

## Pitch\_5\_0\_0.praat

### Task:

The PRAAT script ‘Pitch\_<version>\_<revision>\_<bugfix>.praat’ computes (mean) pitch values of all files in a directory for specified intervals.

The script computes the pitch of all sound files in one directory/folder. For each file it reports the pitch data of intervals that can be specified in various manners. The data can be reported in Hertz, ERB,<sup>1</sup> or semitones,<sup>2</sup> or other units the user can specify inside the script. The data can be the pitch values for the edges and/or centers of an interval, the arithmetic mean (average), standard deviation, median and any other quantiles defined by the user (e.g. minimum, maximum, 2.5% percentile). The results are stored in a tab-delimited text file (the delimiter can be changed in the script) with a unique name ‘pitch\_results\_<date>\_<time>.txt’.

The script reports missing values (“- undefined -“ in PRAAT) with a “NA” or any other symbol that can be set inside the script (e.g. to “.”). Additionally, there is the possibility to generate a dummy header line of data to force automatic data-type detection in JMP (or any other spreadsheet or statistics program) to set the correct data type for each column.

Note, that the pitch algorithm of PRAAT moves with a fixed step rate (default in this script: 5 ms) across the signal; i.e., there is actually not a pitch value for every point in time but rather for a certain stretch of time the same pitch value is used. Taking the value ‘at a point in time’ is done in PRAAT by interpolating (i.e. averaging) the value from the neighbouring frames. As a consequence, taking the median or mean will often lead to the same pitch value as taking it at a point in time. For details on the computation of pitch values for intervals, and why it might be different from your interactive measurements, see the file **Pitch\_notes.pdf**.

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<sup>1</sup> Equivalent Rectangular Bandwidth

<sup>2</sup> With respect to 1 Hertz. The absolute semitone values depend on this reference frequency (1 Hertz), but relations between values are independent of the reference frequency and give identical contours / relations.

### Parameters:

The default form window at the beginning of the script shows only some of the parameters that control the behaviour of the script (the form window is designed to be able to be displayed on a screen with 1024 vertical pixels). The other parameters can be set inside the script, or put into the form window (or parameters in the form window that are not changed can be put inside the script).

The screenshot shows a dialog box titled "Run script: Pitch parameters (Vers. 5.0):". The dialog contains several input fields and options, each with a callout label pointing to it:

- Directory path:** A text input field at the top, currently empty.
- Tier number to be analysed:** A text input field labeled "Tier:" containing the value "1".
- Specification of labels:** A text input field labeled "Label:" containing a period ".".
- Methods to report pitch:** A text input field labeled "Measurements:" containing the string "i,c,m,0,50".
- Lowest pitch values:** A text input field labeled "low F0:" containing the value "75.0".
- Highest pitch values:** A text input field labeled "high F0:" containing the value "500.0".
- Reporting of skipped intervals:** A group of radio buttons with the label "Report skipped intervals:". The "Length or Intensity exclusion" option is selected.

At the bottom of the dialog are four buttons: "Standards", "Cancel", "Apply", and "OK".

Please read the **Programming** section for more internal parameters that can easily be changed.

**Directory path:**

The script handles all sound files in a directory specified in this field. If this field is left empty, the script will handle all sound files in the directory where the script was started (i.e., the script is placed in the same directory as the sound and TextGrid files). If not a single TextGrid can be found, the whole file will be taken as one interval.

**Tier number to be analysed:**

The number of the interval tier to be analysed. If this is set to “0” the whole file will be taken as one interval.

**Specification of labels:**

The intervals that should be analysed can be specified in several ways (in case the whole file is taken as one interval, this field is ignored):

**<label>:**

Giving a label (e.g. a: ) or a list of labels separated by commas or spaces (e.g. i:,I u:,U ) will only report intervals that have this label. This function is case sensitive. Note that labels may not include spaces or underlines in the present version.

**<list>.txt:**

Giving a text file (e.g. label\_list.txt ) will report all intervals that are listed on a line-by-line basis in a raw text file (not a Word or Pages file). Note that the extension .txt must be given in this field. Example of such a text file:

```
a
a:
ae
O
good
```

**‘.’:**

Using a dot ( . ) will report values for every labelled interval.

**empty:**

Leaving this field empty will report values for all labelled and unlabelled intervals.

**Methods to report pitch:**

This is a string, separated by commas, that define what will be reported:

**‘c’ (Center of an interval):**

The middle of each interval specified by **Specification of labels** will be reported. If no TextGrid file is found, the center of a sound file will be used.

**‘e’ (Report data from the left and right edges):**

The edges each interval specified by **Specification of labels** will be reported. If no TextGrid file is found, the center of a sound file will be used.

**‘i’ (Report mean intensity of intervals):**

The intensity mean of the analysed intervals can be reported in the result file. Additionally, a minimal intensity (by default 40dB, c.f. **Programming**) criterion must be met.

**‘m’ (Report means and standard deviation of a interval):**

Setting this switch will report the mean and standard deviation of each interval selected by **Specification of labels**. If no TextGrid file is found, the whole sound file will be used.

**<numerical values> (Specification of quantiles to be reported):**

Quantiles (actually percentiles) of an interval will be reported by specifying values separated by commas or spaces. Values must be given as percentages between 0 and 100. The program will always makes the reporting symmetrical to the lower and upper quantile range. For example, a specification like. 0, 2.5, 10, 50 will report the Minimum (0%), 2.5%, 10%, Median(50%), 90%, 97.5%, and Maximum(100%) quantiles. If no TextGrid file is found, the whole sound file will be used.

**Reporting of skipped intervals:**

Handling of intervals which are excluded by the **Specification of labels:**

**All:**

All intervals excluded from the computations are reported with File, Label, Start(s) and Duration(ms) only (see **Result file** below), all other values are set to the missing value symbol (see below). This function can be helpful to see the context of a particular interval analysed.

**Length of intensity exclusion:**

By default, the minimal length of an interval to be analysed must be 25 ms (see **Programming** to change this criterion). Additionally, the **intensity** setting (see above) can lead to intervals not being analysed.

**None:**

No intervals that are excluded are reported.

**Result file:**

The script generates a raw text file with tab-delimited data and a header line. The file name is of the form “pitch\_results\_<date>\_<time>.txt” with <date> of the form ‘yymmdd’ (i.e. 2-digit year, 2-digit month, 2-digit day) and <time> of the form ‘hhmmss’ (i.e. 2-digit hour in 24 hour format, 2-digit minutes, 2-digit seconds). For example, a file with the name “pitch\_results\_190322\_150110.txt” was created on the 22nd of March 2019 at 3pm, 1 minute and 10 seconds.

The parameters controlling the computation are listed at the end of every result file.

The results will also include the percentage of voicing in an interval (see **Pitch\_notes.pdf** for details).

The result file for a parameter setting to report mean, standard deviation, 10% centils and values at the the left and right edges of all intervals will look like:

File	Label	Start(s)	Duration(ms)	Left(Hz)	Right(Hz)	Mean(Hz)	StDev(Hz)	10.0%(Hz)	90.0%(Hz)	Voiced(%)
g071	j	0.7934	91.6	.	222.43	228.24	10.98	217.34	241.75	75
g071	ã	0.8851	77.8	222.43	122.18	162.51	43.27	123.78	219.46	61
g071	g	0.9629	50.9	122.16	124.81	119.22	2.86	116.10	123.42	100
g071	u:	1.0139	31.6	124.81	129.45	127.59	1.51	125.42	128.95	100
g071	n	1.0455	82.5	129.45	139.26	134.40	5.79	128.31	142.55	98
g071	t	1.1281	14.5	.	.	.	.	.	.	.
•••										
g071	th	12.5693	59.4	.	.	.	.	.	.	0

Script: pitch\_5\_0\_0.praat

Analysis started: 26-Oct-20 15:23:00

Tier: 4

Labels: .

Computation units: Hertz

Step rate: 0.005 s

Low F0: 75 Hz

High F0: 500 Hz

Minimal duration: 25 ms.

**Information for programming:**

Some parameters can be set underneath the ‘form’ section in the script. The user might put some of these into their form window (as long as it fits into their screen).

**step\_rate:**

The step rate (in seconds) of the pitch analysis (default: 0.005).

**minimal\_length\_ms:**

The minimal length (in milliseconds) for an interval to be analysed (default: 25 ms).

**minimal\_intensity:**

The minimal intensity (in dB) for an interval to be analysed if intensity is requested (see **Methods to report pitch**) (default: 40 dB).

**Directories:**

The script uses internally separate strings for sound, TextGrid, result and support directories. Users who use separate directories for these can adjust these names in the script.

**ext\$ (sound file names):**

The default extension for sound files is “.wav”. This parameter can be changed in the script.

**missing\_values\_symbol:**

When PRAAT cannot compute a value it uses internally the string “- undefined -”. This script replaces this string by the string given in this field. For a subsequent analysis of the data with JMP, the dot indicate missing values, for R it would be NA (default: NA).

**sep\$ (separator symbol):**

In the (columns of) data in the result file are separated by this symbol. The default is tab\$ (tabulator) but users might use e.g. the comma for an csv file.

**user\_feedback:**

The script reports which file is being handled and the percentage of all files in a directory that have been handled. By setting this switch, any output (other than error and warning messages) will be suppressed. This will decrease processing time, but there is no feedback other than an increasing size of the result file.

user\_feedback = 1 Gives user feedback (default)

user\_feedback = 0 No user feedback

**np\_string\$ (noprogess string):**

PRAAT itself reports its activity when computing intensity and pitch. All these outputs can take substantial processing time. (This string is actually positioned where in PRAAT the noprogess is written.)

np\_string\$ = “” (= empty string) normal PRAAT feedback

np\_string\$ = “noprogess” No PRAAT feedback (default)

**dummy\_data\_header (dummy data header line):**

Statistic programs like JMP decide the type of data for each column on basis of the first data line.

To force correct data-type assignment (due to missing data in the first data row) a dummy data line of text, 0 and 0.0 can be generated to force correct data-type assignment.

dummy\_data\_header = 0 No dummy data line

dummy\_data\_header = 1 Dummy data line with “Dummy” for strings and “0.0” for numerals

**duration\_in\_ms (duration reporting):**

duration\_in\_ms = 1 Duration is reported in milliseconds (default)

duration\_in\_ms = 0 Duration is reported in seconds

**Current version and date:**

5.0.0, 26-oct-2020

**Known problems:**

None

**Planned extension:**

Handling of point tiers

Reporting time points of measurements as an option

Allow spaces in interval labels

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