


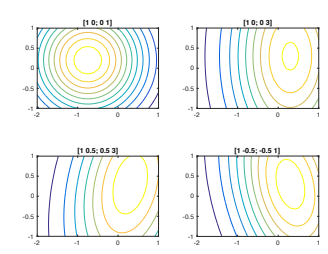
ECE471-571 – Pattern Recognition

Lecture 5 – Mixture Density and Project Discussion

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Geometric Interpretation of Covariance Matrix

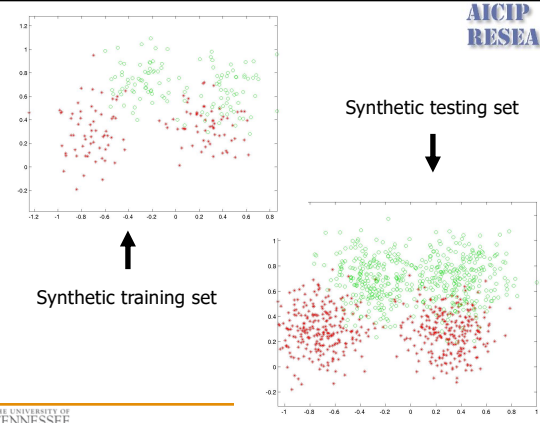


- Variance vs. Covariance
- Values of variance
- Values of covariance
 - Positively vs negatively correlated
- Eigenvalue and eigenvector

<http://www.visiondummy.com/2014/04/geometric-interpretation-covariance-matrix/>



2





Synthetic training set

Synthetic testing set



* Mixture Gaussian Density

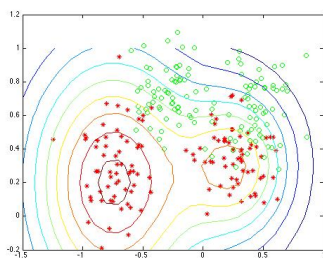
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$$p(x) = \frac{A_1}{\sqrt{2\pi}\sigma_1} \exp\left(-\frac{(x-\mu_1)^2}{2\sigma_1^2}\right) + \frac{A_2}{\sqrt{2\pi}\sigma_2} \exp\left(-\frac{(x-\mu_2)^2}{2\sigma_2^2}\right)$$



2-D Two-Modal Gaussian

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Programming environment

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- OS –Linux
- Compiler – g++
- Editor – Emacs
- Language – C++ or Python

Computing resources AICIP
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- Hydra Linux Lab
 - hydra01-25.eecs.utk.edu

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Programming style AICIP
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- ◆ Indenting
- ◆ Comment
- ◆ Spacing
- ◆ Simple
- ◆ Flexible

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Step 1 – Get an account AICIP
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- ◆ Get an account on the student server
- ◆ Login and change password
 - passwd

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Step 2 – Get familiar with linux commands

- ls – list files
- less xxx – view a readable file (used to quickly browse the file)
- rm xxx – delete a file
- mv xxx yyy – rename xxx to yyy
- emacs – a nice file editor
- mkdir – create a new directory
- cd xxx – go into a new directory
- Access floppy disk
 - mcopy source dest
 - mkdir a:
 - mdel a:xxxx

Step 3 – Learn to use g++

- ◆ g++ -o xxx xxx.cpp Matrix.cpp
- ◆ xxx.cpp is the application source code you wrote
- ◆ xxx is the executable application
- ◆ Learn to use Makefile

Step 4 – Test a sample code

- Download the dataset from the “testing datasets” webpage and uncompress it
 - Use “unzip” to uncompress the .zip file
 - Use “gunzip” to uncompress the .gz file
- Download the sample source code (read.cpp) from the course website
- Download the Matrix library from the course website (Matrix_v1.tar)
- Test a sample code
 - Run “make” under the directory “lib”
 - Run “make” under the directory “example”
 - Under \example, type ./testMatrix

Step 5 – Understanding the matrix library

- ◆ Matrix.h declares the private data and defines the member functions
- ◆ Matrix.cpp implements the member functions

Step 6 - How to organize the source files

- ◆ \lib
 - With the .cpp source code with function implementations
 - Use Makefile to generate a library
- ◆ \include
 - Header files
- ◆ \example
 - Test data
 - Use Makefile to generate executables
- ◆ \data
