

Course 52870 2010/11: M.A. Seminar

Note: The M.A. seminar has undergone some changes and you should read this document carefully even if you attended the seminar last year.

Instructor: Dr. Gal Elidan

Time and Location: Wed 16:30-18:00, Room 4412 (seminar room)

Office hours: Tuesday 14:00, Room 4419

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Requirements

The M.A. seminar will consist of 7 meetings during each academic year. In a two year period, each student must attend 6 out of 7 meetings **each** year. In addition, a short assignment will be given by the lecturer in each meeting and is due 2 weeks after the lecture. Talks will be in Hebrew.

Note the following changes from previous years:

- Out of respect to the visiting lecturers, you are asked to arrive in class in time and plan to stay for the entire duration of the lecture. The door of the seminar room will close at 16:35 and attendance record will be taken at the end of the lecture.
- In each meeting (except the first one each year), the lecturer will give a short assignment. These will mostly be thought experiments and you will be given a pass/no pass grade mostly based on effort. You must therefore pass **all** assignments.
- The seminar meetings **cannot** be replaced by alternatives. Exemptions will only be given due to miluim, sickness (with note) or if you T.A. a class in the same hours. It is **your** responsibility to notify the instructor of attendance issues **ahead of time** or as soon as possible in case of an unforeseen event. Do not wait until the end of the year to “suddenly” discover that you have not completed the requirements.
- Make sure you come and see me if you are taking the seminar for the second year and haven't fulfilled your requirements last year.

Tentative Schedule:

1. **Date:** October 27th

Speaker: Prof. Moshe Pollak

Title: Monitoring

Abstract:

אנו חיים בתקופה של תמורות. העולם מתחמם. הבורסה משתגענת. מתפרצת מגפה. רמת האבטלה משתנה. לפעמים השינוי לטובה, לפעמים לרעה. ברוב המקרים, אין אנו אדישים כלפיו.

לעתים, בייחוד כאשר שינוי נוגע לנו ישירות, אנו רוצים להיות ערים לו מהר ככל האפשר. הבעיה היא שאין בת קול היורדת מן השמים ומכריזה עליו: המידע היחידי שיש לנו מתקבל ממידע עקיף, אפילו נעמוד על המשמר. בדרך כלל, מידע זה מורכב מסדרה של תצפיות על התופעה הנדונה. אלא שכמעט תמיד יש "רעש" לתצפיות, המונע מאתנו לדעת בוודאות אם ארע שינוי. (האם התזויות בבורסה ביום/בשבוע/בחודש האחרון מעידה על שינוי ברמת הסיכון? האם מצביעה עלייה ביום/בשבוע/בחודש האחרון במספר אירועי סרטן על שינוי מגמה? אולי במקרה היתה הצטברות יוצאת דופן של מקרים?) מכיוון שכך, כל החלטה (אם ארע שינוי מהותי או לא) שנחליט עלולה להיות מוטעית. אם נבחר אסטרטגיית התרעה שלוחצת מהר על ההדק, נהיה חשופים לריבוי אועקות שווא. מצד שני, שימוש באסטרטגייה שמרנית מדי יכול לגרום לכך שנאחר את הרכבת.

שיטות ניטור מטפלות באיזון בין השתיים: ברמת סיכון נתונה לאועקת שווא, איזו שיטה ממזערת (במובן פורמאלי כלשהו) את הזמן בין שינוי לגילוי? התשובה לשאלה זו תלויה (שלא במפתיע) באופי של סדרת התצפיות. בהרצאה תינתן סקירה על התחום.

2. **Date:** November 24th

Speaker: Ph.D. candidate David Azriel

Title: The Treatment Versus Experimentation Dilemma

Abstract: It is generally believed that increasing the dosage of a certain drug increases both the probability of a toxic reaction and efficacy. It is therefore important to determine the maximum tolerated dose (MTD) of a given drug, that is, the highest dose of a drug that does not cause unacceptable proportion of toxic reactions. MTD-finding studies, conducted as part of phase I clinical trials, are usually performed sequentially for reasons of efficiency and due to ethical requirements, and have the following two different purposes:

- Treatment: ideally, treat each subject with the MTD; since it is unknown, use the best available estimate of the MTD at the time of treatment.
- Experimentation: obtain a good estimate for the MTD at the end of the study.

We discuss if and how this dilemma can be resolved in two different frameworks:

- (a) Infinite horizon experiments where no model for the response curve is assumed.
- (b) Finite horizon experiment with a certain Bayesian model.

3. **Date:** January 5th

Speaker: Ph.D. candidate Hadassah Brunschwig

Title: Genome-wide estimation of recombination rates and identification of hotspots in mice: an application in statistical genetics
Abstract: During the meiotic phase, necessary for reproduction, grandparental chromosomes are being reshuffled and unique combinations of chromosomal segments are created. This process, called meiotic recombination, has been shown to occur non-uniformly on the genome and to have the tendency to cluster in localized, so called, recombination hotspots. There have been extensive genome-wide studies of hotspots and their characterization for the human genome. For the mouse genome, genome-wide studies do not exist as of yet and the mechanism of hotspots has not been studied. We have made use of available high-resolution data on the mouse genome to study hotspots and to compare the outcomes to results obtained in humans. In this talk I will cover the questions and motivations for the study of recombination hotspots in mice and explain the statistical tools involved in the estimation of hotspots as well as their characterization. Finally, I will give a biological insight into the findings.

4. **Date:** February 16th

Speaker: Dr. Gal Elidan

Title: Probabilistic Graphical Models

Abstract: Probabilistic graphical models are a formalism for representing joint distribution that is a marriage between probability and graph theory (no background needed). In a sentence, the distribution is defined by a qualitative graph that encodes independencies along with quantitative parameters. In recent decades, these intuitive models have become one of the most important tools for coping with uncertainty in high dimensional domains, with applications ranging from bioinformatics and medical diagnosis to machine vision and information decoding.

In the talk I will present the basics of the framework and explain how the graphical representation facilitates efficient computation and estimation. In the second part of the talk I will focus on the problem of inferring the structure of the graph and briefly discuss some of the

challenges of the field.

5. **Date:** March 9th
Speaker: Ph.D. candidate Anna Sikov
Title: To be announced
Abstract:
6. **Date:** April 13th
Speaker: Prof. Ya'acov Ritov
Title: To be announced
Abstract:
7. **Date:** May 18th
Speaker: Dr. Ronit Nirel
Title: To be announced
Abstract: