

- **hgrep** == Humdrum grep: searches for regular expressions with a knowledge of the Humdrum file format and ****kern** rhythmic information.

Options: -k = search only ****kern** spines (ignore data in non-****kern** spines)
 -d = search data only (not interpretations, measure markers, local comments)
 -l = show only names of files which have match
 -n = list the line on which the match occurs
 -m = list the measure on which the match occurs
 -b = list the beat on which the match occurs
 -a = list the absolute beat on which the match occurs
 -f = list the fractional position of the match in relation to the total duration of file.
 -q = quiet mode: don't print matching line

cd ~/scores/bach/371chorales

List all of the occurrences of a low C (C2) in the chorales:

```
hgrep -kd CC *.krn
```

How many times does this note occur?

```
hgrep -kd CC *.krn | wc -l
```

Which chorales have this note:

```
hgrep -kdl CC *.krn
```

How many chorales have this note:

```
hgrep -kdl CC *.krn | wc -l
```

On what measure/beat does the note occur:

```
hgrep -kdm CC *.krn | sed 's/./:/'
```

What is the most common beat that this note starts on:

```
hgrep -kdbq CC *.krn | sort | uniq -c | sort -nr
```

What is the absolute beat (number of quarter notes from the start) of this note:

```
hgrep -kdaq CC *.krn | sort | uniq
```

Where is the pitch located relative to the total duration of the musical data:

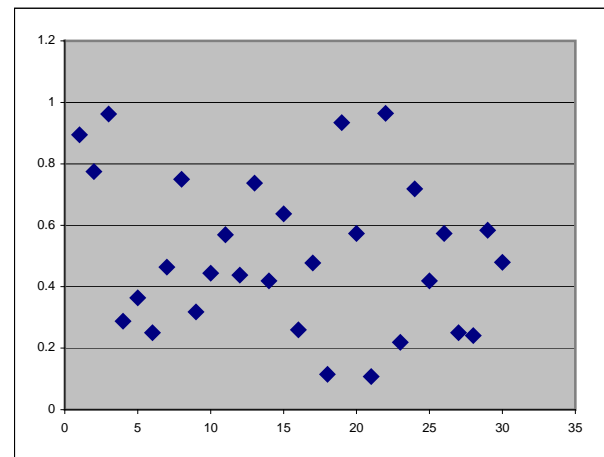
```
hgrep -kdfq CC *.krn
```

Does the note occur near the start, middle or end of the musical data?

0.51 +/- 0.25

What is the most common sonority which occurs at the start of beat 1:

```
for i in *.krn;
do
    sonority -ta $i | hgrep -bdq "."
done | grep "beat 1:" | sort | uniq -c | sort -nr
```



2421 maj
 1233 min
 494 X
 245 minmin
 199 domsev
 139 halfdim
 97 dim
 87 minminx5
 46 majmaj
 44 incmin
 43 incmaj
 42 rest
 33 fullydim
 17 aug
 16 domsevx5
 6 note

Where in the meter are major-chord sonorities likely to occur:

```
for i in *.krn
do
    sonority -ta $i | hgrep -bq -x “**qual” “^maj$”
done | sort | uniq -c
```

How about minor chords? Dominant sevenths (domsev)?

- **sample** == sample the musical sonorities in a rhythmic pattern.

Sample the musical texture at every 8th-note:

```
sample -r 8 chor001.krn
```

Sample with a rhythmic cycle:

```
sample -r”4. 8” chor001.krn
```

Sample the musical texture at every 8th-note, removing duplicate successive sonorities:

```
sample -r 8 chor001.krn | uniq
```

Remove most non-triadic sonorities:

```
sample -r 8 chor001.krn | uniq | sonority -ta | grep -v X
```

[Slow tempo by half by changing *MM100 to *MM50]

Remove all non-triadic sonorities (except dominant 7th):

```
sample -r 8 chor001.krn | uniq | sonority -ta | \
egrep -v “minm|majm|X|inc” | sed ‘s/MM100/MM50/g’
```

- **gettime** == measure the performance time given the indicated tempo.

Measure the timing of notes from the start of a (straight) performance:

```
gettime -p chor001.krn
```

Calculate the time in seconds which the file would be performed at default tempo:

```
gettime -T chor001.krn
```

How long would it take to play all chorales without repeats at specified tempo?

```
gettime -T chor???.krn
```

Which one takes shortest time?

```
gettime -T chor???.krn --simple | sort -t ‘ ‘ -k2 -n | head -n 1
```

Which one takes the longest time?

```
gettime -T chor???.krn --simple | sort -t ‘ ‘ -k2 -nr | grep chor | head -n 1
```

- **swing** == Jazz up Bach.

Delay the offbeats:

```
swing chor001.krn
```

Swing even more:

```
swing -p 70 chor001.krn
```

Listen to the swing:

```
swing chor001.krn | time2tempo -p > swing001.krn
```

Then in a file called .midi in a kernscores directory, place the hum2mid option:

```
--ts          or          --tempo-spine
```