- **hint =** Humdrum command for identifying intervals between simultaneous notes in a score (**H**armonic **INT**erval). Sister program to mint.

copy Haydn quartet files to your local scores (or into your kernscores) directory:

cd ~/scores   # or   cd ~/kernscores
mkdir quartet
cd quartet
wget 'http://kern.ccarh.org/cgi-bin/ksdata?l=/musedata/haydn/quartet&format=zip'-O haydn.zip
unzip haydn.zip
rm haydn.zip
mv quartet haydn
cd haydn

What are the most common sonorities in the quartets?:

hint –l *.krn | rid –GLId | egrep –v "=|r" | sort | uniq –c | sort –nr | less

-l option (L note "one") in hint measures intervals from lowest note.

How many unique sonorities are present? How many total sonorities are there? What is the ratio of unique to total sonitories?

Do the same with Mozart's quartets:

cd ~/scores/quartet
wget 'http://kern.ccarh.org/cgi-bin/ksdata?l=/musedata/mozart/quartet&format=zip' –O mozart.zip
unzip mozart.zip
mv quartet mozart
cd mozart

Do the same with Beethoven's quartets:

cd ~/scores/quartet
wget 'http://kern.ccarh.org/cgi-bin/ksdata?l=/users/craig/classical/beethoven/quartet&format=zip' –O b.zip
unzip b.zip
mv quartet beethoven
cd beethoven

How does the ratio of unique sonorities versus total soniorities differ between these three composers?
                Haydn: 3.38%   Mozart: 4.59%   Beethoven: 7.85%

- **ditto** = fill in meaning of null token.
  ditto *.krn | hint –l | rid –GLId | egrep –v "=|r" | wc -l
  ditto *.krn | hint –l | rid –GLId | egrep –v "=|r" | sort | uniq | wc -l
         Haydn: 6.16%   Mozart: 8.82%   Beethoven: 13.54%

- **tsroot** = Humdrum interface to the Melisma Music Analyzer harmonic analysis tools (http://www.link.cs.cmu.edu/music-analysis/).

  cd ~/scores/quartet/beethoven

  tsroot –r quartet01-1.krn > q01-1.analysis
  extract –f1 q01-1.analysis | rid –d > chord-sequence.hrm

- **harm2kern** = Convert **harm data into **kern data

  sed 's/tsharm/harm' chord-sequence.hrm | harm2kern –a | less

- **sonority** = Similar to hint, but identifies chord labels for non-dissonant sonorities.

What types of chordal sonorities are most common in Beethoven piano sonatas?

http://kern.ccarh.org/cgi-bin/ksdata?l=/users/craig/classical/beethoven/piano/sonata&format=zip

sonority –f "t:i" *.krn | less | rid –GLId | egrep –v "=|r" | sort | uniq –c | sort –nr | less

How does this compare to the chordal sonorities in the Beethoven quartets?

Number of times Beethoven uses an Italian 6th chord in the piano sonatas:
    sonority –t *.krn | grep italian | wc –l

How many times do augmented 6th chords occur in the Beethoven quartets?
    sonority –t *.krn | rid –GLId | grep –v = | sort | uniq –c
How many times do augmented 6th intervals occur in Beethoven quartets?
    ditto *.krn | hint –a | rid –GLId | grep A6 | wc -l

- **context** = useful for examining sequential data syntax.

context –n 2

What are the most common transitions between two sonorities?:

(echo "**data"; (hint –l | rid –GLId | egrep –v "=|r|-") | sed 's/$/,/'; echo "*-") | context –n 2 \
    | rid –GLId | sort | uniq –c | sort –nr | less