

K.Srinivasan - ஸ்ரீநிவாஸன் கண்ணன் - श्रीनिवासन् कण्णन्

(also spelt as: Srinivasan Kannan, Ka.Shrinivaasan,
Shrinivas Kannan)

Permanent Address:

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S/O. (Late) P.R.ES.Kannan,
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kashrinivaasan@live.com

Mobile :9789346927

Name spellings in

consultancy/employer/academic

records : K.Srinivasan (academics, BaaN,Sun
Microsystems), Kannan Srinivasan (Sun
Microsystems),

Srinivasan Kannan (Verizon, Clockwork
Interviews, CloudEnablers),
Shrinivas Kannan(webMethods/SoftwareAG and
CMI), Ka.Shrinivaasan (Global Analytics)

Personal website(research) :-

<https://acadpdrafts.readthedocs.io>

NeuronRain Documentation:- [https://neuronrain-
documentation.readthedocs.io/en/latest/](https://neuronrain-documentation.readthedocs.io/en/latest/)

Krishna iResearch Open Source Repositories:

[https://sourceforge.net/users/ka_shrinivaasan,](https://sourceforge.net/users/ka_shrinivaasan)

[https://github.com/shrinivaasanka,](https://github.com/shrinivaasanka)

<https://gitlab.com/shrinivaasanka>

OpenHub profile:

https://www.openhub.net/accounts/ka_shrinivaasan

Krishna iResearch GitHub Organization:

<https://github.com/Krishna-iResearch>

BRIHASPATI - Private Virtual Classrooms:

GitHub -

Private repositories of virtual classrooms for various commercial online courses (for graduate students and professionals - requires GitHub student logins) - BigData

and Machine Learning, Topics in Mathematics and
Computer Science, Linux Kernel and Cloud, Vedic
Astrology, English, Hindi - <https://github.com/Brihaspathi> -
Consultancy offered on BigData-Machine Learning, Linux
Kernel-Cloud and other IT arena, Vedic Astrology
(Brihaspathi Jyotish Vigyan Kendra -
[https://github.com/Brihaspathi/BrihaspathiJyotishVigyanKen
dra](https://github.com/Brihaspathi/BrihaspathiJyotishVigyanKendra) - ப்ரிஹஸ்பதி ஜ்யோதிஷ் விக்யாந் கேந்த்ரா - Personal reading,
Matrimonial matchmaking,...)

JAIMINI Closed Source Derivative of NeuronRain:

GitHub - <https://github.com/Brihaspathi/jaimini>

SourceForge - <https://sourceforge.net/projects/jaimini/>

GitLab - <https://gitlab.com/shrinivaasanka/jaimini>

LatexPDF CV:

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/CV.pdf

Date of Birth as per records: 19 May 1977

Passport: M9583737

PAN: AOVPS2844F

Aadhaar: 772717942542

Marital status: Unmarried (Never Married)

COMPLETE ACADEMIC AND WORK HISTORY

ACADEMICS

- 1. Elementary Schooling, RC Morning Star, Kumbakonam
(1982-1987)**
- 2. Higher Secondary, Town Higher Secondary**

School,Kumbakonam (1987-1994) (SSLC -470/500 and Plus Two 1115/1200)

3. B.A - Hindi - Praveen Uttarardh - Dakshin Bharat Hindi Prachar Sabha,Chennai (privately tutored from Kumbakonam) - (1988-1992)

4. Bachelor of Engineering (Computer Science & Engg) (1995-99),

PSG College of Technology, Coimbatore-641004 INDIA (CGPA/Percentage: 8.8/87.75)

5. M.Sc (Computer Science), Chennai Mathematical Institute, Chennai (2008 - 10) CGPA 8.08 (coursework - excluding MSc thesis), 8.06(including MSc thesis)

6. Ph.D (Research Scholar in Computer Science), Chennai Mathematical Institute, Chennai (coursework, TAC 2010 - expansion of MSc thesis above - and Complement

Function miniproject - August 2010 - August 2011) - resigned due to personal reasons and went back to Industry. Presently pursuing independent research.

COURSES DONE IN M.Sc and Ph.D and Self-study

M.Sc courses [CMI and IIT-Chennai] and self-study (2008-2010):

Haskell, Operating systems, Distributed systems, Theory of computation, Databases, Logic-1, Complexity-1, Principles of Programming Languages (Java and lambda calculus), Algorithms, Graph theory, Cryptography, Datamining-1, Information Retrieval, Automata, Concurrency, Timed Systems

Ph.D courses[CMI and IMSc] and self study (August 2010

- October 2011):

Complexity-2, Topics in data mining(Recommender Systems, Streaming Algorithms), Randomized algorithms(including PTAS), Logspace computation, Program Verification, Program Analysis, Program Slicing, Computational number theory and algebra, Computational geometry, Expander graphs, Combinatorics(Generating functions), Probabilistic method, Communications Complexity, Linear Programming And Combinatorial Optimization and Computational Biology (BioInformatics) algorithms for sequence alignment.

PUBLICATIONS

(Google Scholar URL - <http://scholar.google.co.in/citations?user=eLZY7CIAAAAJ&hl=en>)

1.(During PhD) Decidability of Existence and Construction of a Complement of a function with Prof.Meena Mahajan, IMSc, 2011

(<http://arxiv.org/abs/1106.4102>)

- Some unreviewed draft additions to the above for Complement Function Circuit and its connection to Riemann Zeta Function, Ramanujan graphs and Ihara Zeta Functions are at:

<http://sourceforge.net/p/asfer/code/HEAD/tree/AstroInferDesign.txt> with some illustrations:

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/RamanujanGraphsRiemannZetaFunctionAndIharaZetaFunction

on.pdf?attredirects=0&d=1 and

<https://github.com/shrinivaasanka/>

[Krishna_iResearch_DoxygenDocs/blob/master/](#)

[kuja27_website_mirrored/site/kuja27/](#)

[RZFAndIZF_25October2014.pdf?attredirects=0&d=1](#)

2.(Master's Thesis) Few Algorithms for Ascertaining Merit of a document (Citation graph Maxflow, Recursive Gloss Overlap Algorithm and Interview algorithm applying either of the previous two with applications of them) with Profs. Ravindran(IIT Chennai) and Madhavan Mukund (CMI) in 2009-2010 - <http://arxiv.org/abs/1006.4458>.

3. (During PhD) Evaluated NIST TAC 2010 dataset (Summarization track) for

Update Summarization by applying Interview Algorithm -

appeared in proceedings of TAC 2010 at:

<http://www.nist.gov/tac/publications/2010/>

[participant.papers/CMI_IIT.proceedings.pdf](http://www.nist.gov/tac/publications/2010/participant.papers/CMI_IIT.proceedings.pdf)

RESEARCH STATEMENTS:

4. Research Statement 1 -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/ResearchStatement2.pdf?attredirects=0

5. Research Statement 2 - with some proof sketches

(includes a new timeout manager algorithm implemented in Global Analytics Decision Platform 3.0) -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenD

[ocs/blob/master/kuja27_website_mirrored/site/kuja27/](https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/PhDThesisProposal.pdf?attredirects=0)

[PhDThesisProposal.pdf?attredirects=0](https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/PhDThesisProposal.pdf?attredirects=0)

6. Research Statement 3 - with some proof sketches -

[https://github.com/shrinivaasanka/Krishna_iResearch_Doxyg](https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/Research_Writeup.pdf?attredirects=0&d=1)

[enDocs/blob/master/kuja27_website_mirrored/site/kuja27/](https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/Research_Writeup.pdf?attredirects=0&d=1)

[Research_Writeup.pdf?attredirects=0&d=1](https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/Research_Writeup.pdf?attredirects=0&d=1)

NeuronRain Theory Drafts (2003-present) - private

unaffiliated research - theory aligned to features of

NeuronRain opensource products

Complexity Theoretic Analysis of Non-majority and Majority Social Choice, Majority Voting Boolean Composition Circuit and KRW Conjecture, P versus NP, ABC Conjecture, Four color Theorem, Zorn Lemma, Axiom of Choice (AOC), XOR Lemma and Hardness Amplification, Circuit Lowerbounds, Pseudorandomness(generators and extractors), Goodness of Voting and Margulis-Russo Threshold/Condorcet Jury Theorem (and its recent versions by [Black], [Ladha]), Theoretical Electronic Voting Machines and Pre-poll -Post-poll Analytics, Vowelless Syllable Boundary Text Compression and Compressed Sensing, Computational Chaos, Polynomial Reconstruction Problem, Complement Functions - Complementary Sets and their Function

Representation(e.g Beatty Functions), Combinatorics (Ramsey coloring of sequences), PAC Learning, Prime-Composite complementation and pattern in primes, Goldbach conjecture, Arithmetic Progressions, Diophantine Analysis and Representation, Riemann Zeta Function, Hypergeometric Functions, Clouds - Logical time and causality(EventNet), Formal Languages (Turing degrees, Embedding in vector space, Lambda Calculus, Category Theory, Logic) and learning lambda expressions from Natural Language Text, Cognitive Psychology - Grounded Cognition and ThoughtNet Evocation, Partial order intrinsic merit rankings and Galois connections, Graph theoretic/Computational Neurolinguistic/Question-Answering Interview Intrinsic Merit/Fitness/Fame and Experiential Learning in the context of WWW (people, text, audio - speech and music, visuals-video and images,

economies) and Social/Economic networks, Social Network Models - Cellular Automaton and Random Graph Diffusion of Concepts-Memes-Fads-Cybercrimes, Game Theory, BKS Conjecture and Question-Answering, Machine Translation, Algorithmic Graph Theoretic Learning Models, Computational Learning Theory, Software Analytics/Program Analysis/Debug Analytics, Operating System Kernel and Scheduler Analytics, Astronomical Analytics of Celestial Bodies and correlations to Seismic-Atmospheric-Oceanic events, Urban planning analytics, Computational Astrophysics - N-body problem, Media Analytics and Advertisement Analytics, Preferential Attachment, Brand Loyalty and Business Intelligence, People Analytics/HR Analytics, Sports Analytics, Handwriting and Face Recognition for unique identification, Fame/Merit Equilibrium (Welfare Functions,

Flow Market Equilibrium and

Convex-Concave Programming in Algorithmic Economics
applied to Fame-Merit) and Economic Merit(Intrinsic
pricing),Cryptocurrencies and Money Trail (EventNet
Graph),Optimal Denomination and Money Changing - Coin
Problem,Mechanism Design, Time series analysis
(economic and weather forecasts), Neural Networks and
Deep Learning, Quantum mechanics and Intrinsic
Fitness/Merit(Bose-Einstein condensation in networks),
Locality Sensitive Hashing and Separate Chaining Hash
tables, Multiple Agent Resource Allocation, Integer
Partitions(additive and multiplicative), Set Partitions,
Space filling/Lagrangian Four Square Theorem
Tiling/Circle Packing, Exact Cover, Random Closed
Packing, Number Theory, Quadratic and Linear

Programming, Cellular Automata, Satisfiability (Least Square SAT Solvers and QBFSAT), Random restrictions and Hastad Switching Lemma, Classical NC-PRAM-BSP (k-mergesort, segment tree, wavelet tree, ray shooting queries, planar point location, sorting networks, local search of rasterized hyperbolic segment arithmetic progressions), Randomized NC and Quantum NC Computational Geometric Integer Factoring, Rasterization of Algebraic Curves, Algebraic Geometry, Knot Theory, Topology and Connections amongst them -

(most recent draft updates to all publications previously

and earlier drafts below - in text

format - nonlinear theoretical writeups interspersed

between NeuronRain code commits in SourceForge,

GitLab and GitHub - links to relevant feature

implementations and theory drafts in design notes of

NeuronRain repositories -

AstroInfer,USBmd,VIRGO,KingCobra,GRAFIT,Krishna_iResearch_Doxygen_Docs,Acadpdrafts):

Krishna_iResearch_DoxygenDocs (GitHub)

Krishna_iResearch_DoxygenDocs (GitLab)

Krishna_iResearch_DoxygenDocs (SourceForge)

Earlier Drafts:

7.(draft1) IntegerPartitions and Hash Functions

[\(https://github.com/shrinivaasanka/Krishna_iResearch_Doxy
genDocs/blob/master/kuja27_website_mirrored/site/kuja27/
IntegerPartitionAndHashFunctions.pdf?attredirects=0\)](https://github.com/shrinivaasanka/Krishna_iResearch_Doxy/genDocs/blob/master/kuja27_website_mirrored/site/kuja27/IntegerPartitionAndHashFunctions.pdf?attredirects=0)

8.(draft2) IntegerPartitions and Hash Functions

[\(https://github.com/shrinivaasanka/Krishna_iResearch_Doxy
genDocs/blob/master/kuja27_website_mirrored/site/kuja27/
IntegerPartitionAndHashFunctions_2014.pdf?
attredirects=0&d=1\)](https://github.com/shrinivaasanka/Krishna_iResearch_Doxy/genDocs/blob/master/kuja27_website_mirrored/site/kuja27/IntegerPartitionAndHashFunctions_2014.pdf?attredirects=0&d=1)

9.(draft1) Interview Algorithm is in $IP=PSPACE$

[\(https://github.com/shrinivaasanka/Krishna_iResearch_Doxy
genDocs/blob/master/kuja27_website_mirrored/site/kuja27/
InterviewAlgorithmInPSPACE.pdf?attredirects=0\)](https://github.com/shrinivaasanka/Krishna_iResearch_Doxy/genDocs/blob/master/kuja27_website_mirrored/site/kuja27/InterviewAlgorithmInPSPACE.pdf?attredirects=0)

10.(draft1) Few Non-trivial questions and Shell Turing

Machines

(https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/UndecidabilityOfFewNonTrivialQuestions.pdf?attredirects=0)

11. (draft1) Lower Bounds for Majority Voting and Pseudorandom choice -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/LowerBoundsForMajorityVotingPseudorandomChoice.pdf

12. (draft1) Circuits for computation of error probability in majority voting -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/CircuitForComputingErrorProbabilityOfMajorityVoting.pdf

CircuitForComputingErrorProbabilityOfMajorityVoting.pdf

13. (draft2) Circuits for computation of error probability in majority voting -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/

CircuitForComputingErrorProbabilityOfMajorityVoting_2014.pdf

14. (draft1) Indepth analysis of a variant of Majority Voting with relation to ZFC -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/IndepthAnalysisOfVariantOfMajorityVotingwithZFAOC.pdf?attredirects=0

15. (draft2) Indepth analysis of a variant of Majority

Voting with relation to ZFC -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/IndepthAnalysisOfVariantOfMajorityVotingwithZFAOC_2014.pdf?attredirects=0

16.(draft1) [A Chaos theoretic Parallel Pseudorandom generator in RNC For Majority Voting and Pseudorandom Choice](https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/ChoiceGeneratorinRNCForMajorityVotingandPseudorandomChoice.pdf?attredirects=0)

(https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/ChaoticPRG.pdf?attredirects=0)

17. (draft1) [Analysis of a Randomized Space Filling Algorithm and its Linear Program Formulation](https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/AlgorithmAndItsLinearProgramFormulation.pdf?attredirects=0)

(https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/AlgorithmAndItsLinearProgramFormulation.pdf?attredirects=0)

[genDocs/blob/master/kuja27_website_mirrored/site/kuja27/Analysis%20of%20a%20Randomized%20Space%20Filling%20Algorithm%20and%20its%20Linear%20Program%20Formulation.pdf?attredirects=0\)](http://genDocs/blob/master/kuja27_website_mirrored/site/kuja27/Analysis%20of%20a%20Randomized%20Space%20Filling%20Algorithm%20and%20its%20Linear%20Program%20Formulation.pdf?attredirects=0)

18. (draft2) Analysis of a Randomized Space Filling Algorithm and its Linear Program Formulation (Parallel PRG and Cellular Automaton algorithm) -

<http://sourceforge.net/p/asfer/code/HEAD/tree/AstroInferDesign.txt>

19. (draft1) Discrete Hyperbolic Polylogarithmic Sieve For Integer Factorization (version 1) -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/DiscreteHyperbolicPolylogarithmicSieveForIntegerFactorization.pdf

[attredirects=0&d=1](#)

20. (draft2) Discrete Hyperbolic Polylogarithmic Sieve For Integer Factorization - with Interpolation Search (version 2) -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/DiscreteHyperbolicPolylogarithmicSieveForIntegerFactorization_updated_interpolation_search.pdf?attredirects=0&d=1

21. (draft3) Discrete Hyperbolic Polylogarithmic Sieve For Integer Factorization - with Interpolation Search (version 3) -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/DiscreteHyperbolicPolylogarithmicSieveForIntegerFactorization_updated_interpolation_search.pdf?attredirects=0&d=1

[tion_updated_interpolation_search_30June2013.pdf?](#)

[attredirects=0&d=1](#)

22. (draft4) Discrete Hyperbolic Polylogarithmic Sieve For Integer Factorization - with Interpolation Search (version 4 and version 5 with handwritten illustrations and calculations) -

http://sourceforge.net/projects/acadpdrafts/files/DiscreteHyperbolicPolylogarithmicSieveForIntegerFactorization_updated_interpolation_search.pdf/download

23. (draft5) Discrete Hyperbolic Polylogarithmic Sieve For Integer Factorization - using Rectangular Binary (or) Interpolation Search

<http://sourceforge.net/projects/acadpdrafts/files/>

[DiscreteHyperbolicPolylogarithmicSieveForIntegerFactoriza](#)

tion_updated_rectangular_interpolation_search.pdf/

download

24. (draft6) Informal Notes on Derivation of Upperbound

for Discrete Hyperbolic Factorization with Stirling

Formula - using Rectangular Binary or Interpolation

Search (

<http://sourceforge.net/projects/acadpdrafts/files/>

DiscreteHyperbolicFactorization_UpperboundDerivedWithSt

irlingFormula_2013-09-10.pdf/download)

25. (draft7) Discrete Hyperbolic Polylogarithmic Sieve For

Integer Factorization - using Rectangular Binary (or)

Interpolation Search and Upperbound derived with

Stirling Formula

<http://sourceforge.net/projects/acadpdrafts/files/DiscreteHyperbolicPolylogarithm>

[micSieveForIntegerFactorization_updated_rectangular_interpolation_search_and
_StirlingFormula_Upperbound.pdf/download](#)

(a C++ implementation of this algorithm is at:

<http://sourceforge.net/p/asfer/code/HEAD/tree/cpp-src/miscellaneous/DiscreteHyperbolicFactorizationUpperbound.cpp>

and factorization result logs at:

<http://sourceforge.net/p/asfer/code/HEAD/tree/cpp-src/miscellaneous/>)

26. (draft8) An NC algorithm and some Sequential Search Algorithms for Discrete Hyperbolic Polylogarithmic Sieve For Factorization using Binary or Interpolation Search with Stirling Formula and Logarithmic Sorted Tile Merge in PRAM model -

http://sourceforge.net/projects/acadpdrafts/files/DiscreteHyperbolicPolylogarithmicSieveForIntegerFactorization_PRAM_TileMergeAndSearch_And_Stirling_Upperbound.pdf/

[download](#)

27. (draft 9) Parallel RAM algorithm for Discrete

Hyperbolic Factorization - AsFer PRAM implementation

design notes with tile id(s)

(<http://sourceforge.net/p/asfer/code/HEAD/tree/asfer-docs/ImplementationDesignNotesForDiscreteHyperbolicFactorizationInPRAM.jpg>)

28. (draft10) Computational Geometric Factorization - An NC algorithm and some Sequential Search Algorithms for Discrete Hyperbolic Polylogarithmic Sieve For Factorization using Binary or Interpolation Search with Stirling Formula and Logarithmic Sorted Tile Merge in PRAM model - updated draft with PRAM to NC reduction

and input size details and references -

http://sourceforge.net/projects/acadpdrafts/files/DiscreteHyperbolicPolylogarithmicSieveForIntegerFactorization_PRAM_TileMergeAndSearch_And_Stirling_Upperbound_updateddraft.pdf/download

29. Individual Invention Disclosure for Survival Index Based Transaction Timeout

Manager (Sun Microsystems) - 2002-2003

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/SurvivalIndexBasedTxnTimeoutManager.pdf?attredirects=0

30. AstroInfer (AsFer) Open Source Product Design with theoretical interludes which substantially expand on the publications above -

<http://sourceforge.net/p/asfer/code/HEAD/tree/asfer-docs/AstrolInferDesign.txt>

31. VIRGO Open Source Product Design with theoretical interludes -

<http://sourceforge.net/p/virgo-linux/code-0/HEAD/tree/trunk/virgo-docs/VirgoDesign.txt>

32. King Cobra - Byzantine distributed request servicing software design with queues and arbiters - theoretical interludes -

<https://sourceforge.net/p/kcobra/code-svn/KingCobraDesignNotes.txt>

33. (draft1) [Informal notes - 1 : on Implication Graphs, Error probability of Majority Voting and P Versus NP](#)

Question

<http://sourceforge.net/projects/acadpdrafts/files/>

[ImplicationGraphsPGoodEquationAndPNotEqualToNPQuestion_excerpts.pdf/download](#)

34. (draft1) Informal notes - 2 : on Minimum Convex

Hulls of Implication Graphs and Hidden Markov Model on
class nodes of Concept Hypergraph

35. (draft1) Informal notes - 3 : on Minimum Convex

Hulls of Implication Random Growth Networks and
Perfect Voter Decidability

36. (draft1) Informal handwritten notes on Philosophical

Analysis of Democracy Circuit and Pseudorandom Choice -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/PhilosophicalAnalysisOfDemocracyCircuitAndPRGChoice_2014-03-26.pdf

37. (draft1) Informal Handwritten Notes - Distinct Partitions, Hash collision chains and Schur Theorem -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/SchurTheoremMCPAndDistinctPartitions_2014-04-17.pdf

38. (draft1) Document Summarization from WordNet Subgraph obtained by Recursive Gloss Overlap -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/DocumentSummarization_using_SpectralGraphTheory_RGO

[Graph_2014.pdf?attredirects=0&d=1](#)

39. (draft1) Arrow's Theorem, Circuit For Democracy and Pseudorandom Choice and P Versus NP -

https://github.com/shrinivaasanka/Krishna_iResearch_DoxxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/CircuitsForDemocracyAndPseudorandomChoice_and_PVsNP.pdf?attredirects=0&d=1

40. (draft1) Krishna iResearch Open Source Products

(AsFer, USBmd, VIRGO, KingCobra, Acadpdrafts) - High Level Handdrawn Architecture Diagram -

http://sourceforge.net/p/acadpdrafts/code/ci/master/tree/Krishna_iResearch_opensourceproducts_archdiagram.pdf

41. (draft1) Miscellaneous notes on Krishna iResearch
Open Source products design, Democracy Circuit,
Complement Function circuit and Parallel RAM to NC
reduction for ANSV algorithm in Discrete Hyperbolic
Factorization




TEAM PATENTS (Sun Microsystems-

Oracle)

1 8,521,8
75 **T** Identity for data sources

28,145 Dynamically configurable resource pool
,759 **T**

37,743 Common transaction manager interface for local
,083 **T** and global transactions

<u>47,739</u>	<u>Read/write lock transaction manager freezing</u>
<u>,252</u>	
<u>57,640</u>	<u>Transaction manager freezing</u>
<u>,545</u>	
<u>67,610</u>	<u>Simultaneous global transaction and local</u>
<u>,305</u>	<u>transaction management in an application server</u>
<u>77,165</u>	<u>Transaction optimization of read-only data</u>
<u>,061</u>	<u>sources</u>
<u>87,134</u>	<u>Utility for configuring and verifying data sources</u>
<u>,008</u>	
<u>97,082</u>	<u>Specifying transaction manager type at various</u>
<u>,432</u>	<u>application levels</u>

Disclosure - Patent Pending (Copyright: Sun

Microsystems/Oracle - 2002 - Reference Number: P8490)

Survival Index Based Transaction Timeout Manager (Java

PoC implemented on SunOne-iPlanet Application Server

6.5 J2EE-JTS Transaction Manager - now GlassFish

- <https://github.com/javaee/glassfish/tree/master/appserver>)

DETAILS OF WORK (1999 – Present)

C/C++/Java/Python on Windows and various Unix flavours

PRODUCTS

Netscape Application Server 4.0, iPlanet/SunONE

Application Server 6.x, SunONE Web/Proxy Server 3.6/4.0,

Apache web server 1.4.x/2.0.x, webMethods Broker

Messaging Server 5.x/6.x/7.x, ASFER Classification and

Inference Software for Large Data Sets

(10.0,12.0,14.9.9,15.1.8,15.6.15), USBmd

(1.0,3.0,14.9.9,15.1.8,15.6.15), VIRGO Linux Kernel

Extensions for Cloud

(5.0,6.0,7.0,8.0,10.0,12.0,14.9.9,15.1.8,15.6.15), Global

Decision Platform(GDP) 2.3.0/ 2.3.1/ 2.5.0/ 2.5.1/ 2.7

/2.7.1/3.0, KingCobra (1.0,14.9.9,15.1.8,15.6.15),

Automated Modelling Platform(AMP), Python 2.4.3 and 2.7

source code, Linux kernel [3.2.0, 3.7.8, 3.9.x, 3.15.5,

4.0.5, 4.1.5, 4.10.3, 4,13,3], Maitreya's Dreams 7.0.3, STL,

BOOST, wxWidgets library, Swiss Ephemeris API (based

on NASA JPL DE406 Ephemeris).

LANGUAGES/PLATFORMS/TOOLS

C/C++, Java 1.5-1.8, J2EE, Python, R and rpy2, Haskell, Solaris 6-10, Windows 2000, HP-UX 11.23 (PA-RISC and IA64), AIX, Linux, Sun Studio, CORBA (Visibroker), VAX FORTRAN, VAX VMS, GNU collection, MS Visual Studio .NET C++, WinDbg, DDD, Visual Basic and ASP, OptimizIt, Eclipse, EclipseCDT, Code::Blocks, ActiveState Python, Cython, IDLE, Haskell FP, Insight, GreatCircle, Valgrind, Callgrind, Python Dumbo MapReduce on Hadoop, Python NLTK, Java MapReduce on Hadoop, Apache HBase, Apache Pig, Apache Hive, Apache Cassandra, Apache Mahout, Apache Spark, Pygraphs, GraphViz, DOT, PiCloud, ActiveMQ, RabbitMQ, Pyutilib workflow, PyF workflow, Linux kernel - [3.2.0, 3.7.8, 3.9.x, 3.15.5, 4.0.5, 4.1.5, 4.10.3, 4.13.3], Maitreya's Dreams 7.0.3, wxWidgets library, Swiss Ephemeris API (based on NASA JPL DE406 Ephemeris), BioInformatics Sequence

Alignment Tools (BioPython, ClustalOmega), ROOT(CERN),
Geolocation Python API, Beautiful Soup, CRF tools, GATE,
SentiWordNet, Stanford CoreNLP, ENT, MongoDB, WEKA,
Jinja2,Flask,Cloud related - Corestack, Openstack, Mistral,
Jclouds, Libcloud, Docker etc.,Tornado,ZeroMQ,Kafka

May 2003 - present - Krishna iResearch (parallel, self-
started, not-for-profit, non-funded, open-source long-term
research initiative) -

https://sourceforge.net/users/ka_shrinivaasan ,

<https://github.com/shrinivaasanka> ,

<https://gitlab.com/shrinivaasanka>

Working on Research, Design and Development of open

source projects - a machine-learning, cloud and queue augmented Linux kernel - NeuronRain - started by self, copyleft licensed under GPL v3 . Premium technical support is available for above opensource codebases. The GitHub repositories implement NeuronRain Green (for cloud and generic datasets), SourceForge repositories implement NeuronRain Research (for astronomical datasets) and GitLab repositories implement NeuronRain Antariksh (for Drone development). An introductory presentation on NeuronRain based Analytics is at:

https://github.com/shrinivaasanka/Grafit/blob/master/EnterpriseAnalytics_with_NeuronRain.pdf

Latest version 2022#10#01:

1. NEURONRAIN - Krishna_iResearch_DoxygenDocs - FAQ

and Documentation for AsFer, VIRGO, KingCobra,
Acadpdrafts and USBmd open source product codebases
which are subsystems of Krishna iResearch Intelligent
Cloud OS - NeuronRain

(https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs ,
<http://neuronrain-documentation.readthedocs.io/en/latest/>)

2. NEURONRAIN - AsFer - AstroInfer astronomy and
astrology machine learning inference open source
software which uses algorithms viz.,

2.1 Bayesian Classifier,

2.2 Support Vector Machines,

2.3 Decision Tree Classifier,

2.4 String mining - Pairwise String Sequence
Alignment (Needleman-Wunsch) ,

2.5 String mining - Multiple String Sequence

Alignment(BioPython,ClustalOmega),

- 2.6 String mining - Powerset construction (C+++) and String matching implementation in python(Jellyfish distance measures like Jaro-winkler, Edit-distance, Phonetic Matching rate etc.,) and
- 2.7 Parsers and Encoding features for USGS and NOAA HURDAT2 data
- 2.8 Automated Generation of Training and Test set for Classifiers that segregate the datasets into Event Classes and Automated generation of encoded astronomical object files specific to each Event Class.
- 2.9 Computational Geometric Factorization - Implementation of Bitonic K-MergeSort of Tiles in Pixelated Hyperbolic Arc (Sequential and PRAM) (for drafts in

https://github.com/shrinivaasanka/Krishna_iResearch_DoxygenDocs/blob/master/kuja27_website_mirrored/site/kuja27/) - A Spark-Python-

C++ implementation of Parallel NC Factorization

has been included which internally executes NC

Bitonic tiles Parallel Merge Sort on Spark Cloud.

2.10 A Concept Hypergraph and HMM(Hidden Markov Model) based Experimental Inference Model Design inspired by Cognitive Psychology - a minimal sentiwordnet evocatives implementation of this sans HMM named ThoughtNet is part of AsFer

2.11 Design for extracting patterns from numerical data

2.12 Time Series Analysis - A Chaos Attractor implementation that generates a sequence of numbers using logistic equation and uses Python and R to compute a correlation coefficient between

a non-Chaotic and Chaotic sequence of numbers.

2.13 Discrete Fourier Transform computation for
a parsed numerical input sequence using Python
and R

2.14 Time Series Analysis - Spline interpolation,
LOESS regression, Approximate Linear Polynomial
interpolation and graph plot for a parsed numerical
input sequence using Python and R (at present
implemented for Dow Jones Industrial Average
historical dataset and Riemann Zeta Function Zeros
dataset)

2.15 An Experimental Text Compression algorithm
that uses Hidden Markov Model Maximum
Likelihood Estimation based on a String Complexity
measure that compresses vowels in text

2.16 An Experimental Minimum Description

Length implementation that uses the previous string complexity measure, computes MDL using Kraft inequality and Shannon entropy.

2.17 Probabilistic Approximate Correct - PAC -

Learning Implementation related to

<http://arxiv.org/abs/1106.4102>

2.18 Wagner-Fischer edit distance implementation for pairwise similarity of encoded strings

2.19 An example implementation of Interview

Algorithm and Intrinsic Merit Ranking for :

<http://arxiv.org/abs/1006.4458> and

http://www.nist.gov/tac/publications/2010/participant.papers/CMI_IIT.proceedings.pdf

2.20 An experimental Expirable Objects implementation

2.21 Linear and Logistic Regression

2.22 K-Means clustering implementation

2.23 K-Nearest Neighbours supervised classifier
implementation

2.24 Linear Perceptron with Gradient Descent
Learning

2.25 Encoding of Maitreya Dreams to strings and
some bugfixes for SWISS Ephemeris degree computation
errors

2.26 An experimental logical clock for cloud -
EventNet - using Python pygraphs and C++ boost::graph
with GraphViz rendering (from dot files)

2.27 Longest Common Substring implementation
for extracting common patterns in already classified and
clustered encoded strings dataset

2.28 Python script for translating the Pairwise
Longest Common Substrings obtained from a cluster of

Kmeans or KNN clustered astronomical dataset into rules that correlate location of astronomical entities to a class of events.

2.29 Utility Knuth-Morris-Pratt String Match algorithm implementation

2.30 Multipurpose bigdata analytics subsystem (storage abstraction on Cassandra/Hbase/Hive/File) for computing metrics from datasets before and after processing by above ML algorithms.

2.31 Streaming Algorithms - Flajolet-Martin LogLog and HyperLogLog Counter implementations for computing cardinality (distinct elements) in streamed multiset data

2.32 Streaming Algorithms - CountMinSketch implementation for computing frequencies (heavy hitters) of elements in streamed multiset data

2.33 Streaming Algorithms - Bloom Filter

implementation for membership query in streamed multiset data stored in Apache Cassandra/Hbase/Hive/File NoSQL tables or disk and stream-simulated through python Generator/Iterable abstraction

2.34 Pig script clients for Hbase/Hive and

Python clients for Hive/Cassandra/Hbase

2.35 Apache Spark Python RDD Transformation

MapReduce script for mining Linux kernel logs and exporting the mined data as config to VIRGO

kernel_analytics module. This integrates the AsFer or other Machine Learning algorithms into VIRGO Linux Kernel (with USBmd, KingCobra modules).

2.36 Sequence Mining of ordered encoded strings

(Apriori GSP Algorithm) for inferring Class Association Rules for USGS Earthquake datasets

2.37 Named Entity Recognition using Conditional Random Fields and Hidden Markov Models (skew normal distribution - by finding Viterbi path through Viterbi Dynamic Programming Algorithm)

2.38 Graph Search - Mine for Graph Relations (and render them in graphics) in Text Data by constructing the WordNet subgraph using the recursive gloss overlap algorithm in <http://arxiv.org/abs/1006.4458> and http://www.nist.gov/tac/publications/2010/participant.papers/CMU_IIT.proceedings.pdf

2.39 New Unsupervised text classification algorithm implementation that computes nodes with prominent core numbers and PageRanks (nodes with high core-numbers and PageRanks are names of the classes) in the definition graphs obtained by Recursive Gloss Overlap algorithm above.

2.40 Lambda Expression Compositionality from the depth first search closure of Recursive Gloss Overlap graph obtained from a text projected to WordNet.

2.41 Social Network Analysis - Graph creation from social networking sites data (LinkedIn profiles, Twitter Followers etc.,) and their Psycho-Social-Sentiment Analysis (Bonacich Power Centrality, Eigen Vector Centrality, Recursive Gloss Overlap Graph Sentiment Belief Propagation and SentiWordNet based sentiment scoring etc.,)

2.42 Cloud Object Move (or) Cloud Perfect Forwarding implementation - This is a standalone client-server implementation that extends C++ `std::move()` and rvalue references to moving objects across cloud without copies. Functionality similar to this is required in KingCobra Neuro currency object transactional move

without duplication.

2.43 Deep Learning - Convolution Neural Networks implementation (multifeature kernel maps) for a primitive pattern recognition

2.44 Deep Learning - Backpropagation in Multilayered Neural Networks implementation - applied to a Software Analytics usecase of CPU and Memory usage

2.45 Sequence Mining of ordered encoded strings (Apriori GSP Algorithm) for inferring Class Association Rules for HURDAT2 NOAA Hurricane datasets

2.46 Dependency Injection based BigData Storage Backend Abstraction subsystem for SQL and NoSQL (MySQL, MongoDB etc.,)

2.47 C++-Python Embedding - Python CAPI Embedding which executes python machine learning scripts from C++

2.48 Config File Support for selectively enabling/disabling AsFer algorithms.

2.49 Web Spider implementation for crawl-scrape of URLs (e.g streamed news updates) with Scrapy Framework

2.50 Sentiment Analyzer implementation (with RGO algorithm etc.,) for Spidered Texts (e.g streamed news updates)

2.51 Streaming Frequency Estimation (Heavy Hitters) with CountMeanMinSketch implementation

2.52 An expanded implementation of Interview Algorithm and Intrinsic Merit Ranking with added complexity-machine learning theoretical analysis for :

<http://arxiv.org/abs/1006.4458> and

http://www.nist.gov/tac/publications/2010/participant.papers/CMI_IIT.proceedings.pdf

that ranks a crawled-spidered webpage, writes a DOT file of the graph, visualizes the RGO NetworkX graph in matplotlib, constructs a junction tree and computes standard qualitative graph complexity measures (viz., connectivity, mincut, treewidth of junction tree etc.,) where as intrinsic merit is quantitative (depends on number of edges, vertices, extent of overlap and depth of recursion)

2.53 A rule search script that sifts through a range of astronomical data (with Maitreya-Swiss Ephemeris) and matches sequence mined rules from past training data to predict future weather phenomena (experimental).

2.54 Python Tornado based WebService that exposes REST API via a browser GUI in URL

http://host:33333/neuronrain_auth At present a login and simple template that accepts AsFer scripts and arguments

as inputs and executes, has been implemented (and an experimental redundant AngularJS client interface) With this NeuronRain is a SaaS and PaaS product that can be deployed on Cloud OS and Containers like Docker.

2.55 Apache Spark MapReduce implementation of Interview Algorithm and Intrinsic Merit Ranking (Global MemCache and Local dict() cache enabled) that parallelizes Recursive Gloss Overlap graph construction algorithm in:

<http://arxiv.org/abs/1006.4458> and

http://www.nist.gov/tac/publications/2010/participant.papers/CMI_

[IIT.proceedings.pdf](#)

and is thus deployable on large scale clouds. Presently benchmarked on single node Spark cluster with local threads SparkContext and various spark-defaults.conf settings.

2.56 Singular Value Decomposition and Principal Component Analysis - R+cpy2 wrapper implementation.

2.57 Approximation with a Probability Distribution - Kullback-Leibler Divergence

2.58 Basic statistics - L1,L2 norms, median etc.,

2.59 A Generic Theory and Implementation of Recursive Lambda Function Growth Learning Algorithm based on Cognitive and Psycholinguistics of which Recursive Gloss Overlap implementation is a special case.

2.60 Python-C-VIRGO Kernel - Cpython extensions - invoking VIRGO system calls (both VIRGO32 and VIRGO64 kernels) from Python userspace for dynamic setting of kernel analytics config key-value pairs

2.61 Python-C++-VIRGO Kernel - Boost::Python extensions - invoking VIRGO system calls(both VIRGO32 and VIRGO64 kernels) from Python userspace for dynamic

setting of kernel analytics config key-value pairs

2.62 Cython Python-C compiler Optimization of previous PySpark Interview Algorithm implementation that has been benchmarked on single node cluster to have substantial performance gains.

2.63 Software Analytics - SATURN Program Analysis Software integrated with VIRGO - SATURN error logs are analyzable by AsFer.

2.64 Perl WordNet::Similarity support and WordNet hypernym-hyponym path subroutine for 2 text words.

2.65 Bitonic Sort implementation - Serial and Parallel on Spark - This can be used as a bigdata sorting tool for numeric data which is in NC when run on Cloud and is $O(n \log n)$ in serial. In the absence of PRAM implementation, NC Bitonic Sort has been invoked as a suitable alternative in parallel tile merge sort step of

Parallel Discrete Hyperbolic Factorization Implementation.

2.66 Long Term Short Term Memory Recurrent
Neural Networks implementation

2.67 Reinforcement Learning - Contextual Multi
Armed Bandit Evocation based on ThoughtNet - Monte
Carlo Policy Search implementation and ThoughtNet
evocative actions based implementation

2.68 File and Neo4j Graph Database ThoughtNet
hypergraph storage backend (which can be generalized to
store any graph relations including WordNet subgraphs
constructed by Recursive Gloss Overlap and can be
queried in NoSQL)

2.69 Automatic ThoughtNet Hypergraph Creation
from Recursive Gloss Overlap classified edges input from
environment.

2.70 Software Analytics - Spark computed Cyclomatic

Complexity of codebases from VIRGO linux SATURN
driver generated .dot graph files

2.71 Audio Pattern Mining - Machine learning of
patterns in music samples by computing Jensen-Shannon
Divergence Distance between Fast Fourier Transform
Frequency Probability Distributions of music data

2.72 Patterns within Strings - Longest Repeated
Substring Implementation by Suffix Arrays - as a special
case pattern in binary encoded time series data is
retrieved.

2.73 Locality Sensitive Hashing Implementation - for
clustering similar documents and nearest neighbour
search.

2.74 ZeroMQ CLI client and server frontend for
concurrent requests to NeuronRain

2.75 Kafka Message Queue backend for AsFer

datasource abstraction which includes KingCobra request-reply disk persisted queue.

2.76 Boyer-Moore Algorithm implementation for finding Majority element in Streaming Sequences.

2.77 Graph Mining - GSpan algorithm implementation for graph substructure mining - for extracting patterns in text-graphs and ThoughtNet/EventNet Graphs.

2.78 ThoughtNet Hypergraph Evocation based Recommender Systems Implementation

2.79 Software Analytics - by Deep Learning (Convolution, RecurrentLSTM, RecurrentGRU, BackPropagation) from system performance logs

2.80 Polynomial representation of text strings and distance measures based on it (L2 norms and Jensen-Shannon divergence) - alternative to edit distance

2.81 Polynomial Reconstruction - Error correcting

codes - BerlekampWelch decoder implementation

2.82 Approximate polynomial time 3SAT Solver - solves 3SAT with high probability depending on error of least squares algorithm (LSMR/LSQR/CVXOPT)

2.83 Java Spark Streaming and ETL for analyzing generic arbitrary URL data - extracts text from any URL with Jsoup and does Spark Dstream and RDD transformations and actions on it.

2.84 Deep Learning - Convolution Networks + Backpropagation Multilayered Neural Networks implementation for image pattern recognition(PILlow imaging library support).

2.85 Deep Learning - Recurrent Neural Networks - Gated Recurrent Unit implementation

2.86 Unified Streaming Abstract Generator ETL pipeline (Jsoup + Java Spark Streaming

Parquet/Kafka/Cassandra/Hive/Logfiles + Java/Python

Spark transformations and Loading)

2.87 Cloud implementations of recursive gloss overlap graph intrinsic merit, bitonic sort have been Benchmarked with Spark 2.1.0 and HiveServer2 Metastore is supported

2.88 Recursive Lambda Function Growth - Random Walk based intrinsic merit computation by growing recursive lambda function composition tree for each random walk in Recursive Gloss Overlap Graph of a text

2.89 Korner Graph Entropy - an alternative Quantitative Intrinsic Merit measure for Recursive Gloss Overlap graph of a text

2.90 Usecases for deploying NeuronRain

2.91 Graph Theoretic alternative instrinsic measures for Recursive Gloss Overlap Graph based on Kleinberg small world lattice, Cheeger Constant

2.92 Index implementation for crawled documents with LocalitySensitiveHashing-Redis key-value store and ThoughtNet Hypergraph as backends

2.93 Small World Indexless Hyperball web crawler - based on Stanley Milgram, Kleinberg lattice Small world experiments and Hyperball algorithm.

2.94 Recursive Lambda Function Growth - maps text to a neural network - Graph Tensor Neuron Network Intrinsic Merit which is amalgamation of Graph Neural Network and Tensor Neuron Network for evaluation of lambda function composition tree for each random walk in Recursive Gloss Overlap Graph of a text - supports both WordNet and ConceptNet

2.95 ThoughtNet Index and LSH Index Query from GUI and Rank text by Graph Tensor Neuron Intrinsic Merit and Korner Entropy

2.96 Unguided Text Summarization - based on Unsupervised Recursive Gloss Overlap graph core number classifier: traversal of k-core subgraph and sentences related to prominent core number class vertices

2.97 ConceptNet 5.6 Python RESTful Client implementation (a potential alternative to WordNet) - contains a Common Ancestor algorithm implementation for ConceptNet distance based on /related ConceptNet (word2vec word embedding for similarity) REST endpoint

2.98 Unsupervised text classifier by ranking based on Betweenness Centrality, Closeness Centrality, Degree Centrality of the word vertices in Recursive Gloss Overlap graph of texts.

2.99 Scheduler Analytics from Deep-learnt process performance data for VIRGO Linux Kernel Scheduler (kernel_analytics VIRGO module)

2.100 Expander graphs - Graph Density (regularity lemma) and Bose-Einstein Condensation Intrinsic Fitness merit measures for Recursive Lambda Function Growth definition graphs of a text

2.101 MAX3CNFSAT ranking of intrinsic merit which unifies outcomes of all intrinsic merit algorithms as variables in a satisfiability CNF and approximately solves it by least squares solver.

2.102 Support Vector Machines Python Implementation

2.103 Computational Geometric Factorization - Spark Implementation of Optimized Parallel Local Binary Search of Pixelated Hyperbolic Arc Tile Intervals for Factor points - found to be faster than Bitonic K-MergeSort based Factorization in dual core single node Spark cluster benchmarks

2.104 Compressed Sensing - Compressed Sketch of an image bitmap - by Moore-Penrose Pseudoinverse

2.105 Non-trivial Proof-of-Work (recreate hash till it has 2 leading ff in hex) and Boost UUID hash (unique id concatenated with denomination) for fictitious Electronic Currency implementation in KingCobra (named "Neuro")

2.106 Neuro currency C++ move semantics - Option to choose between `std::move` and `std::forward` of rvalue reference + `std::move` in zero-copy Perfect Forwarding of Neuro currency message over cloud

2.107 Complement Function Map construction - Diophantine Representation by SymPy Sum of Four Squares Diophantine Solver - for <https://arxiv.org/abs/1106.4102v1>

2.108 Transactional and Secure Neuro Currency Perfect Forward - Neuro cloud `std::move` has been

openssl enabled and done in Python transaction manager
boundary begin()/commit()

2.109 Implementation of Locality Sensitive Hashing
based Algorithm for searching Unsorted Lists by
dimension lift of one dimensional numerical dataset
(similar to Mercer polynomial kernel)

2.110 Socket Streaming Generic Server Decorator for
Streaming Analytics - iterator function has to be
implemented for a datasource and must be decorated by
this Generic Socket Server - userspace counterpart of
streaming kernel analytics in VIRGO64

2.111 Sequential Optimization algorithm for
Computational Geometric Factorization

2.112 Integer Factorization by Brahmagupta/Pell
Diophantine Equation Solver

2.113 Computational Geometric Factorization -

Approximate and sometimes exact Integer Factoring by
Hardy-Ramanujan Ray Shooting Queries

2.114 Recursive Lambda Function Growth - Rich Club
Coefficient and Simple Cycles based graph tensor neuron
intrinsic merit

2.115 Computational Geometric Factorization -
Approximate Integer Factoring by Hardy-Ramanujan-Prime
Number Theorem, Cramer, Baker-Harman-Pintz, Zhang
prime factors estimate ray shooting queries

2.116 ThoughtNet and Recursive Lambda Function
Growth integration - ThoughtNet hypergraph edges are
weighed either by SentiWordNet or Graph Tensor Neuron
Network intrinsic merit

2.117 Epsilon bias non-uniform choice of literals for
unequal number of variables-clauses and New efficiency
measure for LSMR/LSQR SAT solver - real parity

2.118 Scheduler Analytics - Deep Learning

(GRU,ConvNet,BackPropagation,LSTM) Scheduler Class
analytics for process performance stream dataset created
from Psutils and Graphic performance stream dataset
(stream of images) created from Perf/BPF

2.119 Social Network Analysis - Facebook Graph

REST API Analytics on Python 3.4

2.120 Quantum NC algorithm for Computational

Geometric Factorization - counterpart of classical PRAM-
NC k-mergesort/segment-tree Computational Geometric
Factorization

2.121 Deep Learning - Reinforcement Learning

Recommender Systems and Recursive Lambda Function
Growth integration - Recommender systems hypergraph
edges are weighed either by SentiWordNet or Graph
Tensor Neuron Network intrinsic merit

2.122 Spark Structured Streaming (Java 1.8 + Spark 2.4.x) for advertisement analytics - periodic word, count, timestamp information in DataFrames - windowed and non-windowed (timestamped)

2.123 Computational Geometric Factorization
Algorithm based on Parallel construction of Wavelet Tree on PRAMs/Multicore

2.124 Latent Semantic Analysis/Indexing of term-document matrices and Low Rank Approximation

2.125 Software Analytics - Userspace Runtime FlameGraph (along with Perf) and Valgrind/Callgrind/Kcachegrind Call Graph creation

2.126 Software Analytics - Graph Mining of linux kernelspace SATURN Control Flow Graph and userspace Valgrind/Callgrind/Kcachegrind Call Graph DOT files by Gspan algorithm

2.127 Streaming Algorithms - Approximate Counting

implementation

2.128 Streaming Algorithms - Distinct Elements

implementation

2.129 Software Analytics - GraphX/GraphFrames

Parallel Graph Processing support for computing

Cyclomatic complexity measures of code CFG.

2.130 Merit of Large Scale Visuals by ImageNet

based ImageGraph and VideoGraph EventNet Tensor

Products Algorithm Implementation - objects in frames of video are annotated by Keras with Theano backend

2.131 Music Pattern Mining - Histogram timeseries

and Notes Onset Detection - sequence of notes in music are deemed to be strings in a formal language

2.132 Social Network Analysis - People Analytics and

HR Analytics of Social and Professional Profiles by

Recursive Lambda Function Growth Graph Tensor Neuron
Intrinsic Merit, Log Normal Least Energy Intrinsic Merit
and Profile vertex degree based Experiential Intrinsic
Merit

2.133 Machine Translation - by mapping vertices of
Text Graph in Recursive Lambda Function Growth
implementation from English to any other Natural
Language - translation REST API in
PyDictionary/GoSlate/Googletrans invoked - sentence
formation is by graph traversal

2.134 Software Analytics - Deep Learning
(GRU,ConvNet,BackPropagation,LSTM) analytics for
systemwide performance based on Psutil
CPU/Disk/Memory load statistics - implements a
NeuronRain usecase

2.135 Audio/Music Pattern Mining - Complexity

Analysis of Intrinsic Merit of Audio/Music as String of Notes over octave alphabets - Minimum Description Length, Entropy, Minimum DFA etc.,

2.136 Pattern mining large scale visuals - Urban Planning/GIS Analytics - Convex hull analytics of GIS Images

2.137 Intrinsic Merit of Text analyzed as sequence of integers and Ramsey coloring of text graphs

2.138 NeuronRainApps - NeuronRain Usecases - Analytics Driven Drone Autopilot Online Shopping Delivery (requires DroneSDK-Python and Python 3.6+)

2.139 Software Analytics - /proc/sched_debug support for Scheduler Analytics - stream of processor runqueue dictionaries which can be analyzed by streaming and machine learning algorithms

2.140 Software Analytics + Streaming Analytics

integration - Streaming Abstraction - Operating System
Statistics as data stream which is analyzable like any
other BigData Source

2.141 Intrinsic Merit of Music - Music Synthesizer
from DFA (State Machine), Mathematical Functions and
Random Samples

2.142 Intrinsic Merit of Music - Mel Frequency
Cepstral Coefficient analysis

2.143 Streaming Set Partition Analytics - Pattern
mining Stream of histograms by adjusted rand coefficient
and adjusted mutual information (text word frequency
histograms, separate chaining hashtables, voting based on
LSH/separate chaining hashtables, business intelligence
histograms etc.,)

2.144 Set Partition to Tile Cover - Finding Lagrange
Four Square Tile Cover of a rectangle from buckets of a

Set Partition

2.145 Merit of Large Scale Visuals - Extraction of EventNet causality graph from a Video

2.146 Medical Imageing Analytics - Pattern recognition in medical images (ECG,MRI,Scans) for diagnosis

2.147 Streaming Set Partition Analytics - Comparing Set Partitions by Partition Rank measure in SymPy API (implemented In GRAFIT course material as an example - Hashing Dynamic Sets and OS Scheduler Timer - complements previous streaming set partition analytics implementation In AsFer - alternative to rand index and mutual info)

2.148 Topological Handwriting Recognition - Deep Learning Convolution Backpropagation - Approximate DP Polynomial deformations from handwriting Image contours

and distance similarity measure between DP polynomials

2.149 Intrinsic Merit of Music - Learning Weighted Deterministic Finite State Automaton from strings of musical notes (Python 3.7)

2.150 People Analytics - Tenure Histogram model of a professional profile - Partition Rank of Tenure Histogram Set Partition

2.151 People Analytics - Tenure Histogram vector model of a professional profile - Kendall-Tau Rank Correlation Coefficients of Tenure Histogram Vectors

2.152 Urban Planning/GIS Analytics - Patch Analysis of Remote Sensing GIS Imagery of Urban Sprawls

2.153 Image Analytics - ImageNet Keras-Theano - Scikit Learn Random Forest Classification wrapper for images

2.154 Image Analytics - ImageNet Keras-Theano -

Unsupervised Recursive Gloss Overlap classifier based on ImageNet

2.155 Fraud Analytics - complements low level wireless LAN fraud analytics in US

Bmd - clustering and PCA based credit card financial transactions dataset analysis and Pandas Correlation Coefficient

2.156 Intrinsic Merit of Audio - Recursive Lambda Function Growth Merits and Core Number based Dense Subgraph Classification of Speech text Recognized from audio

2.157 Intrinsic Merit of Music - Music Genre Classification based on pairwise earth mover distance between MFCCs of music waveforms

2.158 Urban Planning/GIS Image Analytics - scikit learn extract_patches_2d() integration

2.159 People Analytics - Kaggle LinkedIn DataSet
Analysis - Experiential and Degree Intrinsic Merit

2.160 Time Series Analysis - ARMA and ARIMA
implementations - for stock quotes example data

2.161 Time Series Analysis and Fraud Analytics -
Credit Card Transactions Dataset

2.162 GIS Remote Sensing Image Analytics - Image
Segmentation

2.163 Computational Geometric Factorization - Tile
Search Optimization - Spark 2.4.3 and QuadCore
benchmarks

2.164 Named Entity Recognition - by majority PoS of
Ontology Semantic Paths between PoS annotated and
unannotated words

2.165 Intrinsic Merit of Text - ConceptNet Text Graph
Implementation and Graph Complexity measures -

alternative to WordNet Text Graph

2.166 Social Network Analysis - People Analytics -
PIPL.com python API integration - Syllable based name
clustering

2.167 Social Network Analysis - People Analytics -
Contextual Name Parsing and Syllable Vector compression

2.168 People Analytics - Set Partition based
Electronic Voting Machine(EVM) implementation and a
Drone EVM usecase

2.169 Topological Handwriting and Face Recognition
- Product Homotopies

2.170 Economic Intrinsic Merit - Gravity Model of
Volume of Trade and GDP as fitness measure

2.171 People Analytics - Set Partition Analytics
based Drone Electronic Voting Machine (partial
implementation - has dependency on Drones)

2.172 People Analytics - Handwriting Recognition -
Contour Homotopies - Matplotlib Rasterization

2.173 People Analytics - Handwriting Recognition -
Inner Product Space of Contour Interpolated Polynomials

2.174 People Analytics - Election Analytics - Set
Partition Electronic Voting Machine Streaming analytics
by Histogram distance measures

2.175 People Analytics - Drone Electronic Voting
Machine - JSON persistence of EVMs - Datasource for
Voting Analytics

2.176 People Analytics - Drone Electronic Voting
Machine - Pseudorandom Majority Voting Balls-Bins
Simulation and Voting Analytics

2.177 Set Partition Analytics - Set Partition to Tile
Cover Reduction by Computational Geometric
Factorization - Least Squares Approximate Solution

(LSMR) for the underdetermined linear equations

2.178 Apart from AstroInfer repositories, GRAFIT course materials have some pedagogical analytics: Async IO (suitable for Drones) and cloud implementations based on Python Spark MLlib - Advertisement Analytics by PageRank and Collaborative Filtering, PrefixSpan Astronomical Analytics of Celestial bodies, FPGrowth frequent itemset analytics for OS Scheduler and a design of Earliest Deadline First Worst Case Execution Time OS Scheduler - AstroInfer codebase might import these cloud implementations

2.179 People Analytics - Election Analytics - Drone Electronic Voting Machine - Streaming Boyer-Moore Majority voting

2.180 People Analytics - Drone Electronic Voting Machine - Streaming Voting Analytics - Bertrand Ballot

Theorem Approximation of Majority Voting

2.181 Astronomical Pattern Mining - Rule Search

Script upgrade for Maitreya Dreams Swiss Ephemeris text client maitreya 8.0.1 (maitreya8t)

2.182 Merit of Large Scale Visuals - Python 3.x

Tensor Rank intrinsic merit of EventNet of a video - measure of connectedness of a Video (Video mapped to EventNet Causality Graph) - Tensor Decomposition of Video 3-way EventNet Tensor Product to Rank-1 tensor components by Tensorly - Slicing for footages of unequal frames

2.183 Computational Geometric Factorization -

Quadcore Python 3.6,3.7.5,3.9.0 Upgrade Benchmarks - 60 bits, 512 bits and 1000+, 2000+, 4000+, 18000+ and 20000+ bits integers (1024, 1067, 1213, 1243, 2014, 2037, 2050, 2060, 2061, 2063, 4960, 18178, 18181,

20437, 20523, 20610 bits) - randomly chosen, smooth and hard

2.184 All NeuronRain Python 2.7 Source Files can be upgraded to PEP8 and Python 3.x by autopep8 and 2to3-2.7 utilities. Python 3.x is faster than Python 2.x and has many upgraded builtins including range(), tuned python malloc, async IO. Spark Factorization and EventNet Video Tensor Product implementations in NeuronRain have been upgraded to Python 3.x for compatibility and performance.

2.185 Complement Diophantines - Python 3.7.5 upgrade and Least Squares Vandermonde Polynomial Fit Learning

2.186 People Analytics - Drone Electronic Voting Machine - Python 3.7.5 upgrade and Paper ballot shuffle simulation (and theory on paper currency unique id non-

digital one time password, Money Trail - Neuro
cryptocurrency transactional EventNet Ledger as
Expander Graph and Random Walks in it - Pseudorandom
Extractor and Generator for Unique Identification)

2.187 Chaos Pseudorandom Generators - Python 3.7.5

1-dimensional Binary Cellular Automaton, Mandelbrot set,
Verhulst Logistic and Lehmer-Palmore PRGs
implementation

2.188 Compressed Sensing - Python 3.7.5 Alphabet-

Syllable vectorspace embedding and similar name
clustering in Social Networks and People Analytics

2.189 Leaky Bucket Timeseries Analyzer

Implementation - Python 3.7.5

2.190 PAC Learning - Python 3.7.5 upgrade and

Patterns in Primes

2.191 Text Compression, Compressed Sensing,

Syllable boundaries decompression implementation -

Python 3.7.5 upgrade

2.192 Social Network Analytics - LinkedIn

Connections Analysis, Name filter and Python 3.7.5
upgrades

2.193 GIS and Urban Sprawl Analytics - Image

Segmentation and Face components statistics

2.194 GIS and Urban Sprawl Analytics - Delaunay

Triangulation and Voronoi diagram of Segmented Image,
Multi Agent 4-coloring of Urban Sprawl FaceGraphs for
Fair Division of resources

2.195 Interview Algorithm - Spark Recursive Gloss

Overlap Implementation - Python 3.7.5 upgrade and
Quadcore Benchmarks

2.196 People Analytics - Human Resource Analytics -

Recursive Lambda Function Growth Intrinsic Merit of

Name-filtered Profile - Chaotic Hidden Markov Model of Tenures/Attrition and Martingales

2.197 Computational Geometric Factorization and Set Partition to Lagrange Four Square Theorem Square Tile Cover Reduction - Randomization

2.198 Intrinsic Merit of syllable hyphenated text and its audio - Waveform Distance of Audios as Originality merit measure, Acoustic Distance of Strings, Name Similarity, Music Clustering - alternative to Levenshtein edit distance of strings

2.199 People Analytics - Human Resource Analytics - Chaotic Hidden Markov Model of Tenures/Attrition - implementation - JSON persistence and Weighted Automata model

2.200 Recursive Lambda Function Growth - local lookup alternatives for machine translated multilingual

textgraphs and proper noun filtering

2.201 People Analytics - LinkedIn DataSet - Tenure Statistics

2.202 Word Embedding on a Vectorspace - Spark SkipGram Log Likelihood - Text Similarity, Dissimilarity and Merit Measure of Originality (in GRAFIT)

2.203 People Analytics - R - Ricker Logistic - Population dynamics of urban sprawls (in GRAFIT)

2.204 People Analytics - Social Network Analysis - CoronaVirus2019 analyzer - Statistics in R - Fitting a Probability Distribution (in GRAFIT)

2.205 People Analytics - Social Network Analysis - CoronaVirus2019 analyzer - Chaotic pandemic model, Correlation coefficients in R (in GRAFIT)

2.206 People Analytics - Social Network Analysis - CoronaVirus2019 analyzer - Linear Models in R - Linear

and Logistic Regressions (in GRAFIT)

2.207 People Analytics - Social Network Analysis -
CoronaVirus2019 analyzer - CAGraph Logit (in GRAFIT)

2.208 Intrinsic Merit of Academic Publications -
Bibliometrics - SkipGram Word2Vec of publication full
text - Concept Cloud Wordle - an alternative to H-index,
First Order Logic, Monoidal Categories, Girard Geometry
of Interactions (GoI), Sequent Calculus, ProofNets, TOP
Categories, Shell Turing Machines and Kernel
Lifting, Lambda functions and Beta Reduction, Meaning
representation (in GRAFIT)

2.209 People Analytics - Theoretical (Drone)
Electronic Voting Machines - Population Count - Number
of 1s (Decimal parity) in a bitstream - Various algorithms
- Parallel computation in Spark (in GRAFIT)

2.210 Bibliometrics - Patents as ProofNets and Search

- Novelty detection and Originality merit measure for Patent search, Latent Semantic Analysis, Low Rank Approximation (in GRAFIT)

2.211 Fraud and Cybercrime analytics - Faraday Cageing for Van Eck Phreaking, Analyzing Userspace Phishing/Spoof/Spams, Kernel Ftrace callgraph analyzer, Address book and dictionary attacks, Bayesian Filters, ERSIR, SIS and Cellular Automaton Graph models of Cybercrime transmission - Datasets for CoronaVirus 2019 Pandemic R analyzers could be replaced by cybercrime Susceptible-Infected-Recovered random graph botnet data.

2.212 Fraud and Cybercrime analytics - Digital Watermarking of Large Scale Visuals in OpenCV (in GRAFIT)

2.213 Numeric Compression - Sublogarithmic Space Prime power encoding of huge integers by Unique

Factorization Theorem and Computational Geometric

Factorization and its application in CPU instruction sets
(in GRAFIT)

2.214 NeuronRainApps - NeuronRain Usecases - PX4

Micro Air Vehicle SDK Python Asynchronous I/O Drone

Simulator - Drone_MAVSDK_Client and

Drone_MAVSDK_Server -requires PX4 Firmware +

JMAVSIM + MAVSDK-Python + Python 3.7.5 (in GRAFIT)

2.215 NeuronRainApps - NeuronRain Usecases -

Online Shopping Delivery - PX4 Micro Air Vehicle SDK

Python Asynchronous I/O Simulator - requires PX4

Firmware + JMAVSIM + MAVSDK-Python + Python 3.7.5

2.216 Graph Analytics and Drone Navigation - A* (A-

Star) Best First Search Pathfinding and Motion Planning

Algorithm Implementation for Drones and generic Graph

search (in GRAFIT)

2.217 GIS analytics - OpenCV Image Contours,
Contour graphs and Segmentation for Drone Obstacle
Avoidance and Motion Planning

2.218 Merit of Large Scale Visuals and Music -
OpenCV Image Contours and Segmentation for Medical
Imageing and Intrinsic merit of music - (Functional)
Magnetic Resonance Imageing (MRI and fMRI)

2.219 GIS Analytics and Drone Autonomous Delivery -
Drone Obstacle Avoidance by 3D Navigation on Airspace
defined by Road Geometry (Google Roads REST API and
Drone Swarms example)

2.220 People Analytics - Social Network Analysis -
CoronaVirus2019 Analyzer - Exponential Fit in R

2.221 Generating all possible permuted strings of an
alphabet

2.222 Fibonacci Search - alternative to binary

search in Computational Geometric Parallel Planar Point
Location Factorization and other BigData queries

2.223 People Analytics - People profiles as Tensors -
Chaotic Hidden Markov Model of Tenure Transitions -
TensorFlow integration for conversion of People profile
data to Tensors

2.224 People Analytics and Compressed Sensing -
Alphabet-Syllable Vectorspace Embedding Distance
implementation for Strings - Strings as Tensors -
alternative to Levenshtein Edit distance

2.225 Merit of Large Scale Visuals (LSVR) -
TensorFlow + Keras Backend - alternative to Theano +
Keras Backend

2.226 EventNet Python Parser - Events as Tensorflow
Tensors - EventNet vertices and edges are parsed from
text files and converted to Tensorflow Tensors

2.227 People Analytics - Alphabet Vectorspace

Embedding - Earth Mover Distance between String
Syllable Tensors

2.228 Graph Search and Analytics - NetworkX Graph

Edit Distance - Inexact Graph Matching - Graph mining
of dissimilar graphs

2.229 Software Analytics - Cyclomatic Complexity

Program Analyzer - Graph Edit Distance - Inexact Graph
Matching for various types of Program analysis graphs
(CFG, Slice dependency, Callgraph)

2.230 Text Analytics - Word Sense Disambiguation -

NeuronRain implementation of Lesk's algorithm -
alternative to NLTK and PyWSD

2.231 People Analytics - HR and Talent Analytics -

Domain Specific Dictionary - LinkedIn Dataset analytics in
Spark 3.0.1+ Hadoop 3.2

2.232 People Analytics - HR and Talent Analytics -
Chaotic Hidden Markov Model - Career Transition Score
of a Profile - Weighted Automaton of Career Transition

2.233 People Analytics - HR and Talent Analytics -
Chaotic Hidden Markov Model - Career Polynomial of a
Profile and Inner Product Space Distance Similarity
between 2 people profiles

2.234 Software Analytics and People Analytics -
Program Analyzers in NeuronRain
could also serve as People Analytics tools specific to
Professional profiles of People in
Information Technology domain thus facilitating
automated recruitment of talent -
Cyclomatic complexity analyzers, Userspace and
Kernelspace Call graph analyzers, SATURN
kernel CFG analyzers could be useful in analyzing

complexity of any opensource code
repository

2.235 Bibliometrics - Merit of Academic Publications -
Transformers Attention Model implementation (in GRAFIT)

2.236 Recursive Lambda Function Growth -
Transformer Attention Model - Textgraph Degree
attention

2.237 Named Entity Recognition - Transformers
Attention Model - Textgraph degree attention

2.238 Recursive Lambda Function Growth Textgraph
as EventNet Causality Graphical Event Model -
implementation

2.239 Recursive Lambda Function Growth EventNet
GEM - CoronaVirus 2019 GEM usecase

2.240 Recursive Lambda Function Growth EventNet
GEM - 2 different research articles collated

2.241 Digital Watermarking for both Image and Video
by CV2 overlay

2.242 ThoughtNet Evocation of Thought Hyperedges
by Set Intersection of Hypervertices

2.289 Set Partition Analytics - Set Partition to Tile
Cover Reduction by Computational Geometric
Factorization - CVXOPT GLPK Integer Linear
Programming Exact Solution for the underdetermined
linear equations

2.290 Merit of Large Scale Visuals - GIS and Urban
Sprawl Analytics, CoronaVirus 2019 Analyzer, Histogram
Partition Distance Similarity of images

2.291 Drone Electronic Voting Machine - Set Partition
Analytics `electronic_voting_machine()` invocation - PX4
SITL JMAVSIM simulation - Geocoding integration for
address to longitude-latitude translation

2.292 Drone Electronic Voting Machine - Set Partition

Analytics electronic_voting_machine_asynchronous()

wrapper definition and invocation - PX4 SITL JMAVSIM

simulation - Fictitious address

2.293 Drone Online Shopping Delivery -

NeuronRainApps - Refactoring for ConvexHull and GIS

analytics variables read over

socket stream

2.294 Set Partition Analytics - Complementary Set

Partitions

2.295 GIS Urban Sprawl Analytics - NASA VIIRS

NightLights Urban Area and Population Estimation - from

training data of contour area to square kilometre area

and average population density (GeoTIFF lookup and map

projections have been ignored as they are data format

specific)

2.296 GIS Urban Sprawl Analytics - NASA VIIRS

NightLights 2012 and 2016 Urban sprawl distance similarity and Urban area rankings

2.297 GIS Urban Sprawl Analytics - NASA VIIRS

NightLights 2016 and 2021 Urban sprawl distance similarity and Urban Area Rankings

2.298 Economic merit - Urban and Rural GDP

estimation from GIS Urban Sprawl Analytics

2.299 GIS Weather Analytics (Windy.com layers for

wind,rain,temperature as inputs to drone natural obstacle avoidance algorithm) and Image grayscale inversion for the non-urban (rural) complement of urban night time lights

2.300 Large Scale Visuals Streaming NoSQL

Datastore (MongoDB-GridFS) support in

Streaming_AbstractGenerator Facade

2.301 GIS Urban Sprawl Analytics -

Moments,Centroid,Minimum Enclosing Circle of an urban sprawl

2.302 GIS Urban Sprawl Analytics - Population

Estimator from Urban Sprawl Contours - usecase
comparative study of few urban sprawl growth pattern
examples

2.303 GIS Weather Analytics and Climate Analytics

(Tensorflow Sequential model for climate datasets, historic
extreme weather events and correlation to celestial n-
body choreography patterns) from OpenWeatherMap
PyOWM and ECMWF CliMetLab

2.304 GIS Urban Sprawl Analytics - a Multiple Agent

Resource Allocation DNFSAT Algorithm

2.305 GIS Analytics - MongoDB GridFS backend

standalone python client implementation

2.306 GIS Urban Sprawl Analytics - Urban Sprawl

Extent from NASA SEDAC 2015 GPW 4 Population Count and SEDAC 2020 GPW 4.11 Population Density by contour, convex hull segmentation and minimum enclosing circles

2.307 GIS Urban Sprawl Analytics - Voronoi

Tessellation Clustering Diagram implementation engulfing urban sprawl contours and minimum enclosing circles - a rural + urban extent estimator - alternative to neural network and DBSCAN urban extent models

2.308 GIS Urban Sprawl Analytics - Centrality

Measures of Urban Sprawl Facegraph

2.309 GIS Urban Sprawl Analytics - Delaunay

Triangulation plot - approximation of transportation network between urban areas - an Eulerian circuit and Hamiltonian estimator for Efficient Drone navigation

2.310 GIS Urban Sprawl Analytics - Distance

similarity of Voronoi Tessellations (Earth mover distance, Graph Edit Distance, Modularity - community detection) and Measuring Urban Expansion

2.311 GIS Urban Sprawl Analytics - Computation of Urbanization Correlation from Voronoi Shapely Polygon areas (Rural + Urban) and Urban Sprawl Contour areas

2.312 People Analytics - Merit of Large Scale Visuals

- Unique identification - Topological Face Recognition - Voronoi Tessellation and Delaunay Triangulation of Faces, their Morphology and Shape Grammar

2.313 People Analytics - Merit of Large Scale Visuals

- Unique identification - Topological Face Recognition - Distance similarity between Facial Image Voronoi Tessellations of similar Faces and Facial Landmark Detection - Wasserstein distance between Voronoi Facet

Shapely polygon areas of 2 facial images

2.314 People Analytics - Merit of Large Scale Visuals

- Unique identification - Topological Face Recognition -

Voronoi diagram and Delaunay Triangulation of Facial

images from 68-landmark centroids computed by Dlib face landmarks detection

2.315 People Analytics - Merit of Large Scale Visuals

- Unique identification - Topological Face Recognition -

Netrd Voronoi Facegraph Graph matching distance

similarity measures, Histogram partition distance

similarity (cv2.EMD()) and Voronoi FaceGraph

Isomorphism-Subgraph Isomorphism Similarity (NetworkX)

of 2 facial images

2.316 People Analytics - Merit of Large Scale Visuals

- Topological Face Recognition - Voronoi diagram and

Delaunay Triangulation of Facial images from centroids

computed by Dlib face landmarks detection and Voronoi

FaceGraph Isomorphism-Subgraph Isomorphism Similarity

2.317 People Analytics - Merit of Large Scale Visuals

- Topological Face Recognition - Voronoi FaceGraph

Isomorphism-Subgraph Isomorphism Similarity - VF2 and

ISMAGS Isomorphic Subgraphs iteration

2.318 People Analytics - Merit of Large Scale Visuals

- Topological and Graph Theoretic Face Recognition -

Voronoi FaceGraph Isomorphism Similarity - Percentage

similarity

2.319 People Analytics - Merit of Large Scale Visuals

- Topological and Graph Theoretic Face Recognition -

Delaunay Triangulation Mesh isomorphism and Euler

Characteristic

2.320 Software Analytics - Cybercrime analytics -

Graph Isomorphism Similarity of Code Callgraphs and

Control Flow Graphs - Spark 3.0.1 + Python 3.7.5

2.321 Software Analytics - Cybercrime analytics -

Approximate Graph Isomorphism Similarity of Code

Callgraphs and Control Flow Graphs - Spark 3.0.1 +

Python 3.7.5

2.322 GIS Analytics - DBSCAN Density Clustering

implementation

2.323 Software Analytics - Degree Sequence Earth

Mover Distance Similarity of Code Callgraphs and Control

Flow Graphs - Spark 3.0.1 + Python 3.7.5

2.324 GIS Analytics - DBSCAN Density Clustering -

Neural Network Thresholding implementation

2.325 People Analytics - Merit of Large Scale Visuals

- Topological and Graph Theoretic Face Recognition -

Delaunay Triangulation Mesh Bezier Animation by PyVis

2.326 People Analytics - Merit of Large Scale Visuals

- Textual, Topological and Graph Theoretic Face

Recognition - Physique Recognition From Quadrilateral
mesh isomorphism and Face Distinguisher from ImageNet
predictions

2.327 Computational Geometric Factorization -

Matplotlib plot of benchmarks - 300 integers from 100 to
400 and 20 integers from 500 to 520

2.328 People Analytics - Social Network Analysis -

Bipartite Social Networks (Matrimonial portals, Employer-
Employee Professional networks) - Recommender Systems
and Sentiment Analysis of Profiles for Ranking

Preferences

2.329 GIS Urban Sprawl Analytics - Population

Density computation from Contour Pixel color coding

2.330 GIS Urban Sprawl Analytics - Population count

computation from HRSL Map Legend

2.331 Economic merit - Neuro Cryptocurrency mint -
Commodity linked Neuro Fictitious Cryptocurrency Proof
of Work Algorithm

2.332 Computational Geometric Integer Factorization -
20523 bits quadcore benchmarks - Factorization as a non-
trivial Proof of Work computation for Neuro
Cryptocurrency mining rig

2.333 Set Partition Analytics - Set Partition-
Rectangular Area to Factorization reduction and Integer
Linear Program solution of Frobenius Coin Diophantines
for Neuro Cryptocurrency mining rig Proof of Work, One
Time Password facility augmented for Voter Received
Encrypted Paper Audit Trail (VREPAT) Conceptual Drone
Electronic Voting Machine

2.335 Fictitious Neuro Cryptocurrency Mining Rig -
Random Integer Partition + Rectangular Area

Factorization + Money Changing Problem Proof of Work -
Digital Watermarking implementation for Visual Neuro
cryptocurrency

2.336 Music Synthesizer - Python 3.8 upgrade and
Fractal implementation

2.337 Music similarity - Dynamic Time Warping
Waveform Distance algorithm implementation

2.338 Music Information Retrieval (MIR) - Learning a
polynomial from music waveform

2.339 Fictitious Neuro Cryptocurrency NP-Hard Proof
of Work - Moving Mount Fuji - Single Bin Sorted LIFO
Histogram - Towers of Hanoi - implementation

2.340 Music Information Retrieval - AI Music
Synthesis from Sum of Damped Sinusoids

2.341 GIS Urban Sprawl Analytics - SEDAC Urban
Expansion Probabilities Projection for Year 2030 - a

casestudy of urban sprawls

2.342 GIS Urban Sprawl Analytics - Maximum
Population Density and Area-Population Ratio as
arguments

2.343 Set Partition Analytics - Neuro Cryptocurrency
Towers of Hanoi NP-Hard Proof-of-Work - Set Partition
Histogram to Lagrange Sum of Four Square theorem
square tile cover of an Almost-Square rectangle by
Integer Factorization

2.344 Kernel lift random walk in tree of TOP
Category Shell Turing Machines and UNIX Shell Game
Example

2.345 Intrinsic Merit of Texts - TAC 2010 code
opensourced -

2.346 People Analytics - Social Network Analysis -
CoronaVirus2019 analyzer - Recomputed Spearman,

Kendall Tau, Pearson Correlation coefficients of COVID19 dataset and Verhulste-Pearl-Reed Logistic in R - in GRAFIT repositories

2.347 GMSH Trimesh and Quadmesh - GEO OPT and MSH files from GMSH FLTK

2.348 Merit of Large Scale Visuals - Trimesh and Quadmesh generation from an image by GMSH

2.349 GIS Urban Sprawl Analytics - Polya Urn Urban Growth Model implementation for 4-colored Urban Sprawl Contour Segment Facegraphs

2.350 People Analytics - Social Network Analysis - CoronaVirus2019 analyzer - Recomputed Spearman, Kendall Tau, Pearson Correlation coefficients for revised COVID19 dataset (Lancet,WHO estimates) and corrections to Verhulste-Pearl-Reed and May Logistic code in R - in GRAFIT repositories

2.351 GIS Analytics - Archaeology - an archaeoastronomical and computer vision analysis of MODIS GIS image of Adam's Bridge (Ram Sethu)

2.352 Merit of Large Scale Visuals - Face recognition by Approximate Topological Match of GMSH Quadmesh images

2.353 Merit of Large Scale Visuals - Archaeology - ImageNet predictions from multiple models - Rebus Topological Script Recognition - Dholavira Signboard example deciphered by ResNet50 and ResNet50V2

2.354 Merit of Large Scale Visuals - Astronomy Analytics - DBSCAN Clustering and Segmentation analysis of sky imageries for 2 high magnitude seismic events

2.355 Merit of Large Scale Visuals - Archaeology - Rebus Decipherment of Indus Unicorn Seals and their validation by extracting common subgraphs in ImageNet

predictions textgraphs (GSpan Frequent Subgraph Mining algorithm)

2.356 Merit of Large Scale Visuals - GIS Urban Sprawl Analytics - Automatic Delineation of Urban Growth Boundaries from Transportation Network GIS - KMeans Clustering of Contour Polynomials

2.357 Computational Geometric Factorization - Quadcore benchmarks - Spark 3.0.1 + Python 3.7.x - Nanoseconds perf counter

2.358 Astronomical Dataset Analytics - Planetarium Ephemeris Search

2.359 GIS Urban Sprawl Analytics - Minimum Spanning Forest,HITS Facegraph complexity measures for Automatic Urban Delineation

2.360 Medical Imageing and Music Information Retrieval (MIR) - fMRI imagery analysis for music-evoked

autobiographical memories

2.361 Intrinsic Merit of Music - Kolmogorov

Complexity approximation by Normalized Compression
Distance (NCD)

2.362 People Analytics - Unique Identification -
Fingerprint recognition

2.363 Intrinsic merit of Music - Music Information
Retrieval - AI Music Synthesis from Weierstrass Fourier
Fractal

2.364 GIS Urban Sprawl Analytics - Moran's I
measure of Urban Sprawl Dispersion

2.365 People Analytics - Social Network Analysis
(Professional) - Chaotic Hidden Markov Model of Career
Transition - JSON persistence to MongoDB

2.366 Space Archaeology - Edge detection for
Airborne-Satellite GIS imagery (LIDAR,SAR,LandSat) by

Canny Edge Detector

2.367 GIS Urban Sprawl Analytics - Automatic
Delineation of Urban Growth Boundaries by KMeans
Clustering of Contour Polynomials and Canny Edge
Detector

2.368 Astronomical Dataset Analytics - Planetarium
Ephemeris Search - SkyField implementation

2.369 Astronomical Dataset Analytics - Planetarium
Ephemeris Search - Longitude-Latitude and AstroPy
support

2.370 Astronomy Dataset Analytics - Angular
separation of solar system planets during Extreme
Weather Events on Earth - an N-Body gravitational pull
correlation study

2.371 Majority Voting Versus Query complexity model
of Intrinsic Merit of Texts-Audio-Video-People - all

implementations of Intrinsic Merit compute Merit()
function by queries

2.372 Astronomy Dataset Analytics - NASA JPL

Horizons Ephemeris Lookup Service support and Hubble
Ultra Deep Field imagery RGB analytics

2.373 Astronomy Dataset Analytics - Computation of
N-Body Gravitational Acceleration for Solar System bodies
on days of Extreme Weather Events (Earthquakes and
Hurricanes)

2.374 Astronomy and Cosmology Datasets Analytics -
Hubble eXtreme Deep Field imagery RGB analysis and
Distance similarity of N-Body gravitational accelerations

2.375 Astronomy and Cosmology Datasets Analytics -
Wilkinson Microwave Anisotropy Probe-Cosmic Microwave
Background (WMAP CMB) and N-Body gravitational
accelerations from arbitrary vantage points

2.376 NeuronRainApps - Wikipedia Textgraph

Question-Answering Bot - WordNet Walk on answer
textgraph

2.377 Economic Merit and People Analytics -

Mechanism Design of Multiround Majority Voting derived
from Simultaneous Ascending

Auction - for Drone EVM usecase implementation in
NeuronRain

2.378 Merit of Large Scale Visuals - Archaeology -

Rebus Decipherments of Indus Pashupathi Seals and
mining frequent subgraphs from predictions

2.379 Astronomy and Cosmology Datasets Analytics -

N-Body gravitational accelerations computed for USGS
(1900-2012) 8+ magnitude Earthquakes and NOAA

HURDAT2 (1851-2012) North Atlantic Hurricanes Datasets

2.380 GIS Urban Sprawl Analytics - Facebook (Meta)

High Resolution Settlement Layer (HRSL) Population

Density Maps - GDAL GeoTIFF to JPEG format Translation

2.381 GIS Urban Sprawl Analytics - Facebook (Meta)

High Resolution Settlement Layer (HRSL) Population

Estimation from GDAL-Rasterio Georeferencing

2.382 GIS Urban Sprawl Analytics - Facebook (Meta)

High Resolution Settlement Layer (HRSL) and LandSat 9

OLI2-TIRS2 GDAL-Rasterio Georeferencing - Window read

2.383 GIS Urban Sprawl Analytics - Facebook (Meta)

High Resolution Settlement Layer (HRSL) and Global

Human Settlement Layer (GHSL) GDAL-Rasterio

Georeferencing - Sampling and Mollweide-EPSS

transforms reprojections

2.384 GIS Urban Sprawl Analytics - Facebook (Meta)

High Resolution Settlement Layer (HRSL) and Global

Human Settlement Layer (GHSL) GDAL-Rasterio

Georeferencing - Gini Index of Population and Built-Surface

2.385 GIS Urban Sprawl Analytics - Facebook (Meta)
High Resolution Settlement Layer (HRSL) - Population estimation from GDAL-Rasterio Georeferencing

2.386 GIS Urban Sprawl Analytics - Polya Urn Urban Growth Model - Revised for N color segments

2.387 NeuronRainApps - Autonomous Driving - Obstacle Lattice from LIDAR Point Cloud Data - Python and C++ lattice walk obstacle avoidance usecases

2.388 Computational Geometric Integer Factorization - Python 3.10.4 upgrade - 2232 and 67 bits Quadcore Benchmarks and Mathematica-Pari/GP-FLINT performance numbers comparison

2.389 GIS Urban Sprawl Analytics - Polya Urn Urban Growth Model - Weights Learnt

2.390 Intrinsic Merit of Music - AI Music Synthesis
from Sum of Sinusoids - Signal synthesis from librosa
tone()

2.391 Intrinsic Merit of Music - AI Music Synthesis
from Polynomials Learnt from training data - PolyFeatures
and Carnatic-Hindustani notes support

2.392 Intrinsic Merit of Music - Virtual Piano
Implementation and Music Synthesis from 12-notes octave

2.393 Intrinsic Merit of Music - Virtual Piano
Implementation - Carnatic Music Synthesis from 12-notes
octave

2.394 Intrinsic Merit of Music - Deep Learnt
Automata and Music Synthesis - a Boolean Composition
and Learning Theory perspective

2.395 GIS Urban Sprawl Analytics - Polya Urn Urban
Growth Model - Urban sprawl area computation

2.396 GIS Urban Sprawl Analytics - Comparison of Raster Data Bounding Boxes between 2 dates - Chennai Metropolitan Area Sprawl - GHSL GHS SMOD Degree of Urbanization - R2019A and R2022A

2.397 Complement Diophantines - Lagrange and Barycentric interpolations

2.398 Intrinsic Merit of Music - Synthesized Bach from training music waveforms

2.399 Astronomy and Cosmology Datasets Analytics - Solar system N-Body Pairwise angular separations computed for NOAA HURDAT2 (1851-2012) North Atlantic Hurricanes Datasets

2.400 Computational Geometric Integer Factorization - Multiple Integers - Python 3.10.4 upgrade + Spark 3.0.1 Quadcore Benchmarks

2.401 GIS Weather Analytics and Climate Analytics -

NASA JPL DE421 Ephemeris N-Body analytics integration and correlation to extreme weather events - Syzygies and angular separations of Solar system bodies

AstroInfer is the userspace Big Data Mining and Deep Learning facet of NeuronRain. Initially implemented for mining patterns in astronomical datasets(degrees of astronomical objects viz planets, constellations etc.,) and prediction based on rules and execution of those rules (SourceForge), has been generalized for any dataset (GitHub,GitLab). It is also used in USBmd and VIRGO codebases below for traffic analytics and kernel analytics. Design started in May 2003.

(Latest NeuronRain AsFer research version Code at

sourceforge repository: <http://asfer.sourceforge.net> and

periodically updated Design Details at:

<http://sourceforge.net/p/asfer/code/HEAD/tree/asfer-docs/AstroInferDesign.txt>

(Latest NeuronRain AsFer enterprise version Code at

github repository: <https://github.com/shrinivaasanka/asfer-github-code> and periodically updated Design Details

at:<https://github.com/shrinivaasanka/asfer-github-code/blob/master/asfer-docs/AstroInferDesign.txt>)

3. NEURONRAIN - VIRGO - VIRtual Generic Os Linux

Kernel (compatible with 4.1.5 (32-bit) and 4.13.3 (64-bit)

mainline kernels) - Linux Kernel Extensions for cloud -

kernel modules, system calls for cloud rather than at
application level high up the stack with :

3.243 Config file support

3.244 Psuedorandom Generator Based

Loadbalancer

3.245 Kernel space remote execution

3.246 User space remote execution with kernel
upcall and pthread creation of userspace library function
or executable

3.247 Example unit test cases

3.248 Usermode output redirected logging
feature for Kernel upcall to Userspace

3.249 Intermodule Function Invocation in
Kernel Space - through which any machine on cloud can
be completely remote-controlled deep upto board and
hardware cards through function names or commands

sent through `virgo_clone()` calls.

3.250 CPU Pooling Driver and `virgo_clone` system call - Multi-kernel-threaded VIRGO clouddriver Kernel Driver Module for unrestricted service of `virgo_clone` or other client requests.

3.251 Memory Pooling Driver (and a key-value store) and system calls userspace clients for it on Cloud nodes - `virgo_malloc`, `virgo_get`, `virgo_set`, `virgo_free`.

3.252 Queueing Driver - that implements a wrapper over linux concurrent managed workqueue (CMWQ) and also a native local queue - used for KingCobra requests queuing with handler invocation. Also implemented is a standalone kernel queueing service that listens on requests rather than being forwarded by CPU and Memory pooling drivers above.

3.253 VIRGO Cloud File Systems Driver

and system calls - implements distributed cloud file system calls and telnet userspace clients for -
virgo_open, virgo_close, virgo_read and virgo_write of a file on remote cloud node

3.254 All the drivers above for CPU, Memory and File System on cloud have 3 paths each for telnet connection to remote driver kernel server socket and system call connection to remote driver kernel server socket - 1) parameter is executable in userspace 2) parameter is a function name which uses a kernel upcall plugin to execute in userspace 3) parameter is a function name executable in kernel space - configured by a boolean flag with in the driver binaries. Based on this flag either kernel upcall to userspace or kernel intermodule invocation is done.

3.255 A config driver - for exporting config symbols

3.256 Experimental Bakery algorithm kernel module implementation - for synchronization in cloud

3.257 Utilities driver kernel module - a universal kernel module with exported utility function symbols that can be invoked across VIRGO Linux subsystems and Linux kernel including EvenNet logging kernel socket client and skbuff kernel socket debugger.

3.258 Experimental EventNet driver kernel service module - This listens on incoming EventNet log messages (Vertex and Edge) and writes to EventNet Vertex and Edge text files by VFS write. These files can then be massively processed by the boost::graph or pygraph GraphViz code in AsFer to create DOT files and graphics. Event vertices and edges can be logged by

virgo_eventnet_log() utility function from any kernel module on any VIRGO cloud node.

3.259 From the above EventNet graph, a logical time ordering can be obtained on the cloud events and partakers which is for example useful in establishing money trail in KingCobra MAC electronic money.

3.260 Kernel Analytics Kernel Module - reads the config key-value pairs set by AsFer or any other machine learning software and exports them which can be looked-up in any other kernel module. The key-value config are analytics variables learnt by mining kernel or other logs and objects. With this an adaptive dynamic kernel which changes over a period of time depending on a machine learnt config is obtained. At present an Apache Spark usecase which mines kern.log and exports a config variable through kernel_analytics has been implemented.

3.261 Thus VIRGO has all the requisite minimum functionalities for a linux variant cloud, artificially intelligent, operating system

3.262 SATURN Program Analysis Module - Intercepts linux build and extracts program analysis data in trees. SATURN logs are analyzable by AsFer (e.g null pointers, aliasing, memory etc.,).

3.263 VIRGO is suitable for analytics driven embedded systems e.g kernelspace IoT

3.264 VIRGO KTLS config kernel module - only in VIRGO_KTLS branch of VIRGO64 repositories

3.265 64 bit version of VIRGO Linux kernel based on mainline 4.13.3 kernel (in a separate repository) is in separate repository and has been found to be better performing and stabler than VIRGO 32bit.

3.266 VIRGO 64-bit has lot of random panics

related resolutions related mostly to i915, CIFS drivers and SMB security. Though functionally similar to 32 bit VIRGO linux, 64 bit kernel is suited for large RAM installations, with CPU level security features and faster than 32 bit binaries. 4.13.3 kernel also supports Kernel Transport Layer Security (KTLS). VIRGO64 repositories implement KTLS setsockopt() in a separate branch - VIRGO_KTLS.

3.267 Streaming kernel analytics in VIRGO64 - for live reading of stream of analytic variable-value pairs from remote cloud node over network in kernel_analytics module and exporting them as global symbols in local cloud node kernel. Requires a webservice creating a stream of key-value analytics learnt from a dataset. Presently implemented only in VIRGO64

3.268 Kernel Analytics powered PXRC Flight

Controller Driver - Kernel support pxrc flight controller driver from 4.17. Changed PXRC driver in kernel 5.1.4 has been committed to VIRGO64 repositories which imports kernel analytics variables exported by kernel_analytics driver in VIRGO64.

3.269 Kernel Analytics powered UVC Video Driver - Changed UVC Video driver in kernel 5.1.4 has been committed to VIRGO64 repositories which imports kernel analytics variables exported by kernel_analytics driver in VIRGO64.

3.270 Read-Copy-Update in userspace - usecase (in GRAFIT) - wraps VIRGO System calls

3.271 Software Transactional Memory in userspace - Lockfree datastructures - usecase (in GRAFIT) - wraps VIRGO system calls

VIRGO enables viewing entire cloud as a single “logical machine” upto hardware level with machine learning support by implementing lowlevel primitives that can be invoked by highlevel cloud OS components viz., OpenStack Neutron. This differentiates from other cloud libraries which are in userspace mostly. AstroInfer together with KernelAnalytics-VIRGO-USBmd-KingCobra make it a Cloud OS kernel with Machine Learning and Analytics abilities. Support for mobile operating systems in cloud are, among other things, long term goals for VIRGO.

(Latest NeuronRain VIRGO research version Code at sourceforge repositories: <https://sourceforge.net/projects/virgo-linux/> , <https://sourceforge.net/projects/virgo64-linux/> and periodically updated Design details at: <https://sourceforge.net/p/virgo64-linux/code/ci/master/tree/vi>

[rgo-docs/VirgoDesign.txt](#) , <http://sourceforge.net/p/virgo-linux/code-0/HEAD/tree/trunk/virgo-docs/VirgoDesign.txt>

(Latest NeuronRain VIRGO enterprise version Code at github repositories: VIRGO -

<https://github.com/shrinivaasanka/virgo-linux-github-code> ,

<https://github.com/shrinivaasanka/virgo64-linux-github-code> and

periodically updated Design details at:

<https://github.com/shrinivaasanka/virgo64-linux-github-code/blob/master/virgo-docs/VirgoDesign.txt>,

<https://github.com/shrinivaasanka/virgo-linux-github-code/blob/master/virgo-docs/VirgoDesign.txt>)

Design started in 2008.

4. NEURONRAIN - USBmd- Linux kernel USB device driver module for debugging and network analytics :

4.272 Contains a modified version of Linux kernel

mainline USB and USBWWAN broadband modem drivers with debug statements and functions that capture and dump data transfer buffers in kern.logs.

4.273 These logs are parsed and processed with Apache Spark and other AsFer machine learning algorithms (e.g Streaming Algorithm implementations) to create a debug and traffic analytics for in and out data - a typical software analytics usecase with widespread necessity in anti-cybercrime, anti-theft and anti-virus products

4.274 Mainline USB drivers (USBWWAN, USB serial, USB storage) instrumented with debug statements in URB related functions

4.275 Apache Spark Python MapReduce Log Analyzer for kern.log - extracts patterns in USB requests and wireless LAN traffic. By enabling Kernel Address Sanitizer

in linux kernel 4.10.3 64 bit code and Spark ETL, USB related kernel function invocations have been profiled.

4.276 64-bit version of this driver is in separate repository based on 4.13.3 mainline linux kernel (32-bit version is based on mainline kernel 4.1.5)

4.277 USBmon and Ftrace kernel utility support for analyzing USB interface traffic and kernel functions invocation graph logs

4.278 This USB analyzer complements the Program Analysis - Software Analytics module in AstroInfer (for userspace applications) analyzing kernelspace function call graph and network activity among others

4.279 tcpdump and wireshark pcap format WLAN logs can also be analyzed by Spark Analyzer for regular expression patterns

4.280 Ftrace kernel function call graphs are written

to a DOT file and analyzable by any Subgraph Miner

4.281 Ftrace call graphs have been analyzed by NetworkX for PageRank and Degree Centrality measures which provide insight into most active code in kernel for an executable

(Latest NeuronRain USBmd research version Code at sourceforge repositories: <https://sourceforge.net/p/usb-md/> , <https://sourceforge.net/p/usb-md64/code/ci/master/tree/> and periodically updated Design Details at:

https://sourceforge.net/p/usb-md64/code/ci/master/tree/USBmd_notes.txt,

<http://sourceforge.net/p/usb-md/code-0/HEAD/tree/>

[USBmd_notes.txt](#))

(Latest NeuronRain USBmd enterprise version Code at

github repositories: <https://github.com/shrinivaasanka/usb-md-linux->

[github-code](#) , <https://github.com/shrinivaasanka/usb-md64-github-code>

and periodically updated Design Details at:

https://github.com/shrinivaasanka/virgo-linux-github-code/blob/master/USBmd_notes.txt ,

https://github.com/shrinivaasanka/usb-md64-github-code/blob/master/USBmd_notes.txt).

5. NEURONRAIN - King Cobra - Kernelspace Messaging
and Computational Economics Software that includes a
new fictitious Electronic Message Currency - Neuro -
which depends on Google Protocol Buffer based Cloud
Object Move functionality in AsFer. Flow of such a
fictional currency on AsFer EventNet implementation
(actors in event vertices are buyers/sellers and direction
of flow determines buy/sell) can simulate Economic

Markets and Pricing. EventNet is thus equivalent to hyperledgering in other cryptocurrencies and can capture money trail.

(NeuronRain KingCobra research version sourceforge

Repositories - <https://sourceforge.net/p/kcobra/> ,

<https://sourceforge.net/projects/kcobra64/> and periodically updated design notes at

<https://sourceforge.net/p/kcobra64/code/ci/master/tree/KingCobraDesignNotes.txt>
t, <https://sourceforge.net/p/kcobra/code-svn/KingCobraDesignNotes.txt>)

(NeuronRain KingCobra enterprise version sourceforge

Repositories - <https://github.com/shrinivaasanka/kingcobra-github-code> ,

<https://github.com/shrinivaasanka/kingcobra64-github-code> and

periodically updated design notes at

<https://github.com/shrinivaasanka/kingcobra64-github-code/blob/master/KingCobraDesignNotes.txt>,

<https://github.com/shrinivaasanka/kingcobra-github-code/blob/master/KingCobraDesignNotes.txt>

[b/master/KingCobraDesignNotes.txt](#)

Implements a minimal kernelspace and userspace messaging framework using VIRGO cpupooling (virgo_clone) and memory pooling drivers that in turn queues the requests into a kernel workqueue. There is also a standalone VIRGO queue kernel service that listens on the requests without dependencies on VIRGO cpupooling and memorypooling drivers to forward the requests. The VIRGO workqueue handler pops the request from workqueue and invokes KingCobra driver's servicerequest exported function and replies to the publisher and optionally disk persists the incoming requests to filesystem through VFS. Differentiator is KingCobra implements a cloud messaging with a decentralized queue with disk persistence and workflow

in kernel level so that hardware is easily integrated into cloud:

5.282 Linux Kernel workqueue based kernelspace pub-sub kernel module - Receives Messages from VIRGO Queuing

5.283 Atomic Cloud Move for Neuro (Message As Currency) electronic money is implemented In AsFer in C++ client-server perfect forwarding (overloaded `std::move()` and `std::forward()`)

5.284 Userspace JMS pub-sub client-server

5.285 Pricing - CVXPY implementation - Eisenberg-Gale Market Equilibrium Convex Optimization for finding Market Clearing Prices for Goods and Services. Replacing Prices by Perceived Merit translates Market Equilibrium to Intrinsic Merit Versus Perceived Ranking Equilibrium.

5.286 Disk persistence of Request-Reply queues.

5.287 64-bit version of this driver is in separate repository based on 4.13.3 mainline linux kernel (32-bit version is based on mainline kernel 4.1.5)

5.288 Fictitious Neuro currency Buy-Sell transactions are edges in an EventNet Event-Actor Graph implemented in AsFer and can be mined for subgraph patterns - EventNet is thus an economic network

5.334 Algorithmic Trading in Fictitious Neuro Cryptocurrency - EventNet Graphical Event Model (GEM) HyperLedger implementation

6. NEURONRAIN - acadpdrafts - All publications and drafts with code (along with important documents and Photo ID proofs) are uploaded at

<http://sourceforge.net/projects/acadpdrafts/>

The opensource codebases above are nonprofit academic research efforts. Premium Technical Support for above opensource codebases available. Premium Dual licensed Closedsource products derived from codebases in:

<https://github.com/shrinivaasanka>, <https://gitlab.com/shrinivaasanka> and <https://sourceforge.net/u/userid-769929/profile/> are in development since 2010.

7. NeuronRain GRAFIT Open Learning :

[https://github.com/shrinivaasanka/Grafit/tree/master/course_](https://github.com/shrinivaasanka/Grafit/tree/master/course_material)
[material](https://github.com/shrinivaasanka/Grafit/tree/master/course_material), <https://gitlab.com/shrinivaasanka/Grafit>,
<https://sourceforge.net/u/userid-769929/Grafit/ci/master/tree>

/ - May 2010 - Present - Free online courses based on
NeuronRain codebases and Design Documents,

Puzzles/Questions from Competitive examinations and
miscellaneous topics - non-linear material focusing on
Bigdata, Problem solving, Machine Learning,

Fundamentals, Programming - Creative Commons 4.0

NCND licensed - includes spillover implementations of
other NeuronRain repositories:

Virtual Classroom -

<https://classroom.github.com/classrooms/8086998-https-github-com-shrinivaasanka-grafit>

HAMSA - NeuronRain Lectures, Audio-Visuals related to NeuronRain repositories, Theory and Miscellaneous -
<https://kuja27.blogspot.com>

GRAFIT course materials (in .zip) are available from Moodle GRAFIT website -

<https://moodle.org/pluginfile.php/4765687/user/private/Grafit-master.zip?forcedownload=1>

BRIHASPATHI - Private Online Virtual Classrooms

Private repositories of virtual classrooms for various commercial online courses (BigData, Machine Learning, Topics in Mathematics and Computer Science,...) -

<https://github.com/Brihaspathi> - requires GitHub student

logins

April 2015 - September 2015 - CloudEnablers -

CusDelight - Corestack, Chennai - Architect

1. Design and PoC implementation in python for translating Topology Orchestration Specification for Cloud Applications (TOSCA) XML BPMN Plan Models to Stackforge/Mistral Workflow YAML (Mistral-translator - similar to Heat-translator project for Simple TOSCA YAML to Heat Orchestration Templates)
2. Design and PoC implementation in python for Jinja2

rendering template feature addition to TOSCA Plan XML and Mistral YAML based on JSON context for conditionals and control structures support

3. Creating a Capability matrix of different Cloud

Orchestration and template softwares:

AWS,Heat,Mistral,Puppet,Chef,Ansible,Saltstack,Twisted,Nunjucks

4. Study of OpenTOSCA implementation of TOSCA

(University of Stuttgart) and feasibility of its integration into Corestack (Cloudenablers)

5. Feasibility study of new features to Mistral Workflow

Engine Parser (if-else,nested for-each,with-items,concurrency)

6. Feasibility of Apache Brooklyn CAMP blueprints based cloud application deployment

7. Design and PoC Development of Service Dynamic Data

Discovery, MetaData and Actions REST API, Cloud Federation and Abstraction Layer (for abstracting providers, federated clouds and multiclouds like ComputeNext, Libcloud, Jclouds, Dasein, AWS etc.,) for provider abstraction and Directory Service REST API

8. Corestack code review

9. Study of feasibility of Jclouds integration into corestack

10. Design and PoC for Process Checkpoint and

Restoration with CRIU in baremetal, VMs and Docker

(with overlay and aufs union mount filesystems). Docker public repository -

<https://hub.docker.com/r/srinivasankannan/cloud-migration/>

11. Design and PoC sync scripts implementation for

Automated VM image synchronization with bup, rsync,

lsyncd-lua and inotifywait (inotify-tools).

12. Design and PoC implementation for Service Discovery

through above REST API and migrating them with Jinja2
Heat and Mistral YAML templates extraction and
Performance tunables for cloud.

June 2014 - July 2014 - Clockwork Interviews Pvt Ltd,
Chennai (Hiring product - <http://piqube.com>) -
Consultancy on Design and a Java based minimal
Implementation for computing the various statistical
measures from a job experience sequence: 1) Stability or
predictability of job experience sequence using Shannon
Entropy and Inversion number, 2) Estimating various
types of average experience metrics, 3) Mobility scoring,
4) Initial work on Skills based clustering of linkedin
profiles using String similarity and 5) Initial Hidden
Markov Model design for job change motivation inference

February 2014 - Clockwork Interviews Pvt Ltd, Chennai
(Hiring product - <http://piqube.com>) - In-office non-profit
Consultancy to PiQube for initial design of a Multivariate
Linear Regression model for Stability and Gap scoring in
Resume that includes entropy independent variables
using ENT sequence disorder measure, study of various
tools (including Stanford CoreNLP - Classifiers and
Recursive Tensor Neural Network Sentiment Analysis
Tools) for Sentiment Analysis of a Resume and Holistic
Resume scoring model using social network analysis from
multiple datasources

October 2013 - January 2014 - continued work on my opensource products (Krishna iResearch - https://sourceforge.net/users/ka_shrinivaasan) and non-profit machine learning remote consultancy to Clockwork Interviews Pvt Ltd, Chennai (Hiring product - <http://piquebe.com>) for initial design of a Resume scoring, Named Entity Recognition in Resume using GATE, CRF++, IIT-Bombay CRF, study of Social Network Analysis Tools (SocVnet,SNAP etc.,) and informal mail interactions on my open source products among other things

September 2012 - February 2013 - Parttime Consultancy for Global Analytics(Chennai) and Work on my opensource products (Krishna iResearch)

1. Did the Python AMP workflow implementation as per the workflow specification for AMP using PyUtilib, RabbitMQ and Config files support. Wrote some python scripts for AMP workflow config files support and parsing .
2. Wrote Design spec analyzing workflow alternatives (like PyF, cascade) .
3. Wrote AMP workflow-over-cloud (AMP on Hadoop) specification in addition to AMP workflow spec.
4. Guided on GDP 2.7.x and 3.0 bug fixes and issues.
5. Helped in debugging GDP 3.0 timeout manager implementation in Feb 2013 which was found to be working.

Apart from the above worked on design and development

of my nonprofit open source products-

https://sourceforge.net/users/ka_shrinivaasan

January 2011 - March 2011 and July 2011 - August 2012

- Global Analytics(Chennai) - Senior Lead Software

Architect (C/C++/Python)

1. Mentored and Managed a team of 3 people .

2. Released version 2.3.1 of Global Decision

Platform(GDP) with fixes for crashes in production environment.

3. Did refactoring, many bug fixes and enhancements to Global Decision Platform(GDP) version 2.5.0 for master demo lead passthroughs to work.

4. Implemented acceptor-worker thread model request handling in GDP 2.5.0 with single acceptor thread and configurable number of worker threads for Service Execution Manager(SEM) and Service components of GDP. This resulted in significant improvement in response time.

5. Designed and implemented session based request-response in GDP 2.5.0

6. Implemented modified timeout error logging with placeholders for errorcodes and request id and did fixes

for frequent crashes in production environment for GDP 2.5.0.

7. Released GDP version 2.5.1 for which 2 minor binaries were developed to clear the queue and test the creation of queues (for System V message queues)

8. Released GDP version 2.7 which has important bug fixes for crashes in python container(needed for AMP runtime described later), few features for graceful shutdown of the SEM, option to reconnect to MySQL during exception in Python container etc.,

9. Redesigned GDP 2.5.0 SEM loadbalancer for GDP 3.0 to route requests to service processes by periodically monitoring the service process load and removing a

bottleneck due to wait/notify code. This resulted in 10x speed up of the request-response throughput time.

10. For GDP version 3.0, designed and Implemented a new Session Timeout Manager algorithm to timeout the request session based on user configured timeout value(simplified version of Survival Index Based Transaction Timeout Manager mentioned later).

11. For GDP version 3.0, worked on embedding multiple python interpreters in Service process with Python C API replacing boost::python calls. This involves facility to have a global dictionary across multiple interpreters (or) local dictionary per request (or) per-thread dictionary for each service worker thread (using thread local storage) and also creation of pool of interpreters from which

interpreters are allocated per request and returned to the pool after the request is serviced. This obviated the need for boost::python since boost did not support multiple interpreters with multithreading and interpreter pooling. This involved fixing one of the most time consuming bug related to restricted mode python in 2.4.3. Since it was deprecated in python 2.7, fixed Python 2.4.3 source to circumvent restricted mode and also did another fix for the same problem with PyImport_ImportModuleEx()

12. Mentored the team to work on Dynamic Risk Tables (DRT) library of GDP to extend the database compatibility to MySQL and Oracle

13. Was involved in the Automated Modelling Platform(AMP) development to automate the predictive

modelling from the production data. Fixed many crashes in python runtime during testing of AMP realtime design. Suggested an alternative design for AMP realtime based on external user address-space message queue, which populates the in-memory queue from on-disk request log, periodically replenishes it from disk, reads requests from message queue and posts them in parallel to Realtime-subset and Realtime-superset python services, and gives a virtual view of the single physical queue to each queue client(queue clients are located in SEM) - meant to replace an existing queueing module with msgsnd/msgrcv which involves user and kernel address-space copying to remedy huge queue backlog seen in AMP realtime prototype. This tightly couples GDP Python runtime with the AMP runtime

14. For GDP 3.0, implemented a GDP pluggable queue named GDAMPQ designed for AMP above - Global Decisioning and Automated Modeling Platform Queue which is a simple in-memory queue with optional disk persistence to replace an existing queueing module with msgsnd/msgrcv which involves user and kernel address-space copying. This in-memory queue in best testing circumstances is 30% better than the System V unix message queues.

15. Worked on Python 2.4.3 source code to analyze crashes in PyMalloc. Modified Python 2.4.3 source to add a flag DISABLEPYMALLOC to disable calls to PyMalloc and re-route them to unix malloc/free systemcalls. Also analyzed Python 2.4.3 source code for restricted mode related errors while designing multi-interpreters for GDP

3.0 and fixed them.

16. Worked on writing python configuration scripts for automating the build configuration and installation of GDP components like SEM, Service and Master .

17. Implemented a minor encrypt utility for master component of the GDP

18. Wrote Functional specification for GDP 3.0 Automated Installer design

19. Wrote Functional specification for AMP Workflow

20. Wrote Functional specification for AMP Cloud deployment

21. Studied python workflow packages for AMP workflow viz., Pyutilib.workflow, PyF and implemented a workflow prototype for AMP workflow in Pyutilib.workflow.

22. Implemented a small prototype stub using Dumbo Mapper-reducer for Cloud

Deployment of AMP

23. Did 2 one-week training sessions for GDP versions

24. Did one-week training session for Python.

25. Implemented a mini-GDP client and server for debugging socket related errors in production.

26. Developed a documentation knowledgebase intranet website for GDP documentation, design documents, installation troubleshooting documents and debugging documents.

27. Implemented a Build Version feature for GDP 2.7.1 and GDP 3.0 which dynamically generates a buildversion.h headerfile which contains #defines for build machine and architecture information,SVN source tree version information for the build and is built at runtime by SEM, Service and Master binaries which include this buildversion.h header file

(In August 2012 resigned for personal reasons.)

January 2011 - March 2011 - Consultant for Global Analytics(Chennai) and Work on my opensource products (Krishna iResearch) - (C++/Python)

Worked on my Open Source Products Design & Development (Krishna iResearch) and Did consulting and development for Global Analytics,Chennai (optimization, a smart-pointer reference-counted memory manager backed-up by an Object Pool, and refactoring) in Global Decision Platform (GDP) 2.3 for GPD 2.3.1 and 2.5 which is written in C++ with boost::python embedding.

August 2008 - June 2011 - Work on my opensource

products (Krishna iResearch)

Started working on open source project ASFER

(<http://asfer.sourceforge.net>) as part of my non-profit open source initiative Krishna iResearch - ASFER is a rule miner and executer- presently uses Vector space retrieval and Support Vector Machines with added Support for Naive Bayesian Multinomial Classifier and Decision Tree Classifier

March 2006 - July 2008 - webMethods and webMethods

(now Software AG) (Bangalore) (C/C++/Java)

Worked on WebMethods Broker Server 5.x/6.x/7.x- a heavily multithreaded messaging product written in C/C++/Java based on publisher/subscriber model - Clients can publish and/or subscribe to certain predefined types of messages called "Events". My responsibilities included development of new functionalities and fixing customer escalation issues in core areas of Broker (Connection Layer, Territories/Gateways, Broker Admin Tool etc.,) and writing knowledgebase documents.

November 2005 - February 2006 - Krishna iResearch
(self-started, not-for-profit, open-source research initiative)

Initial design work for Krishna iResearch open source products focussing on algorithms for web and BigData

August 2005 - November 2005 - Verizon Data Services India, Chennai

In Verizon India for brief period and then self-study in Mathematics and Computer Science.

May 2003 - Krishna iResearch (self-started, not-for-profit, open-source research initiative)

Registered on SourceForge.net and Initial design work started for open source products focussing on algorithms for web and BigData

February 2000 - July 2005 - iPlanet (Sun Microsystems-Netscape Alliance) and Sun Microsystems (now Oracle)
(Bangalore)

Ported SunONE Application Server to Red Hat Enterprise Linux

Advanced Server 2.1 (2005)

Certified JWSDP 1.3 webservices pack on Sun One Application

Server 7.1 (2005)

Studied feasibility of supporting SunOne Web/Proxy Server on Solaris 10 zones (2005)

On Academic Sabbatical for 3 months (February 2005-May 2005)

Implementation of a threaded ICP server and porting SOCKS server for Sun Java system web proxy server 4.0 (C/C++/Solaris/Windows/RHELinux) (2004-2005):

Implemented a threaded ICP(Internet Cache protocol) server functionality using NSPR threads.

Also ported a legacy SOCKS server to proxy server 4.0.

Load Balancer Module for Apache Web Server 1.3.27 / 2.0.47

(C/C++) (2003-2004) :

Designed and implemented a Load balancer module for Apache 1.3.27 which will route the

HTTP/HTTPS requests onto SunONE Application Server instances by Round Robin Algorithm.

This module is part of Sun ONE Application Server 7, Enterprise Edition. Also ported the module to Apache 2.0.47.

Optimizations and Features for iPlanet/Sun ONE Application

Server 6.x (Java) (open sourced at <http://glassfish.java.net>)

(2002) :

a) Fixed bugs related to performance, admin-tool and security in iPlanet Application Server 6.x. Also fixed few CTS bugs

in SunONE Application Server 7 Standard Edition.

b) Involved in optimization of SUN J2EE Reference Implementation (RI) to make the JTS transaction manager enterprise-class. This included introducing a new

Component Level

Transaction Attribute setting feature in iPlanet Application Server

6.5. With this, user can set the type of transaction (XA or Local)

at J2EE application component level. [Patents granted - details in the end]

c) Added a Trace functionality for the JTS transaction manager in SunONE Appserver 7.0

Enterprise Edition

(http://glassfish.sourceforge.com/documentation/1:2ur2-b04-1/dir_512e7fccb5ab465c594742cd72317a0e.html).

Debugging and Monitoring framework (MagicDraw) (2002)

:

Designed a Debugging and Monitoring framework for Sun

ONE

Application Server 7.0 Enterprise Edition.

Store Adapter prototype for High Availability(Java) (2002)

:

Implemented a store adapter prototype for Clustra High Availability Database. This was to test the feasibility of using

Clustra HADB as backend store for session data in SunONE Application Server 7.0 Enterprise Edition.

Minor Feature Addition to SunOne Application Server 6.5 SP1 (2002)

Added support for enabling/disabling TCP_NODELAY in SunOne Application Server 6.5 SP1

Survival Index based Transaction Timeout Manager for iPlanet Application Server (Java)(2002):

Designed and implemented a new Transaction Timeout Manager for iPlanet Application Server. This resulted in an overall speed-up of 10% for the application server.

(Invention Disclosure done in 2002-2003)

Miscellaneous Bugfixes for customer escalations in the BillerXpert product which was dependent on iPlanet Application Server. This was one of the most involved bugfixes that required many days of debugging with JVM Profiling tools. (2001)

An automated Test suite for nightly build setup of iPlanet Application Server 6.0 (2001):

Designed and implemented a test suite which ran a set of

regression tests on nightly builds of iPlanet Application Server - written on Korn shell.

JVM related bugfix for IBM's Java Virtual Machine team related to native thread and green thread implementations of JVM (2000)

Created a Resume Querying System using JDBC with Oracle Backend for Sun Microsystems Human Resources Department to track candidate profiles - named ResumeXpert (2000)

Official Training Courses (SunU)

1. Solaris internals
2. Multithreaded Application development in Solaris
3. SOLARIS DEVICE DRIVER INTERNALS

July 1999 - January 2000 - BaaN Infosystems (now SSA Global) (Hyderabad)

Developed a storefront for an e-commerce application called

E-Enterprise using Microsoft Internet Information

Server/Site Server, Visual Basic, Active Server Pages and Visual Interdev

January 1999 - May 1999 - BE Thesis and Project(team)

- COBRA - Distributed Computing Framework based on
CORBA(Visibroker) and JAVA.

April 1998 - June 1998 - BE Internship at Steel Authority
of India Limited (Raurkela and Durgapur Steel Plants) -
Enhancements to Automated Furnace Data Acquisition
software through a GUI developed on VAX Fortran over
VAX VMS

MISCELLANEOUS

1. Gold medal for proficiency from PSG Tech for ranking first in B.E.(CSE) - Received in February 2000
2. GRE (2002) - score 2040, TOEFL - 270
3. Joint Entrance Screening Test(JEST) 2006 in Theoretical Computer Science - Rank 21 (Reg No: 22123).
4. Participated in Winter School 2010 on Machine

Learning and Computer Vision, Microsoft Research &
CIFAR, IISc

5. UGC Net July 2016 - 66 (I), 54 (II), 50.67 (III) (in
percentage) (Roll No. 69004241)

EXTRA-CURRICULAR:

Painting, Writing, Reading non-fiction mostly on
science, mathematics, religion and philosophy.

VIDEO RESUME(s):

[https://github.com/shrinivaasanka/asfer-github-code/tree/
master/python-src/image_pattern_mining/ImageNet/testlogs/](https://github.com/shrinivaasanka/asfer-github-code/tree/master/python-src/image_pattern_mining/ImageNet/testlogs/)

(ExampleVideo*mp4)

[https://github.com/shrinivaasanka/Grafit/blob/master/
course_material/NeuronRain/LinuxKernelAndCloud/code/
testlogs/Krishna_iResearch_NeuronRain_Repositories-2020-](https://github.com/shrinivaasanka/Grafit/blob/master/course_material/NeuronRain/LinuxKernelAndCloud/code/testlogs/Krishna_iResearch_NeuronRain_Repositories-2020-)

07-10_13.17.20.mp4