

AMATH 582 Homework 1

Your Name

January 24, 2020

Abstract

Add your abstract here.

1 Introduction and Overview

Add your introduction and overview here.

1.1 Subsection Title

This is a subsection.

1.1.1 Subsubsection Title

This is a subsubsection.

2 Theoretical Background

Add your theoretical background here. Some example text: As we learned from our textbook [1], Fourier introduced the concept of representing a given function $f(x)$ by a trigonometric series of sines and cosines:

$$f(x) = \frac{a_0}{2} + \sum_{i=1}^{\infty} (a_n \cos nx + b_n \sin nx) \quad x \in (-\pi, \pi]. \quad (1)$$

You can reference numbered equations, figures, tables, algorithms, and code like this: Equation 1, etc.

3 Algorithm Implementation and Development

Add your algorithm implementation and development here. See Algorithm 1 for how to include an algorithm in your document. This is how to make an *ordered* list:

1. Fluffy swallowed a marble.
2. I took Fluffy to the vet.
3. They took an ultrasound of Fluffy's intestines.

4 Computational Results

Add your computational results here. See Table 1 for how to include a table in your document. See Figure 1 for how to include figures in your document.

Algorithm 1: Example Algorithm

```
Import data from Testdata.mat
for  $j = 1 : 20$  do
  Extract measurement  $j$  from Undata
  Do something useful
end for
if  $i \geq 5$  then
   $i \leftarrow i - 1$ 
else
  if  $i \leq 3$  then
     $i \leftarrow i + 2$ 
  end if
end if
```

| | Name | Years |
|----|------------------|--------------|
| 1 | Frosty | 1922-1930 |
| 2 | Frosty II | 1930-1936 |
| 3 | Wasky | 1946 |
| 4 | Wasky II | 1947 |
| 5 | Ski | 1954 |
| 6 | Denali | 1958 |
| 7 | King Chinook | 1959-1968 |
| 8 | Regent Denali | 1969 |
| 9 | Sundodger Denali | 1981-1992 |
| 10 | King Redoubt | 1992-1998 |
| 11 | Prince Redoubt | 1998 |
| 12 | Spirit | 1999-2008 |
| 13 | Dubs I | 2009-2018 |
| 14 | Dubs II | 2018-Present |

Table 1: UW mascots as described in [2].



Figure 1: Here is a picture of Dubs [3]. Dubs did not swallow a marble.

5 Summary and Conclusions

Add your summary and conclusions here.

References

- [1] Jose Nathan Kutz. *Data-driven modeling & scientific computation: methods for complex systems & big data*. Oxford University Press, 2013.
- [2] *University of Washington*. URL: <https://gohuskies.com/sports/2013/4/18/208229209.aspx>.
- [3] Evan Webeck. *10/10, would cheer with: UW introduces new live mascot, Dubs II, and he is adorable*. Mar. 2018. URL: <https://www.seattletimes.com/sports/uw-huskies/10-10-would-cheer-with-uw-introduces-new-live-mascot-dubs-ii-and-he-is-adorable/>.

Appendix A MATLAB Functions

Add your important MATLAB functions here with a brief implementation explanation. This is how to make an **unordered** list:

- `y = linspace(x1,x2,n)` returns a row vector of `n` evenly spaced points between `x1` and `x2`.
- `[X,Y] = meshgrid(x,y)` returns 2-D grid coordinates based on the coordinates contained in the vectors `x` and `y`. `X` is a matrix where each row is a copy of `x`, and `Y` is a matrix where each column is a copy of `y`. The grid represented by the coordinates `X` and `Y` has `length(y)` rows and `length(x)` columns.

Appendix B MATLAB Code

Add your MATLAB code here. This section will not be included in your page limit of six pages.

```
clear all; close all; clc;
load Testdata

L = 15; % spatial domain
n = 64; % Fourier modes
x2 = linspace(-L,L,n+1); x = x2(1:n); y = x; z = x;
k = (2*pi/(2*L))*[0:(n/2-1) -n/2:-1]; ks = fftshift(k);

[X,Y,Z] = meshgrid(x,y,z);
[Kx,Ky,Kz] = meshgrid(ks,ks,ks);

for j = 1:20
    Un = reshape(Undata(j,:),n,n,n);
    close all, isosurface(X,Y,Z,abs(Un),0.4)
    axis([-20 20 -20 20 -20 20]), grid on, drawnow
    pause(1)
end
```

Listing 1: Example code from external file.