Journal of Adrian Gusa for Fall Quarter 2006

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September 11, 2006

1 Week of September 13, 2006

1.1 Learning LaTeX

This was my first contact with LaTeX, which I wanted to learn for a long time but never had the occasion to do it. It is exactly what I heard/thought it would be. I think now I'm ready to give up on Microsoft Office.

I looked for a free editor for Windows and I found LaTeX Editor or LEd (www.latexeditor.org) which looked nice. It seems this is only an editor, the compiler comes separately, so I found out from their website that two of the most popular TeX distributions are MiKTex (www.miktex.org) and TeXLive (www.tug.org/texlive). However, I never got to install any of those and use it. The reason is that in the process I got the idea of switching to Linux which is, again, an old wish which never came to a definite accomplishemnet because I always had to come back to Microsoft Word.

I installed the Ubuntu 6.06 Linux distribution and found out there is a pretty nice LaTeX editor called Kile, so this is what I am using now.

I looked on the internet and found a good pdf file called "Essential LaTeX++" which is available at
http://www.math.hkbu.edu.hk/TeX/essential.pdf. It is great for a quick tutorial on LaTeX.

Note Look for two books on LaTeX

- Leslie Lamport — LaTeX A Document Preparation SystemUsers Guide and Reference Manual
- Michel Goossens, Frank Mittelbach and Alexander Samarin — The LaTeX Companion

It still isn't clear to me how to do advanced page formatting (margins, empty lines). I still have to look into this, although I have read that everything can be controlled in detail.

I also took the VARK test (which can be found at
http://iliad.cats.ohiou.edu/vark/questionnnaire.htm) this week and I wrote the mathematical autobiography as my first assignement.

2 Week of September 21, 2006

2.1 Learning Python

This week I spent some time reading from the book "Dive into Python". It gave me an idea of how Python works and how to use it.

Unfortunately, I didn't have enough time to look at the scientific side of Python. I will have to look at www.scipy.org.

Designing the first project

I worked on the design of the application given as the first assignment. I came up with the idea of having two separate modules, such that the application can work offline.
I wrote the design specifications for the application and drew some UML diagrams to support it and make it more understandable.

2.2 Problems with LaTeX

I use Kile as the LaTeX editor under Linux for my LaTeX documents. I had some problems with including images in documents. After a while, I found out that a manual for Kile said that usually the default setting should work fine when using .eps files. Even if the images don't appear in the .dvi file, they appear when generating a .ps output file. Initially I ws trying to output .pdf files and that didn't work. Ps files work just fine it seems.

I also have another problem with images for which I don't have a solution yet. I have two big images that I want to appear on a whole page. This works just fine, the only problem is that they don't appear at the right place in the document. I'm using the [h] option for the *begin*{*figure*} command however the images only appear after another page of text, at the end of the document.

I have the same scenario twice: some text, some images followed by some more text. In the first case, in the middle of the document, it works just fine. In the second case, towards the end of the document after the point where I insert the images, there is almost a whole page of text following. I want to have the pictures printed at the place where they are added in the document, then the remaining text on the last page of the document. However, I don't know why,

the images keep appearing on the last two pages of the document, after the text which should end the document.

Hint: Maybe use *clearpage* for forcing the text to go after the pictures.

3 Week of September 28, 2006

3.1 Improving the design from the previous week

This week I went over the design from the previous week and made some changes according to the comments I had received.

I also studied te design of the opposite team and suggested improvements.

3.2 Learning LaTeX

I read more about LaTeX and became more comfortable with page formatting, working with pictures, complex mathematical expressions and using tables.

3.3 Learning Python

I still didn't have time to look at the scientific possibilities that Python has.

4 Week of October 5, 2006

4.1 Coding in Python

This week I started using Python for some small examples and got accustomed to creating program files and running them.

I also coded my part of the program - the thorough checker.

The thorough checker ivolved generating some random points in the interval [1,R] with the condition that most of the points must be near 1. I used a normal distribution function with median=0

and sigma=R/10. The negative values become positive by taking the absolute value, and then 1 is added to all values in order to have values greater than 1. Since for a normal distribution 95% of the values are within 2*sigma away from the mean, and in our case sigma = R/10, that means that 95% of the values will fall within 2R/10. I don't really know if that means that the values are "close" enough to 1, or what is exactly "close" to 1 would mean. 2R/10 could mean 2000 when R=10000, or just 20 when R=100.

5 Week of October 12, 2006

5.1 Administrative work

This week I corrected the Mathematical Autobiography, made some corrections to the journal and moved everything to one single file.

5.2 Coding in Python

I also looked over the code for the whole project, except for the missing parts, in an attempt to find any hidden errors.

6 Week of October 19, 2006

6.1 Article reading

I read the article "Approximating a Wavefunction as an Uncostrained Sum of Slater Determinants".

6.2 Coding in Python

I ran the different functions of the application and got used to using the Python interpretor shell.

7 Week of October 26, 2006

7.1 Article reading

I found the articles "A nonorthogonal CI treatment of symmetry breaking in sigma formyloxyl radical" by Philippe Y. Ayala and Bernard Schlegel and "A Class of Bases in L^2 for the Sparse Representation of Integral Operators" by Bradley K. Alpert. I skimmed through the first article and read the second one. I also read some articles on Wikipedia connected to the theory of wavelets which is discussed in the second article.

8 Week of November 2, 2006

8.1 Article presentation

I prepared a presentation for the article "A Class of Bases in L^2 for the Sparse Representation of Integral Operators" by Bradley K. Alpert. This took some time because I wanted to make a slide presentation. However I encountered some problems when trying to render the LaTeXfile into slides, so I ended up presenting off the usual pdf file.

9 Week of November 9, 2006

9.1 Article presentation

After last week's presentation of the article "A Class of Bases in L^2 for the Sparse Representation of Integral Operators" by Bradley K. Alpert, I reflected on how everything went and I considered the observations the other team members made.

As it turns out, I should have included some examples to support all the theory that I presented, and to give a picture of what happens. Also, I should have put more emphasis on defining the concepts that were used throughout the article, like defining the L^2 norm, the inner product, etc. The presentation itself would have been better, had I used the laser pointer for precisely indicating the formulas I was refering to at any given point.

It might have been better to present less material, and insist on the significance of what was discused and what it is useful for. I

tried to explain a little bit the purpose of the paper, but, with this and all the material, it took too much time.