WHO behind the malign and attack on ELM, GOAL of the attack and ESSENCE of ELM (version 2.0)

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Many researchers are curious on who are circulating anonymous malign letters and setup anonymous malign websites to attack ELM (Extreme Learning Machines) community, the reasons behind and their final goals. Many of you have also received such malign letters which, from both contents and the attacking approaches viewpoints, may be considered most horrible in academic history. **We tried not to waste any time on handling such illegal and horrible attacking for the moment**, and we believe that the time will tell the truth in the end. There are many positive things awaiting us to study and concentrate.

1) <u>WHO behind the attack</u>:
   a. This malign and attacking campaign were initiated and have been mainly driven by **WANG**, **D**…X from L…X University (Person A, Surname: WANG). WANG (A) plagiarized others' works. He has been working very hard in the past years in order to affect other researchers' independence and freedom in research (e.g., sending mass emails, repeatedly calling researchers and begging them not to study ELM, threatening authors of new submissions he is reviewing/handling, etc). WANG (A) was suggested by us to write a comment letter and publish it with our response if he feels ELM same as others. However, WANG (A) played games by asking others to submit the comment letter to a journal so that he can continue playing behind the curtain. After reading our response and knowing their comments are incorrect, they decided to withdraw the comment letter and spread it as an anonymous malign letter in order to reach his goal of attacking others. WANG (A) pretended in front of some researchers that this was not done by him. In fact, WANG (A) not only attacks ELM community but also those who he considers better than him but are younger than him or in the same generation as him, or those who helps him in one way or another but he considers should provide much more help on him.
   b. **WANG**, **L**…X from N…X University (Person B, Surname: WANG), who is also involved in such attack campaign in one way or another, plagiarized others' research works 10 years ago. WANG (B) was warned by the university due to his plagiarism case. Although his misconduct was forgiven by others , he is keeping playing games and unfortunately did not learn any lesson from his earlier misconduct.
   c. **Sug**…X, **P**…X from N…X University (Person C) is one of the main forces in such attack campaign.
   d. There are a few "assistants" and "special helpers" working behind too due to their common "benefit" concerns (instead of academic concerns). The main reason we do not wish to show the full list of those few people and only show the surnames of three misconduct people is that it's better to give them some opportunities of correcting their own mistakes. Research is always serious, and it is not based on maligning, attacking, telling lies and cheating others. People could be cheated for a while but not forever. All these malign and attacking will finally become a joke and ridiculous story in academic history.
   e. In order to show that they themselves are "ethical" and can be "trusted," they are suggested to disclose their own names to the research community in the world. **We doubt whether they are "brave" enough to show their names and tell the world who they are.**

2) GOAL of the attack:
   a. They claimed in the anonymous malign and attack letters/website that ELM is same as SVM, LS-SVM, RVFL, RBF network, etc. At the first glance, it seems that they are advocating those techniques, however, it turns out that they are actually claiming in a "smart and indirect manner" that SVM, LS-SVM, RVFL, RBF networks, etc are same as each other if they really think those techniques are the same as ELM. They are trying to downgrade the originality of those related earlier works. However, obviously those techniques are quite different from each other.
   b. They claimed in the anonymous malign and attack letters/website that ELM does not refer to those earlier works and should not be forgiven, however, it's reasonable that those earlier works do not refer to each other as it was not easy for the authors of those earlier works to access others' works. This actually intends to insult the authors of those earlier works, to challenge the seriousness of those pioneers in research, and intentionally tells the world that those earlier works are same. Actually those earlier works are significantly different from each other, there is no credit and citation issue to them at all. On the other hand, those earlier works have been referred in relevant ELM works appropriately. In fact, some authors of those earlier works told us (by emails) and/or stated openly to the research community that they actually feel thankful to ELM community for the credit given to them. Several years ago, Halbert White, the pioneer of artificial neural networks and also the main inventor of QuickNet (1988) commented that "ELM" term was so sexy and so great!
   c. Different research communities (including ELM, RVFL, QuickNet, SVM, LS-SVM, Neural Science, etc) are actually discussing relevant research often in a very harmony manner and we are enjoying such fruitful and encouraging discussions. Our aim is very simple: try to find the truth of nature with joint research effort. However, such a few who have never truly working on any of these areas (except for several plagiarism cases or related papers but mainly written by others) feel jealous on the growing harmony atmosphere among different research communities.

3) ESSENCE of ELM:
   It is worth highlighting that ELM theories and learning frameworks aim to fill the several gaps in machine learning techniques.
   a. Filling the gap among different SLFNs: there are many types of SLFNs including feedforward networks (e,g., sigmoid networks), RBF networks, SVM (considered as a special type of SLFNs), polynomial networks, Fourier series, wavelet, etc. Those are considered separate and different algorithms before. However, ELM actually fills gaps among them and proposes that it needn't have different learning algorithms for different SLFNs if universal approximation and classification capabilities are considered.

      References:
      [1] G.-B. Huang, L. Chen and C.-K. Siew, "Universal Approximation Using Incremental Constructive Feedforward Networks with Random Hidden Nodes", *IEEE Transactions on Neural Networks*, vol. 17, no. 4, pp. 879-892, 2006.
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   b. Filling the gap among different learning theories: Ridge regression theory, linear system stability, matrix stability, Bartlett's neural network generalization performance theory, SVM's maximal margin, etc are usually considered different before ELM. Especially Bartlett's neural network generalization performance were

seldom adopted in training networks before. ELM adopts Bartlett's theory in order to guarantee its generalization performance. ELM theories and philosophy show that those earlier theories are actually consistent in machine learning.

References:

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c. Filling the gap between single hidden layer of learning and multi-hidden-layer of learning: Different from BP and SVM which consider multi-layer of networks as a black box, ELM handles both SLFNs and multi-hidden-layer of networks similarly. ELM considers multi-hidden-layer of networks as a white box and trained layer-by-layer. However, different from Deep Learning which requires intensive tuning in hidden layers and hidden neurons, ELM theories show that hidden neurons are important but need not be turned (for both SLFNs and multi-hidden-layer of networks), learning can simply be made without iteratively tuning hidden neurons. ELM not only achieves state-of-art results but also shortens the training time from days (spent by deep learning) to several minutes (by ELM) in MNIST OCR dataset, traffic sign recognition and 3D graphic application, etc. It's difficult to achieve such performance by conventional learning techniques mentioned in the anonymous malign and attack letters/website.

References:

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[6] G.-B. Huang, Z. Bai, L. L. C. Kasun, and C. M. Vong, "Local Receptive Fields Based Extreme Learning Machine," *IEEE Computational Intelligence Magazine*, vol. 10, no. 2, pp. 18-29, 2015.
[7] L. L. C. Kasun, H. Zhou, G.-B. Huang, and C. M. Vong, "Representational Learning with Extreme Learning Machine for Big Data," *IEEE Intelligent Systems*, vol. 28, no. 6, pp. 31-34, December 2013.

d. Filling the gap between machine learning and biological learning, and the gap between Frank Rosenblatt's dream and John von Neumann's puzzle:

ELM theories show that hidden neurons are important but need not be tuned in many applications (e.g, compressive sensing, feature learning, clustering, regression and classification). In theory, such neurons can be almost any nonlinear piecewise continuous neurons including hundreds of types of biological neurons of which the exact math modelling may be unknown to human being. ELM theory was confirmed in biological systems in 2013.

Rosenblatt dreamed that perceptron can be "the embryo of an electronic computer that will be able to walk, talk, see, write, reproduce itself and be conscious of its existence" and Neumann felt puzzled on why ``an imperfect (biological) neural network, containing many random connections, can be made to perform reliably those functions which might be represented by idealized wiring diagrams." There exists significant gap between them. From ELM theories point of view, the entire multi layers of networks (artificial neural network or biological networks) are structured and ordered, but they may be seemingly ''messy'' and ''unstructured'' in a particular layer or neuron slice. ''Hard wiring'' can be randomly built locally with full connection or partial connections. Coexistence of globally structured architectures and locally

random hidden neurons happen to have fundamental learning capabilities of compression, feature learning, clustering, regression and classification. This may have addressed John von Neumann's puzzle. Biological learning mechanisms are sophisticated, and we believe that ''learning without tuning hidden neurons'' is one of the fundamental biological learning mechanisms in many modules of learning systems. Furthermore, random hidden neurons and ''random wiring'' are only two specific implementations of such ''learning without tuning hidden neurons'' learning mechanisms.

References:
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We wish those few follow regular academic approaches and obey research integrity and legal rules. Everyone is sincerely welcome to investigating any of our works on ELM. We sincerely appreciate all constructive suggestions and criticism on any works of ours related to ELM in transparent manners. We feel sorry for inconvenience caused if any.

Sincerely,

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