ambitus.py

A Python helper module for generating scales to be used with the Ambitus font

The Ambitus font provides a flexible means of generating simple musical diagrams, for example pitch ranges for vocalists, initial tunings for timpani or scales of any kind.

While the font is quite straightforward to use, building complex scales can be time-consuming. This module takes the legwork out of building different kinds of scales.

Importing the module

Not really much to it...

```
>>> import ambitus
```

Generating notes

You can generate `Note` objects by specifying its base (one of `CDEFGAB`), an optional accidental (`b` or `#`) and the octave (`1-6`). These are reflected in the `Note`s attributes `note`, `alt` (for alteration, negative values are flat, positive values are sharp), and `oct`.

```
>>> N = ambitus.Note("Cb4")
>>> N.note
'C'
>>> N.alt
-1
>>> N.oct
4
>>> print(N)
Cb4
>>> M = ambitus.Note("A#4")
>>> M > N                    # A#4 is higher than Cb4
True
>>> ambitus.Note("B3") < N  # enharmonically equivalent notes are not
considered identical
True
```

However, in general you don't need to generate notes individually, we want to build scales, after all!

Generating scales

Diatonic scales

The `diatonic()` function returns a list of `Note` objects that can later be fed into the glyph generator.

```
diatonic(scale="Major", startkey="C4", stopkey="")
```

The parameter `scale` can be set to one of the following values:

- `"Major"`
- `"Natural minor"`
- `"Harmonic minor"`
- `"Aeolian"`
- `"Locrian"`
- `"Ionian"`
- `"Lydian"`
- `"Dorian"`
- `"Phrygian"`
- `"Mixolydian"`
- `"Melodic minor"`
- `"Phrygian n6"`
- `"Lydian augmented"`
- `"Lydian dominant"`
- `"Mixolydian b6"`
- `"Locrian n2"`
- `"Altered dominant"`

`startkey` defaults to `"C4"` but can be set to any note between `Cb1` (C flat, first octave) and `"B#6"` (B sharp, 6th octave). For reference, `"C4"` is middle C.

The optional parameter `stopkey` can be set to a different note in the same range and determines where the scale will end. It defaults to the note exactly one octave above `startkey`. If you set `stopkey` below `startkey`, the scale will be constructed downwards (useful for minor scales, for example – harmonic minor for the ascending scale, melodic minor for the descending scale). If you choose a `stopkey` that isn't part of the scale (like `C#5` when building a C major scale from `C4`), scale construction will end before passing that note (`C5` in this example).

```
>>> ambitus.diatonic(scale="Aeolian", startkey="Bb4")
[Bb4, C5, Db5, Eb5, F5, Gb5, Ab5, Bb5]
>>> ambitus.diatonic(scale="Mixolydian", startkey="F#3", stopkey="C6")
[F#3, G#3, A#3, B3, C#4, D#4, E4, F#4, G#4, A#4, B4, C#5, D#5, E5,
F#5, G#5, A#5, B5]
```

Parameter names are optional:

```
>>> ambitus.diatonic("Phrygian", "D2")
[D2, Eb2, F2, G2, A2, Bb2, C3, D3]
```

Additional scales

Support for chromatic, halftone-wholetone, pentatonic, blues scales and possibly others is planned but not currently implemented.

Converting scales

After you have generated a scale (or any other list of `Note` objects), you can pass that list to the `build_glyphs()` function. It will return a string that can be copied and pasted into a word processor, music notation program or any other program that can display the Ambitus font.

```
>>> scale = ambitus.diatonic("Phrygian", "D2")
>>> print(ambitus.build_glyphs(scale, clef="bass"))
Bq-7:bq-6:q-5:q-4:q-3:bq-2:q-1:q:|
```

Result:

The `build_glyphs()` function takes several parameters:

```
build_glyphs(notes, clef="treble", head="q", stem=True, sep=":",
start="", end=":|")
```

- notes is the list of Note objects (required).
- clef can be any of "treble" (default), "bass", "alto", "tenor", "treble8" (for treble octave), "soprano", or "mezzosoprano". Note that Ambitus only supports glyphs up to three ledger lines off the standard staff, so if you try to write C2 in the treble clef, no glyph will be generated, and you'll see a warning message to that effect.
- head can be set to "q" for quarter notes (default), "h" for half notes, and "w" for whole notes.
- stem is True by default. If you set it to False, quarter or half notes will be printed without a stem.
- sep is the separator you want to use between notes. It defaults to ":" which is adequate for quarter and half note scales but may be a bit narrow for whole noted scales. Other separators include (in ascending width) "/", "?" and "_". A narrower separator ";" is also available, but probably too narrow unless your scales doesn't contain any accidentals.
- start can be any string you want to include between the clef and the start of your scale, for example, an additional separator.
- end is attached to the end of the string. It should contain at least one separator, and you may want to include a barline "|" for a single line, "||" for a double barline, and "|||" for an ending barline.

Examples

```
>>> scale = ambitus.diatonic()          # Simple example with default
parameters: C major
>>> print(ambitus.build_glyphs(scale))  # Default "rendering"
parameters: quarter notes with stems
Tq-6:q-5:q-4:q-3:q-2:q-1:q:q1:|
```



```
>>> scale = ambitus.diatonic("Locrian", "Cb4")
>>> print(scale)
[Cb4, Dbb4, Ebb4, Fb4, Gbb4, Abb4, Bbb4, Cb5]
>>> print(ambitus.build_glyphs(scale, sep="/", start=":"))
T:bq-6/bbq-5/bbq-4/bq-3/bbq-2/bbq-1/bbq/bq1:|
```

```
>>> scale = ambitus.diatonic("Mixolydian", startkey="F#3",
stopkey="C6")
>>> ambitus.build_glyphs(scale, head="w", sep="/", start=":",
end="/|||")
'T:#w-0/#w-9/#w-8/w-7/#w-6/#w-5/w-4/#w-3/#w-2/#w-
1/w/#w1/#w2/w3/#w4/#w5/#w6/w7/|||'
```
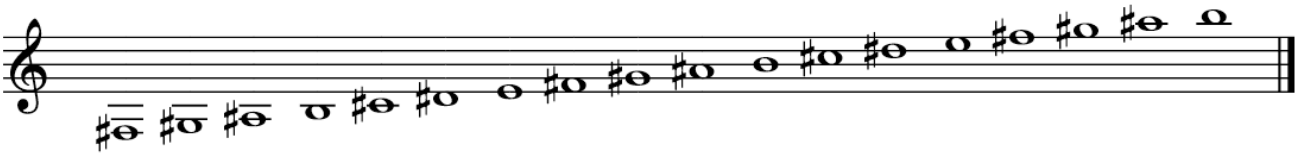


```
>>> scale = ambitus.diatonic("Lydian", "D4")
>>> print(ambitus.build_glyphs(scale, clef="alto", head="q",
stem=False))
Aq1s:q2s:#q3s:#q4s:q5s:q6s:#q7s:q8s:|
```


Interactive mode

If you run the module from the command line instead of importing it, you can build scales interactively.

Here's an example session:

```
> python ambitus.py
Welcome to Ambitus!
_____

The following scales are available:
 1: Major
 2: Natural minor
 3: Harmonic minor
 4: Aeolian
 5: Locrian
 6: Ionian
 7: Lydian
 8: Dorian
 9: Phrygian
```

```
  10: Mixolydian
  11: Melodic minor
  12: Phrygian n6
  13: Lydian augmented
  14: Lydian dominant
  15: Mixolydian b6
  16: Locrian n2
  17: Altered dominant

  Choose a scale or press <Enter> to quit: 1
  Begin scale at (default: C4)? A4
  End scale at or below (default: one octave above the beginning)? A6
  Scale:  [A4, B4, C#5, D5, E5, F#5, G#5, A5, B5, C#6, D6, E6, F#6, G#6,
  A6]
  Which clef should be used?
  TReble (default), BAss, ALto, TEnor, T8 (treble octave), SOprano,
  MEzzo: tw
  Invalid clef!
  Which clef should be used?
  TReble (default), BAss, ALto, TEnor, T8 (treble octave), SOprano,
  MEzzo: tr
  Choose separator (one of ;:/?_ (default ':')) /
  Choose notehead (one of q (default), h, w) h
  Remove stems (default: No)? y
  Any additional spacing in front of the scale (;:/?_ or leave blank)?
  Any additional characters at the end (default ':|')
  Note F#6 out of range for treble clef (Fb3-E#6)
  Note G#6 out of range for treble clef (Fb3-E#6)
  Note A6 out of range for treble clef (Fb3-E#6)
  Th-1s/hs/#h1s/h2s/h3s/#h4s/#h5s/h6s/h7s/#h8s/h9s/h0s:|

  Choose a scale or press <Enter> to quit:
  Exiting...
```

Result: