

## Assignment

Your task is to prepare and submit an academic paper to me. It is specified below. English grammar is NOT IMPORTANT, but you should generally try to use correct English spelling. Punctuation, spacing and capitalisation are important. The minimum paper length is 2 pages.

Here are the detailed specifications:

1. The paper should be in IEEE journal format, double column, 11point text, A4 paper, using the IEEEtran.cls journal style. Use the template and delete anything you don't need.
2. Give the paper a title and include your name as author.
3. Write an abstract (minimum 20 words),. Have 3 different sections of text (including “introduction” and “conclusion” section, with minimum 20 words in each section) plus a bibliography/references section. Use at least one internal reference to another section (i.e. something like “This can be seen later in Section 2”). The LaTeX command to do that should be a `\ref{}`.

The purpose of the assignment is to demonstrate your skills at using LaTeX (so the title, abstract and content text needs to explain that...).

Here is some technical information for your paper:

Given original speech  $S$ , real whisper  $W$ , artificial whisper  $W'$  and reconstructed speech  $S'$ , we first use autoregressive modelling to determine corresponding LPCs for time-aligned segments of each signal,  $\mathbf{a}_S$ ,  $\mathbf{a}_W$ ,  $\mathbf{a}_{W'}$  and  $\mathbf{a}_{S'}$  respectively, each with order  $P = 10$ .

7.5.1. *Log-likelihood ratio.* LLR is computed from  $\mathbf{R}_S$ , the speech autocorrelation matrix as follows [Hu and Loizou 2008]:

$$d_{LLR} = \log \left\{ \frac{\mathbf{a}_{S'} \mathbf{R}_S \mathbf{a}_{S'}^T}{\mathbf{a}_S \mathbf{R}_S \mathbf{a}_S^T} \right\} \quad (6)$$

7.5.3. *Cep.* The LPC cepstral distance [Kitawaki et al. 1988], designed to compute a spectrally relevant comparison measure, is defined as:

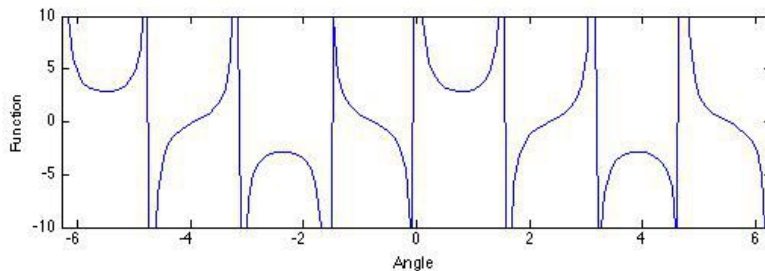
$$d_{CEP} = 10/\log_{10} \sqrt{2 \sum_{i=1}^P \{C_x(i) - C_y(i)\}^2} \quad (8)$$

where  $C_x(m)$  and  $C_y(m)$  are the LPC cepstrum coefficients of the signals being compared, which may be recursively found from their respective LPC coefficients, a [Hu and Loizou 2008]:

$$C(m) = \mathbf{a}_m + \sum_{k=1}^{m-1} \frac{k}{m} \{C(k) \mathbf{a}_{m-k}\} \quad \text{for } 1 \leq m \leq \quad (9)$$

4. Your paper should include equations (6), (8) and (9) shown above, using the LaTeX `\begin{equation}` and `\end{equation}` commands, as well as using in-line mathematics mode  $\$...\$$  for the mathematical symbols in the text. You can rearrange and improve my equations if you want, but they should be mathematically unchanged.
5. You will need to write some comments to introduce the equations and give the meanings of the symbols without copying my text.

6. Next, you will need to use MATLAB or some other tool to plot a graph similar to the one below, showing the function  $f(x) = \csc(x) + \sec(x)$ . Your plot must be VECTOR graphics format, .eps, .ps or .pdf (so it's not fuzzy like my plot below) and have labelled axes, as well as a figure caption.



Here is some MATLAB code that does the job:

```
x=[-2*pi:0.1:2*pi];
f=csc(x)+sec(x);
plot(x,f)
axis([-2*pi 2*pi, -10, 10])
```

7. Finally, you will need to create a table using the data below. You must format it properly (and neatly) and put it into a LaTeX table correctly for an IEEE paper:

Window	Stopband Atten.	Filter Len.	Length for 802.11p
Hamming	-26.5dB	$N = \frac{6.22\pi}{\Delta\omega}$	$N \approx 31L$
Hanning	-31.5dB	$N = \frac{6.65\pi}{\Delta\omega}$	$N \approx 33L$
Blackman	-42.7dB	$N = \frac{11.1\pi}{\Delta\omega}$	$N \approx 55L$
Kaiser	—	$N = \frac{A-7.95}{2.28\Delta\omega}, A > 21$ $N = \frac{5.79}{\Delta\omega}, A < 21$	$N \approx 33L$
Chebyshev	—	$N = \frac{2.06A-16.5}{2.29\Delta\omega}$	$N \approx 67L$

The caption of the table should be “*Popular FIR filter lengths for different windows*”.

8. The figure, equation and table need to be referenced in the text (using the \label and \ref commands).
9. You should include at least three references which are cited in the text with \cite{}. One journal paper, one conference paper and one book. Use bibtex to create the reference list. If you can't find any papers, use my papers and book (see them on <http://www.lintech.org>).

### Assessment method

After checking your files carefully, please email me two things ONLY:

- your final pdf of the paper
- your .tex file

Send them to [iym@ustc.edu.cn](mailto:iym@ustc.edu.cn). Inside your email, give your full name in PINYIN (and in Chinese characters), and state your student ID number.

Submission deadline: **Saturday 12th July 2014**

## Assessment criteria and checklist

<b>Examining the .pdf file</b>	
	Looks like an IEEE paper
	Double column, single spaced, A4 paper, 11 point text
	Title, authors name and address correct
	Abstract
	Introduction
	2 more uses of <code>\section{}</code>
	First equation correct
	Second equation correct
	Third equation correct
	Correct use of inline mathematics mode $...$
	Appropriate text for the three equations
	Correct function plotted, axes correct, vector graphics
	Labelled axes (check text size not too small), figure caption is IEEE style
	Table dimensions and layout are correct, caption is correct and IEEE style
	Table contents are correct
	Three references given at the end of the paper, 1xJ, 1xC, 1xB
	No ? Found in the PDF document
	Check for correct use of paragraphs, spacing around figures/tables, as well as indentation around equations.
	Check punctuation, word spacing and capitalisation.
<b>Examining the .tex file</b>	
	Internal <code>\ref{}</code> for the figure
	Internal <code>\ref{}</code> for the table
	Internal <code>\ref{}</code> for an equation
	Internal <code>\ref{}</code> for one of the text sections
	Use of <code>\cite{}</code> for J, C, B
	Vector graphics type
	Check that .tex file compiles without errors