AlgoRhythm

A Library for Algorithmic Music Composition

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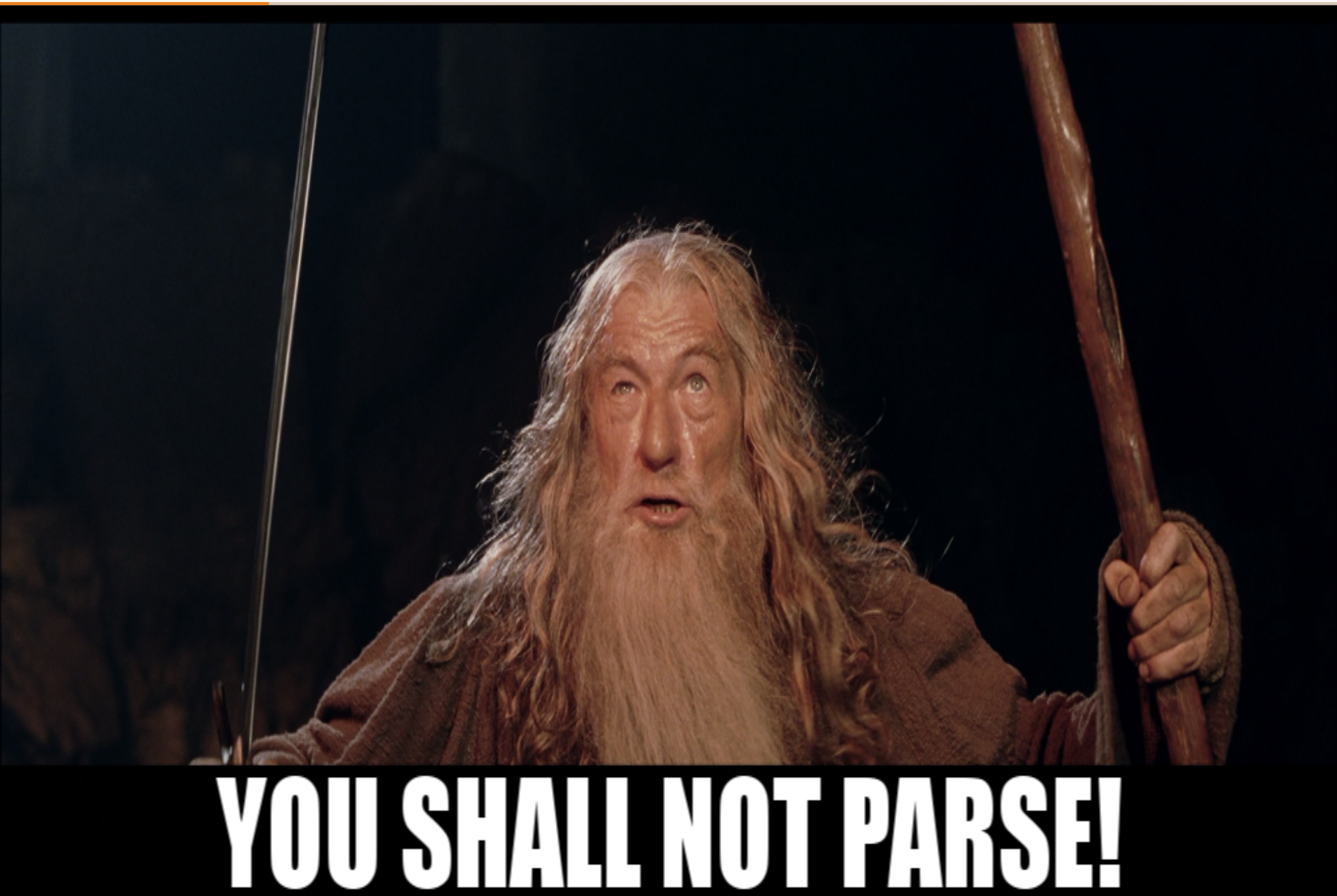
Music DSL

music representation (Music, MusicCore, Scale, Chord, etc...
music manipulation (transpose, retrograde, time-scale, etc...

Focus on Generation, Ignore Analysis



Generation

genState, selectors, diatonic improv, etc...

Dynamic Performance

k-means, etc...

Grammars

grammar description

Grammars: Tabla Rhythm

```
tabla :: Grammar () Syllable
tabla = S |:
  [ S |--> TE1 :-: XI
  , XI |--> TA7 :-: XD
  , XD |--> TA8
  , XG |--> TB2 :-: XA
  ...
  , TE4 |--> Ti :-: Rest :-: Dha :-: Ti
  , TC2 |--> Tr :-: Kt
  , TB3 |--> Dha :-: Tr :-: Kt
  , TD1 |--> Rest
  ...
  ]
instance ToMusicCore Syllable where
    ...
```

Grammars: Jazz Improvisation

```
melody :: Grammar () NT
melody = MQ |:
  [ -- Abstract Rhythm { MQ ~> Q }
    (MQ, 1, (== qn))      |-> Q%:qn
  , (MQ, 25, (> (hn^.)))  :-> \t -> Q%:hn :-: MQ%:(t - hn)
  ...
    -- Concrete Rhythm { Q ~> MN }
  , (Q, 47, (== wn)) |-> MN%:qn :-: Q%:hn :-: MN%:qn
  , (Q,  6, (== hn)) |-> HT%:(qn^^^) :-: HT%:(qn^^^) :-: HT%:(
  ...
  -- Abstract Melody { MN ~> N }
  , (MN, 1, (== wn)) |-> MN%:qn :-: MN%:qn :-: MN%:qn :-: MN%:
  , (MN,  1, (== qn)) |-> HT%:(en^^^) :-: HT%:(en^^^) :-: AT%:
    ...
  -- Concrete Melody { N ~> NT }
  , (N, 50, (== qn)) |-> ColorTone%:qn
  , (N, 45, (== qn)) |-> Rest%:qn
  , (N,  1, (== en)) |-> ApproachTone%:en
  ...
  ]

mkSolo :: Music SemiChord -> Music NT -> IO Melody
```

Grammars: Tonal Harmony

```
harmony :: Grammar Modulation Degree
harmony = I |:
  [ -- Turn-arounds
    (I, 8, (> wn)) :->
      \t -> Let (I%:t/2) (\x -> x :-: x)
  , (I, 6, (> hn) /\ (<= wn)) :->
      \t -> II%:t/4 :-: V%:t/4 :-: I%:t/2
  , (I, 2, (> hn) /\ (<= wn)) :->
      \t -> V%:t/2 :-: I%:t/2
  , (I, 2) -|| (<= wn)
    -- Modulations
  , (V, 5, (> hn)) :-> \t -> Modulation P5 $: I%:t
  , V -| 3
  , (II, 2, (> hn)) :-> \t -> Modulation M2 |$: I%:t
  , II -| 8
  ]

instance Expand Degree Modulation SemiChord where
    ...

voiceLead :: Music SemiChord -> IO (Music Chord)
```

Demo: Code

```
orientalAlgebras = do
  let ?harmonyConfig = HarmonyConfig
    { basePc   = A
    , baseOct  = Oct3
    , baseScale = arabian
    , chords   = equally allChords
    }
  let ?melodyConfig = defMelodyConfig
    { scales   = equally allScales
    , octaves = [(20, Oct4), (15, Oct5), (5, Oct6)]
    , colorWeight = 0
    , approachWeight = 10
    }
  let ?midiConfig = MIDIConfig (6%5) [Piano, Sitar, Tabla]
  let ?tablaBeat = sn

  (back, fore) <- integrate (12 * wn)
  rhythm <- runGrammar tabla (12 * wn) ()
  writeToMidiFile "out.mid" (dyn (back :=: fore :=: rhythm))
```

Demo: Music score