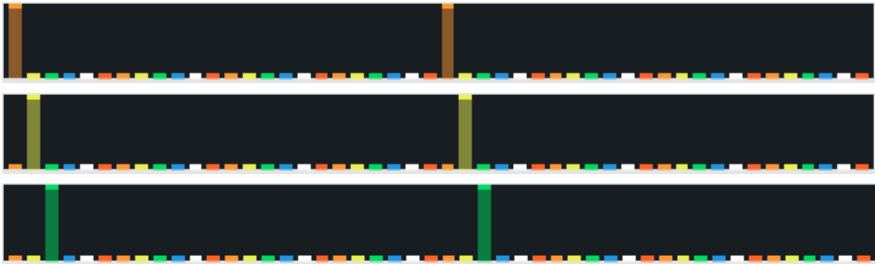
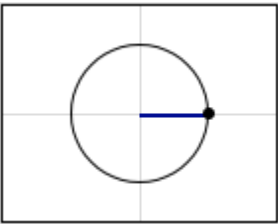
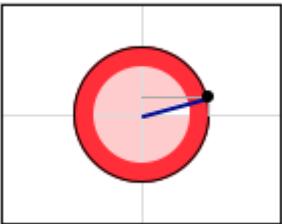
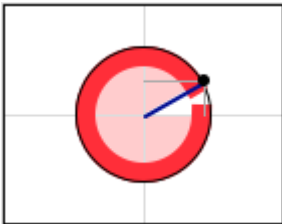
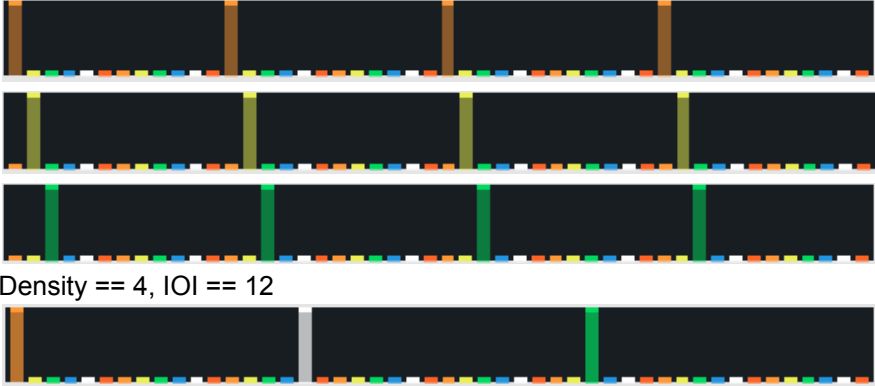
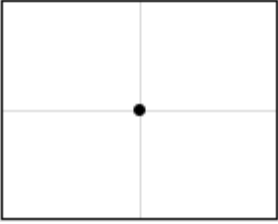
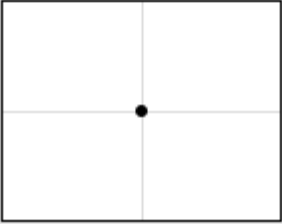
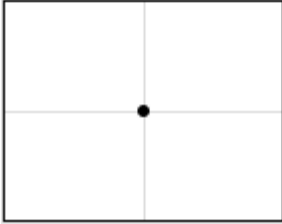

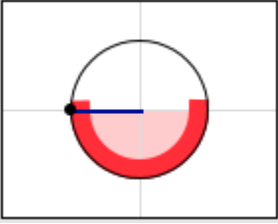


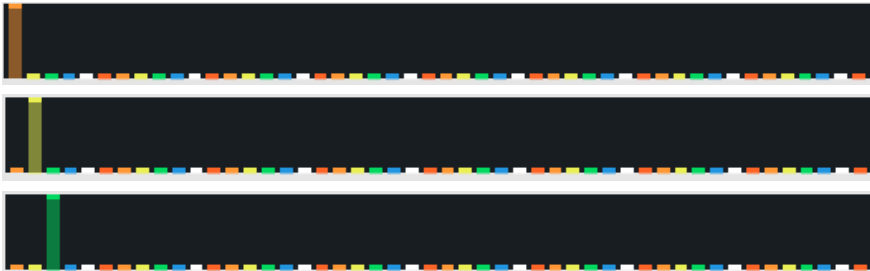

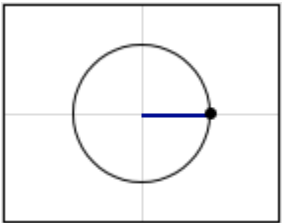
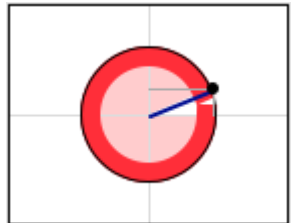
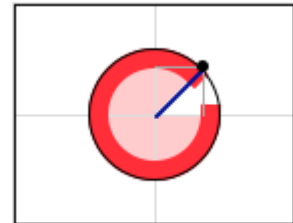
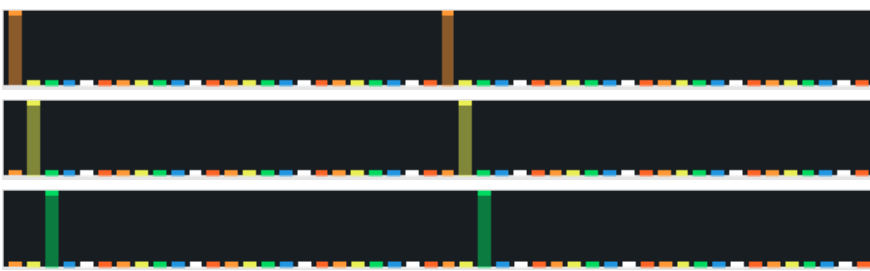
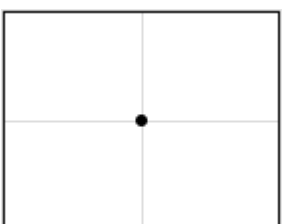
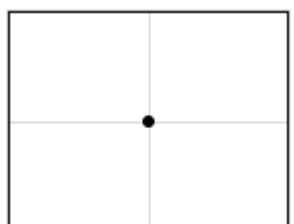
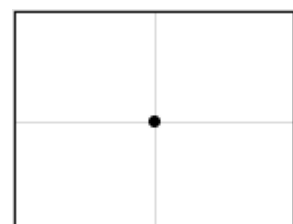
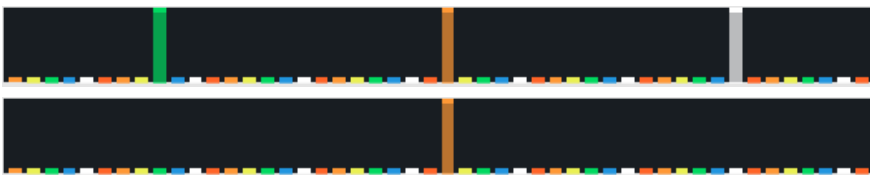
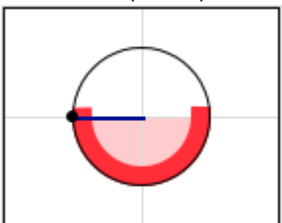
PLOTS of several DFT coefficients from periodic rhythms and their rotated version.

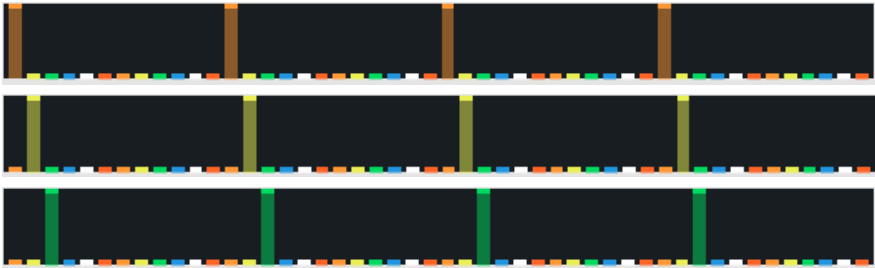
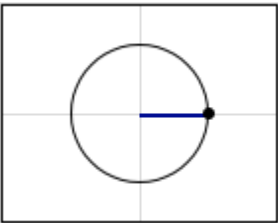
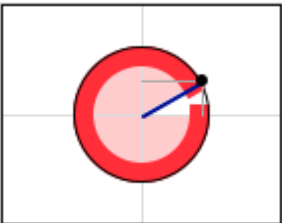
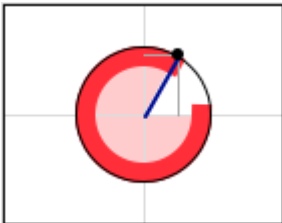
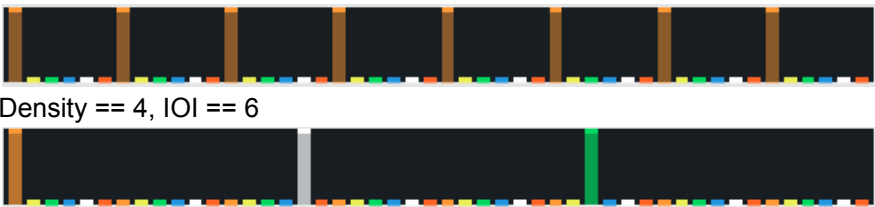
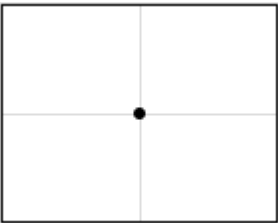
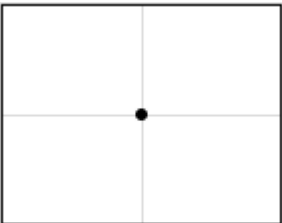
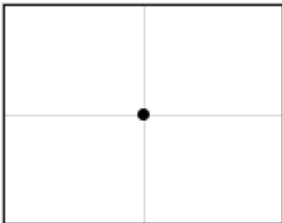

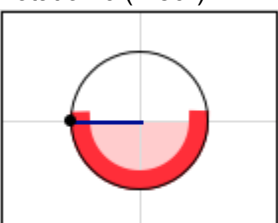
Observations:



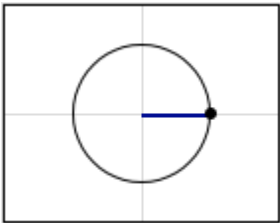
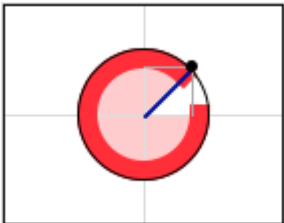
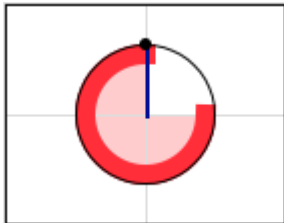


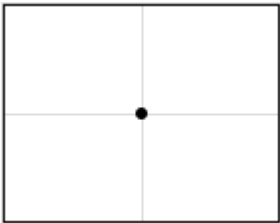
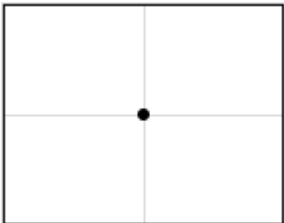
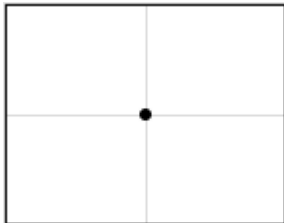

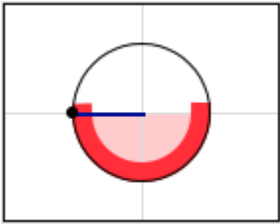
- Coefficient pair is computed by: $[coefIndex_{(r,i)} = index * 2]$
- All rhythmic patterns are periodic (always the same IOI), only density (number of onsets) varies.
- All rhythmic patterns have 48 pulses length, which comprises one bar. Why? Refer to research about binarization from Toussaint.
- DFT was normalised by dividing: $[normVector = bin0r / vector]$ and scaled to be adapted to LCD plotting coordinates.
- Change of density (number of onsets) doesn't affect the coefficient rotation.
- Pulses within each rhythmic pattern representation are grouped and color coded every 6 pulses: (1) orange, (2) yellow, (3) green, (4) blue, (5) gray/white, (6) red
- We only depict the first 3 rotations, all the remainder are multiples of the first one.
- Which coefficients are depicted? Computing the DFT on a vector with length 48 pulses results in 96 coefficients, we highlight the following which represent important musical subdivisions of the bar (from musical notation):
 $96/2/2/2/2 = 48, 24, 12, 6, 3$
 $96/3/2/2/2 = 32, 16, 8, 4, 2$
- What's the structure of each table? For each coefficient the 1st row represents the cases able to be captured by that coefficient, the 2nd row represents cases not captured by that coefficient, and the 3rd row represents exceptional cases.

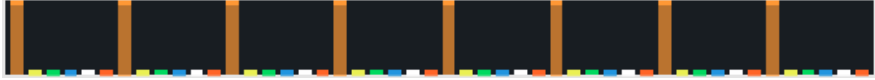
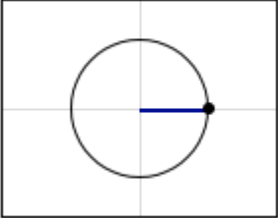
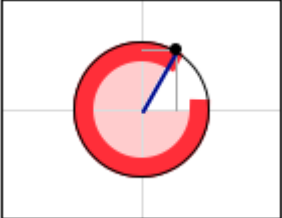
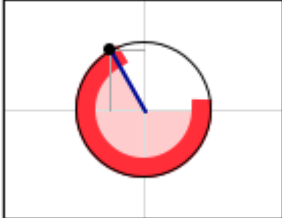


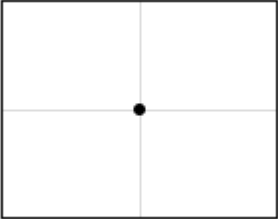
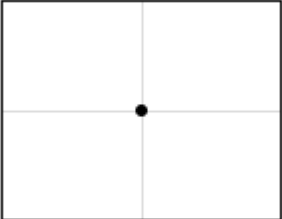
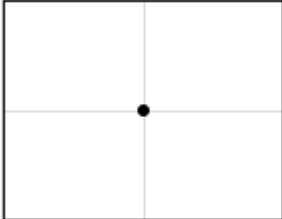

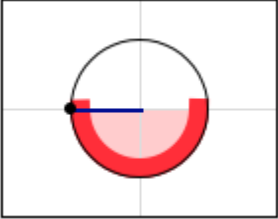
Coefficient pair #0 (r0, i1)	Rotation 0 (0°)	Rotation 1 (0°)	Rotation 2 (0°)
			

Rhythmic Figure #2 (Coefficient #2 r4, i5)	Rotation 0 (0°)	Rotation 1 (15°)	Rotation 2 (30°)
 <p>Density ≤ 2</p>			 <p>Rotation 0...23 $\neq 15^\circ$</p>
 <p>Density == 4, IOI == 12</p> <p>Density == 3, IOI == 16</p>	<p>Rotation 0</p> 	<p>Rotation 1</p> 	<p>Rotation 2</p>  <p>Rotation n...</p>
 <p>*special cases</p>	<p>Rotation 0 (-180°)</p> 	<p>*special case</p>	

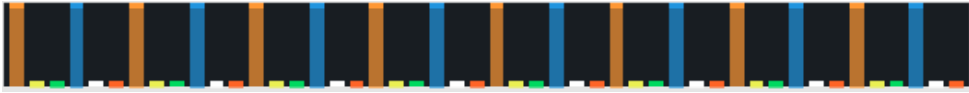
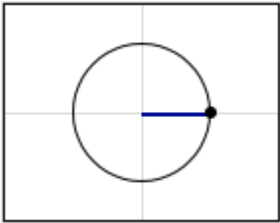
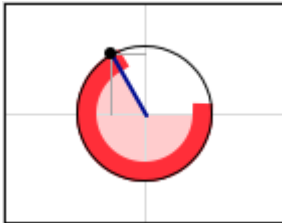
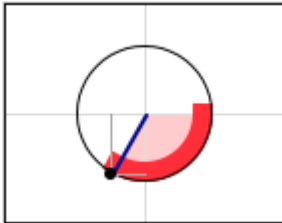

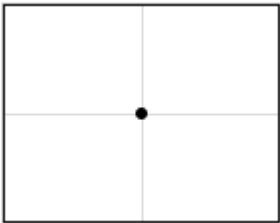
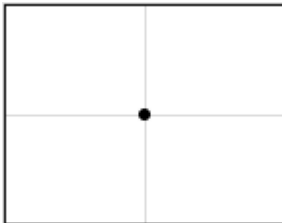
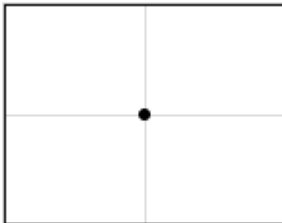
Coefficient pair #3 (r6, i7)	Rotation 0 (0°)	Rotation 1 (22.5°)	Rotation 2 (45°)
 <p>Density == 1, IOI == 48</p>  <p>Density <= 3, IOI >= 16</p>			 <p>Rotation 0...15 +=22.5°</p>
 <p>Density == 2, IOI == 24</p>	<p>Rotation 0</p> 	<p>Rotation 1</p> 	<p>Rotation 2</p>  <p>Rotation n...</p>
 <p>*special cases</p>	<p>Rotation 0 (-180°)</p> 	<p>*special case</p>	

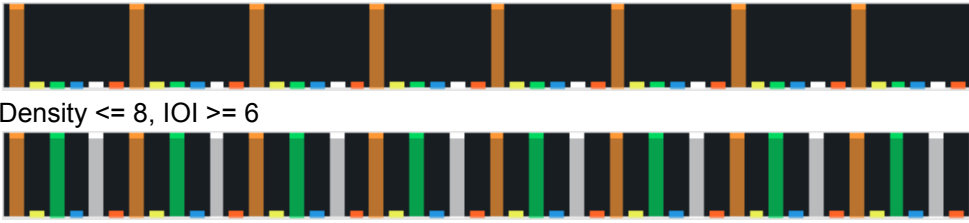
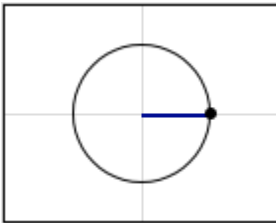
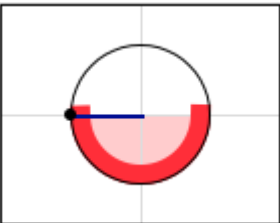
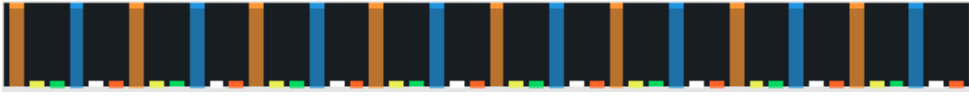
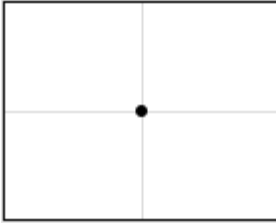
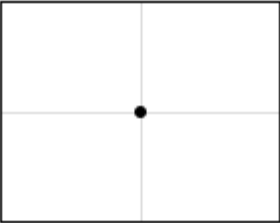
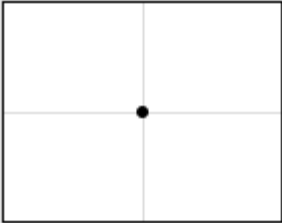
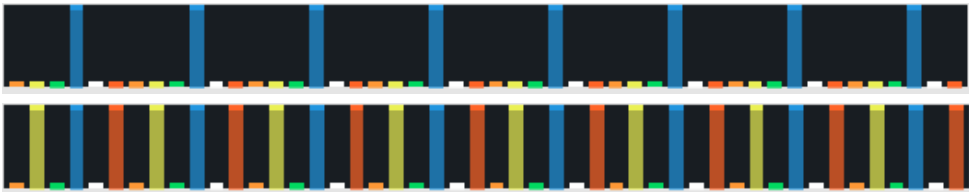
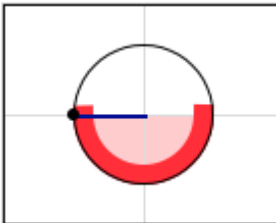
Coefficient pair #4 (r8, i9)	Rotation 0 (0°)	Rotation 1 (30°)	Rotation 2 (60°)
 <p>Density ≤ 4, IOI ≥ 12</p>			 <p>Rotation 0...11 $\neq 30^\circ$</p>
 <p>Density == 4, IOI == 6</p> <p>Density == 3, IOI == 16</p>	<p>Rotation 0</p> 	<p>Rotation 1</p> 	<p>Rotation 2</p>  <p>Rotation n...</p>
 <p>*special cases</p>	<p>Rotation 0 (-180°)</p> 	<p>*special cases</p>	


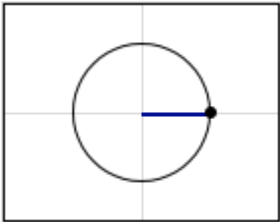
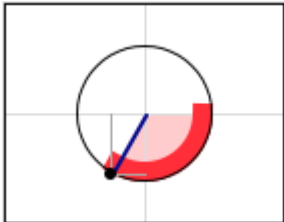
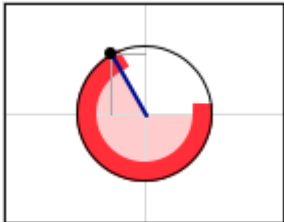

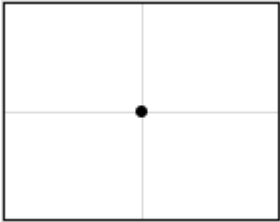
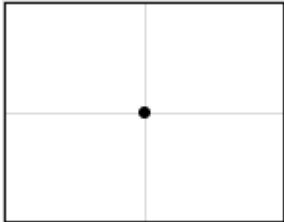
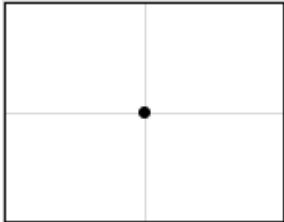
Coefficient pair #6 (r12, i13)	Rotation 0 (0°)	Rotation 1 (45°)	Rotation 2 (90°)
 <p>Density ≤ 2, IOI ≥ 24</p>  <p>Density ≤ 6, IOI ≥ 8</p>			 <p>Rotation 0...7 $\neq 45^\circ$</p>
 <p>Density $= 4$, IOI $= 12$</p>  <p>Density $= 12$, IOI $= 4$</p>	<p>Rotation 0</p> 	<p>Rotation 1</p> 	<p>Rotation 2</p>  <p>Rotation n...</p>
 <p>*special cases</p>	<p>Rotation 0 (-180°)</p> 	<p>*special case</p>	

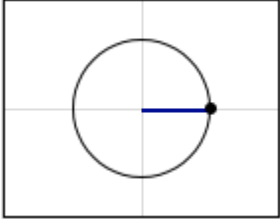
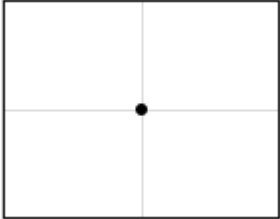
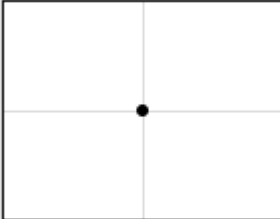
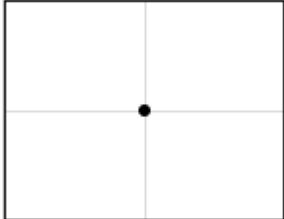
Coefficient pair #8 (r16, i17)	Rotation 0 (0°)	Rotation 1 (60°)	Rotation 2 (120°)
 Density ≤ 8 , IOI ≥ 6			 Rotation 0...5 $\pm 60^\circ$
 Density == 16, IOI == 3  Density == 3, IOI == 16	Rotation 0 	Rotation 1 	Rotation 2  Rotation n...
 *special cases	Rotation 0 (-180°) 	*special case	

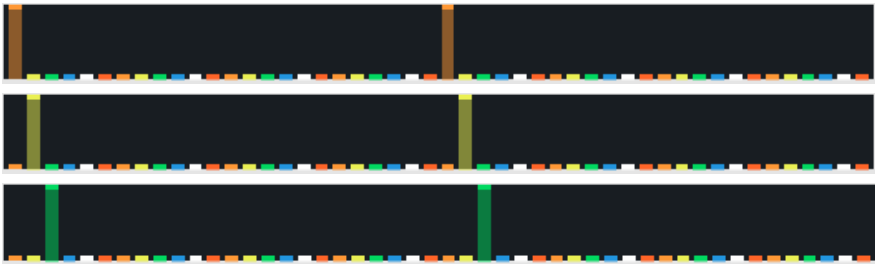
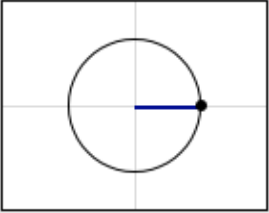
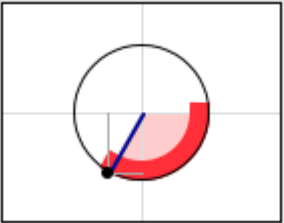
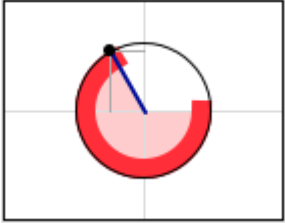
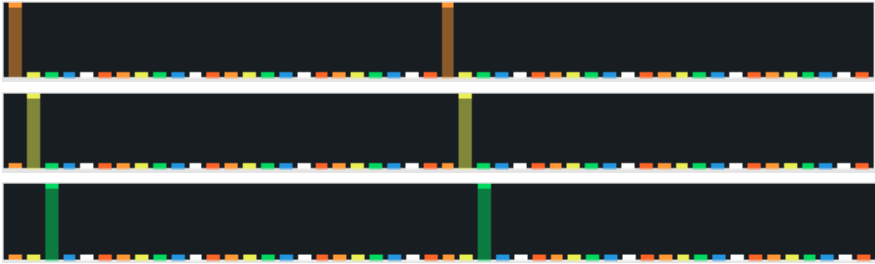
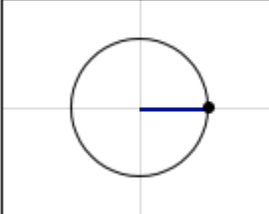
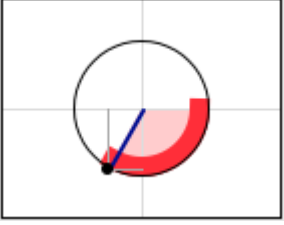
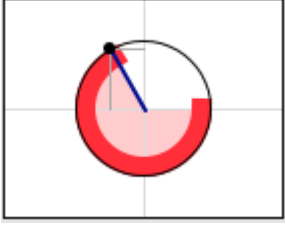
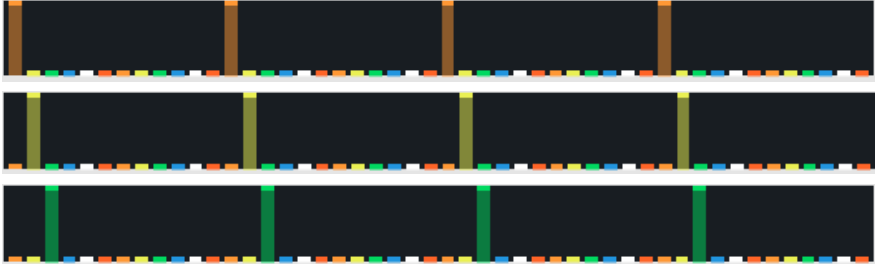
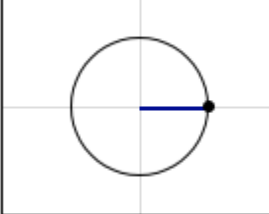
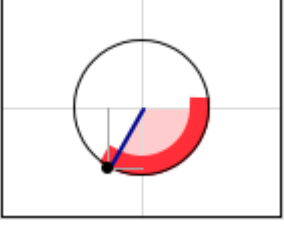
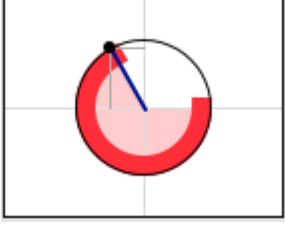
Coefficient pair #12 (r24, i25)	Rotation 0 (0°)	Rotation 1 (90°)	Rotation 2 (180°)
<div data-bbox="129 311 1086 399"></div> <div data-bbox="129 406 403 438">Density <= 4, IOI >= 12</div> <div data-bbox="129 438 1086 526"></div> <div data-bbox="129 534 403 566">Density <= 12, IOI >= 4</div>	<div data-bbox="1126 311 1400 534"></div>	<div data-bbox="1444 311 1713 534"></div>	<div data-bbox="1769 311 2049 534"></div> <div data-bbox="1758 542 2016 574">Rotation 0...3 += 90°</div>
<div data-bbox="129 662 1086 750"></div> <div data-bbox="129 758 403 790">Density == 16, IOI == 3</div> <div data-bbox="129 790 1086 877"></div> <div data-bbox="129 885 403 917">Density == 24, IOI == 2</div>	<div data-bbox="1126 662 1400 917"></div> <div data-bbox="1120 654 1243 686">Rotation 0</div>	<div data-bbox="1444 662 1713 917"></div> <div data-bbox="1433 654 1556 686">Rotation 1</div>	<div data-bbox="1769 662 2049 917"></div> <div data-bbox="1758 654 1881 686">Rotation 2</div> <div data-bbox="1758 925 1915 957">Rotation n...</div>
<div data-bbox="129 981 1086 1069"></div> <div data-bbox="129 1077 302 1109">*special cases</div> <div data-bbox="129 1109 1086 1197"></div>	<div data-bbox="1126 981 1400 1236"></div> <div data-bbox="1120 973 1332 1013">Rotation 0 (-180°)</div>	<div data-bbox="1433 973 1601 1013">*special case</div>	

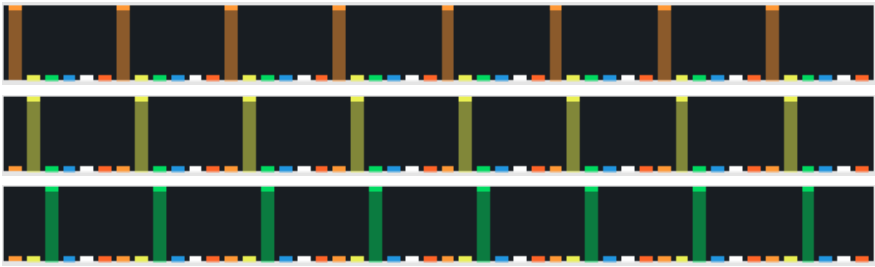
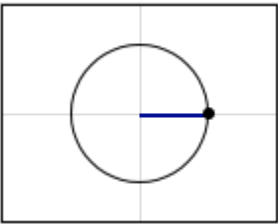
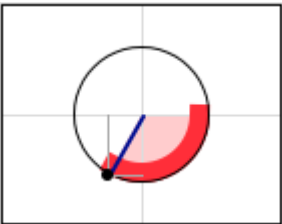
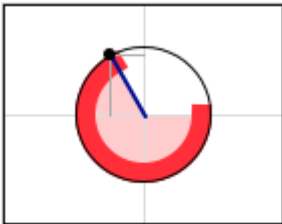
Coefficient pair #16 (r32, i33)	Rotation 0 (0°)	Rotation 1 (120°)	Rotation 2 (240°)
 <p>Density ≤ 16, IOI ≥ 3</p> <p>Density ≤ 12, IOI ≥ 4</p>			 <p>Rotation 0...2 $\neq 120^\circ$</p>
 <p>Density $\equiv 3$, IOI $\equiv 16$</p>	<p>Rotation 0</p> 	<p>Rotation 1</p> 	<p>Rotation 2</p>  <p>Rotation n...</p>
*special cases		*special case	

Coefficient pair #24 (r48, i49)	Rotation 0 (0°)	Rotation 1 (180°)	Rotation n
 <p>Density ≤ 8, IOI ≥ 6</p> <p>Density ≤ 24, IOI ≥ 2</p>			Rotation 0...1 $\neq 180^\circ$
 <p>Density == 16, IOI == 3</p>	Rotation 0 	Rotation 1 	Rotation 2  Rotation n...
 <p>*special cases</p>	Rotation 0 (-180°) 	*special case	

Coefficient pair #32 (r64, i65)	Rotation 0 (0°)	Rotation 1 (120°/240°)	Rotation (-120°/120°)
<div></div> <div>Density <= 16, IOI >= 3</div>	<div></div>	<div></div> <div>*</div>	<div></div> <div>Rotation 0...2 += 120° *I suspect this pattern wraps the circle around</div>
<div></div> <div>Density == 3, IOI == 16</div>	<div>Rotation 0</div> <div></div>	<div>Rotation 1</div> <div></div>	<div>Rotation 2</div> <div></div> <div>Rotation n...</div>
<div>*special cases</div>	<div>Rotation 0 ()</div>	<div>*special case</div>	

Coefficient pair #48 (r64, i65)	Rotation 0 (0°)	Rotation 1 (120°/240°)	Rotation (-120°/120°)
Density <= 16, IOI >= 3		*	Rotation 0...2 += 120° *I suspect this pattern wraps the circle around
Density == 3, IOI == 16	Rotation 0 	Rotation 1 	Rotation 2  Rotation n...
*special cases	Rotation 0 ()	*special case	

Coefficient pair 32 (r64, i65)	Rotation 0 (0°)	Rotation 1 (120°/240°)	Rotation 2 (-120°/120°)
			
			
			

Coefficient pair 32 (r64, i65)	Rotation 0 (0°)	Rotation 1 (120°/240°)	Rotation 2 (-120°/120°)
			
And so on... same pattern repeated on the circle.	And so on...	And so on...	And so on...