Mindey I.

A mathematics B.A. graduate, with focus on probablity and statistics, and interest in their applications to decision making.

Background

Educational

2004–2010 **B.A.**, *Vytautas Magnus University*, Kaunas, Lithuania.
Mathematics and Its Applications Program

2011–2012 **PhD. (Discontinued)**, *Purdue University*, West Lafayette.
Interdisciplinary Life Science Program

2005–2006 **Spec.**, *Waseda University*, Tokyo.
Intensive Japanese Language Program

Practical

Fall 2011 **Research with V. Raskin**, *in West Lafayette, Indiana*.
Application of mereology to semantic ontology, to supplement it with well-defined parthood relation for construction of more accurate knowledge graph. [paper]

Spring 2011 **Research with D. Kihara**, *in West Lafayette, Indiana*.
Dimensionality reduction with Krawtchouk Moments for 3D object search. [presentation]

Fall 2010 **Developer at /Undisclosed Legal Entity/**, *1 year in Vilnius, Lithuania*.
Writing proprietary modules for OpenERP (Enterprise Resource Planning package) in Python.

Research with J. Vencloviene, *Kaunas, Lithuania*.
Feature extraction based on HSIC (Hilbert-Schmidt Independence Criterion). [thesis]

Fall 2009 **Research with A. Bikelis**, *in Kaunas, Lithuania*.
Random variable decomposition into infinitely divisible and non-divisible components. [paper]

Fall 2005 **Developer at Unoh Inc. (Now Zynga Japan)**, *in Tokyo, Japan*.
Contributing to LAMP-based photo sharing social network *Photozou*.

Spring 2010 **Teaching Assistant at Vytautas Magnus University**, *Kaunas, Lithuania*.
Responsibilities included teaching statistics class to biology students.

Spring 2003 **Technician at Institute of Physics**, *in Vilnius, Lithuania*.
The work inlcuded LAN administration, with common tasks of installing TWiki, MediaWiki, dealing with GRUB and LILO bootloaders, repairing computers as needed.

Skillsets

Analytical Computing

Maple, Mathematica, and by Hand.
Taking a newly published algorithm, and turning it into efficiently running code.

Experience 1: 3D Shape Feature Extration (for efficient search) using Krawtchouk moments.

Experience 2: ECG Signal Feature Extraction (for illness recognition) using PCA (principal component analysis) based on HSIC (Hilbert-Schmidt Independence Criterion).

I have studied Kernel Methods (from here), and have moderate interest in Machine Learning.

Statistical Computing

IPython, R, C and MATLAB.
Applying and integrating statistical methods into applications.

Toolset: I use rpy2 (executing R code in Python), pytave (executing MATLAB code in Python), NumPy, Scipy, pandas. Among other computational packages I used: sympy, Theano, statsmodels, matplotlib, and many others. I can extend Python with C when needed.

Look at the statistical courses taken for the subset of statistical methods known. I know enough to be able to use characteristic functions to do probability distribution arithmetic.

Human communication

English, Lithuanian, Japanese, Chinese, German, Russian.
Getting the ideas accross in English, Japanese, Chinese, Lithuanian.

Toolset: I use these tools for human-to-human communication: SSH, GNU Screen, PGP, Vim, vimwiki, drawing tablet, RetroShare, Bitcoin, Skype, Google Hangouts, VNC, TeamViewer, Chrome Remote Desktop, GoCast, awwapp, Dropbox, Google Docs, Google AdWords.

My German and Russian are passively used languages, and the rest – actively.

Web Development

Django and Google App Engine.
Accepting and representing the computational data on the web via GUIs and APIs.

Toolset: In Django, I use VirtualEnv, CoffeeScript, South Migrations, Crispy Forms, Model Based Forms, Django Social Auth, and Mercurial repository. I also have experience using SVN, GIT, Bazaar. I had learned to use Google's BigTable datastore for Google Apps Applications. Paypal API, Bitcoin API, some experience in cryptograpic communication with banks. I use django-tastypie to create RESTful APIs.

I have experience runnining Google AdWords acconts, using both Google Analytics and Google AdWords APIs, and creating a website for PPC advertising.

Game Development

Panda3D.
Gamification of work and eduction.

Hobby: 3D Study Maze (for entertainment-based learning and work). Sample code of 3D Study Maze: http://code.google.com/p/3d-study-maze/ (video)

+ Mathematical courses taken:

Fall 2004   **Calculus I and II**.

Set of real nubers, set operations, bounds for sets of real numbers, sequences of numbers and their limits, real function and its limit, continuous functions, derivatives, Taylor formula, function graphing. Indefinite integral, integration of indefinite integral, definite integral, Newton-Leibniz formula, application of definite integral in geometry, physics and mechanics, infinite series. Convergence tests for series, functional series, power series, Taylor series.

Fall 2007   **Multivariable Calculus**.

Multivariable functions, limits and continuity of multivariable functions, partial derivatives of multivariable functions, extreme values of multivariable functions, least square method, double integrals, triple integrals, line integrals, Green's formula, surface integrals.

Geometry.

Vectors, operations with vectors, linear dependence of vectors in plane and space, basis in plane and space, scalar product, vector product, parallelepipedal product, equation of a plane, equation of a line in space, equation of a line in plane, circle, ellipse, hyperbola, parabola, cone, cylinder, tangent plane and normal of the curve.

Spring 2008   **Complex Analysis**.

Operations with complex numbers, sequences and series of complex numbers, functions of a complex variable, limits and continuity, derivatives, Cauchy-Riemann equations, integrals, Cauchy's theorem, Cauchy's integral formulas, Taylor's series, Laurent's series, residues, residue theorem, Fourier series and integrals.

Algebra.

Theory of linear algebraic equations, sets and mappings, relations, permutations, integer numbers, linear vector space, linear transformations, matrices, determinants and their properties, algebraic structures, semi groups and monoids, groups, isomorphism, rings, fields, complex numbers, polynomials, closure of complex numbers field.

Fall 2008   **Differential Equations**.

The first order differential equations, the Cauchy problem, general, particular and special solutions, phase space, vector and direction fields, examples of differential equations, systems of ODE, Existence and Uniqueness theorems, higher order ODE, fundamental system, linear differential equations, equations with constant coefficients, a qualitative approach in the plane, first integrals, Lyapunov stability definition.

Measure and Integral Theory.

Basic operations on sets, the power of a set, countable sets, the power of the continuum, algebras of sets, step functions, continuous functions, monotone functions, bounded variation functions, absolutely continuous functions, measurable functions, measurable set, Lebesgue integral, Fubini's theorem, multiple integrals, fundamentals of set theory, measurable spaces, Lebesgue–Stieltjes measure on a line, distribution function, convergence almost everywhere, convergence in measure.

Discrete Mathematics.

Countable sets, principle of mathematical induction, arrangements, permutations and combinations, binomial coefficient identity, principle of sieve, Stirling numbers, degree generating function, exponential generating function, recurrence relations, continued fractions, propositional logic, basic concept of graph.

Spring 2009   **Partial Differential Equations**.

First order partial differential equations, classification of partial differential equations, main types of equations and problems of mathematical physics, the wave equation, initial and initial-boundary value problems, the heat conduction equation, initial and initial-boundary value problems, the existence and uniqueness of a solution, solving methods, boundary value problems for the Laplace equation in simple regions.

Numerical Methods.

Function interpolation, cubical splines, numerical integration, solution of nonlinear equations and linear algebraic equation systems, matrix proper value problem.

Functional Analysis.

Sets, metric spaces, contracting mappings, topological spaces, compactness in the topological and metric spaces, linear spaces, Hahn-Banach theorem, normal spaces, spaces with inner product, Hilbert spaces, Continues linear operators, conjugate spaces and conjugate operators, compact operators, spectral theorem, Fredholm equations..

Fall 2009 **Numerical Methods for Differential Equations**.

Interpolation by algebraic polynomials, interpolation by splines, numeric integration, Monte Carlo integration, solving non-linear equations, solving system of linear algebraic equations by iterative methods, solving system of linear algebraic equations by direct methods, convergence of iterative methods, eigenvectors and eigenvalues problem, eigenvectors and eigenvalues problem solving by orthogonal transformations, one variable function optimization.

Fall 2008 **Probability Theory**.

Random events, probability space, conditional probability, random variables, distribution functions, density functions, multivariate random variables, independent random variables, moments and cumulants, binomial distribution, Poisson distribution, normal distribution, convergence of infinite sequences of random variables, the law of large numbers, the central − limit theorem.

+ Statistical courses taken:

Spring 2009 **Mathematical Statistics**.

Notion of sample and sample space, numerical characteristics of distribution and their estimates, main parametric distributions, point estimates of parameters, parametric estimation methods (method of moments and maximum likelihood estimate), confidence intervals for parameters, basic concepts of hypothesis testing, testing hypotheses on mean and variance, nonparametric hypotheses, linear regression model.

Fall 2009 **Correlation Analysis**.

Problem examples and solution stages, types of dependencies, rank correlation, generalized correlation coefficient, partial and multivariate correlation, hypothesis testing on independence, regression analysis, types of regression functions, parameters estimation on linear models, least-square method, accuracy of estimations in regression analysis.

Multivariate Statistics.

Distributional characteristics of multivariate random variables, statistical estimation, multivariate normal distribution, analysis of variance, logistic regression, basic concepts of classification, discriminant analysis, cluster analysis, introduction to factor analysis and survival analysis.

Stochastic Processes.

Notion of stochastic process, distribution and numerical characteristics, classification of stochastic processes, conditional probability and mathematical expectations, random walk, (reflection principle, arcsine law,) the classifications of states of Markov chains, branching processes, Lévy processes and their properties.

Spring 2012 **Statistical Methods For Biology**.

Descriptive statistics, binomial and normal distributions, confidence interval estimation, hypothesis testing, analysis of variance, introduction to nonparametric testing, linear regression and correlation, goodness-of-fit tests, and contingency tables.

+ Computing courses:

Fall 2009   **Process Analysis and Recognition**.
Determinate and random processes in continuous and discrete spaces, phenomena of signal discretization and quantization, synthesis of signals, processes of dynamic systems; time and frequency characteristics of signals, cepstral parameters of signals, filtering, processes recognition.

Spring 2008   **Data Types and Structures (C++)**.
Abstract types, their implementation and application in design of object-oriented software models, class description methods, class internal structure hiding, external interface description, feature inheritance in class families and their polimorfism, class compositions, critical situation management and template programming.

Summer 2010   **Programming in Python**.
Variables, expressions, and statements, functions, conditionals, fruitful functions, iteration, strings, lists, modules and files, recursion and exceptions, dictionaries, classes and objects, classes and functions, classes and methods, sets of objects, inheritance, linked lists, stacks, queues, trees, debugging.

Fall 2011   **Computing For Life Sciences**.
Unix system, programming in Python, basic background about proteins, DNA, and RNA biological databases, algorithms for biological sequence (DNA, protein) sequence alignment and database search, algorithms for sequence motif search, protein tertiary (3D) structure comparison, protein 3D strucure prediction from amino acid sequence, protein-protein interaction, biological network analysis, systems biology, drug protein interaction.

Fall 2007   **Programming in C**.
Basic terminology of structural programming, notion of algorithm, linear cyclic and branching algorithms, structure of C programming language, data types and variables, control structures, recursive computation, input/output control, subroutines, two dimmential arrays (search, insertion, deletion, sorting), elementary strings and file processing. Programming style and guidelines.

Fall 2008   **Programming in Java**.
Objects and classes, OOP principles, the Object class, reflection, garbage collection, java project structure, assert conditions, Java I/O system, text processing, collections framework, generics, threads, JFC/Swing, applets, processing XML with Java, networking (client-server applications).

Other courses taken:

Fall 2012   **A Crash Course on Creativity**.
Opportunity recognition, reframing problems, challenging assumptions, connecting and combining ideas, working on creative teams, and mastering a mindset of innovation.

Spring 2008   **Sociology**.
Origins of sociology, classical and contemporary sociological theories, sociological research, social interaction, community and formal organisation, culture and its sociological analysis, socialization, deviations and social control, social stratification and mobility, global stratification, sociology of families and gender, religion in modern society, sociology of politics and economics.

Fall 2007   **Psychology**.
Psychology is being presented as a field of human inquiry, core topics in psyhology, such as sensation, perception, and consciousness, learning and memory, thought, language and intelligence, motivation and emotion; issues of lifespan change, personality, social psychology, abnormal psychology.

Fall 2004 | **Economics**.

Microeconomics, demand and supply, elasticity of demand and supply, consumer behavior and utility, theory of production, production costs, company behavior in market of perfect competition, monopoly, oligopoly, market of factors of production; basics of entrepreneurship, macroeconomics, evaluation of country's economic achievements, recurrence and evaluation of economical growth, aggregate demand and aggregate supply, fiscal policy and its means, money, banks and monetary policy, inflation, unemployment.

Fall 2006 | **Media and Democracy in the Baltic Region**.

Structures and functions of the media and its effects in the Baltic Region, political awareness, economic, social and technological forces that shape the development of the media in the Baltic countries, major problems and dilemmas of establishing the media as a new institution in the New Political World, contemporary issues stemming from globalization of media institutions, messages and audiences.

Spring 2005 | **Microelectronics**.

Quantum theory of solids, metals, dielectrics and semiconductors, doped semiconductors, contact metal-semiconductor, diode, voltamperic characteristic, thermoelectric effects in semiconductors, transistors, integrated circuits, magnetic properties of materials, paramagnetics and diamagnetics, ferromagnetics, superconductivity, electromagnetic field, Maxwell equations, optics, diffraction and interference, polarization, light propagation in materials, optical waveguides, fundamentals of microelectronics, acoustoelectronics.

Applied Physics.

Kinematics, momentum conservation law, energy, energy conservation law, oscillations and waves, elastic waves, superposition of oscillations, interference, standing waves, thermodynamics, the First and the Second laws of thermodynamics and theirs applications, statistical interpretation, entropy, diffusion, thermal conductivity and viscosity, electric field, electric current, classical theory of conductivity, Ohm and Jaule-Lenz laws, Kirchhoff rules, methods of direct current electric circuits analysis.

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