Project report

Neronet

People

Project

Results

Demo

Quality

Process

Effort

Remarks

Project report

Neronet

Toolbox for managing the training neural networks

CSE-C2610
Software Project

Aalto University

April 12, 2016

Outline

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Forecitation

I have supervised several bachelors' theses and other student projects.

You surprised me with your commitment and effort.

Pyry Takala, PO

Outline

Team

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At the start of the course, we were all both

- ▶ terrified, and
- ▶ inspired

by our project topic!

Product owner

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▶ Machine learning researcher at Aalto
▶ Past: Amazon, McKinsey & Company, Goldman Sachs, August...
▶ A great PO!

Agile coach

- ▶ Continuous Delivery researcher at Aalto
- ▶ Past: Prosys PMS Ltd, WiRCA-miehet, Aalto...
- ▶ A great coach!

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Pyry's problem

Challenges in training neural networks

- ▶ Takes forever!
- ▶ Might anything be wrong?
- ▶ If yes, what?
- ▶ Is it developing better than its precedants?
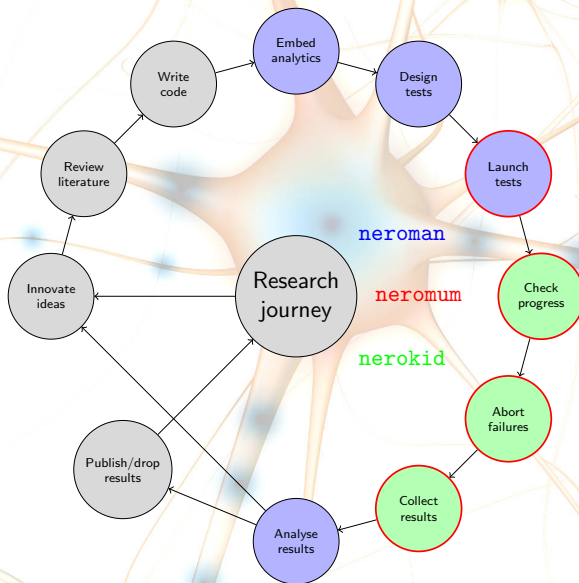- ▶ Why does it take forever?

Vision

A tool that would

- facilitate experiment management
- provide information on ongoing experiments
- be able to autoterminate experiments
- archive all results
- possibly even facilitate analysis

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Vision

Other requirements

- lightweight
- easily extensible
- open source
- good usability
- framework agnostic

Journey map

Technical challenges & ASRs

- ▶ deeply technical and an advanced domain
- ▶ remote computing nodes and cluster management
- ▶ good usability? according to whom?
- ▶ framework agnostic?

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Result

A three component tool involving Python, SSH and sockets that … meets the vision!

- ▶ All core functionality Done.
- ▶ Most features accessible both via CLI and GUI.
- ▶ PO satisfied.
- ▶ We are proud!

Solution

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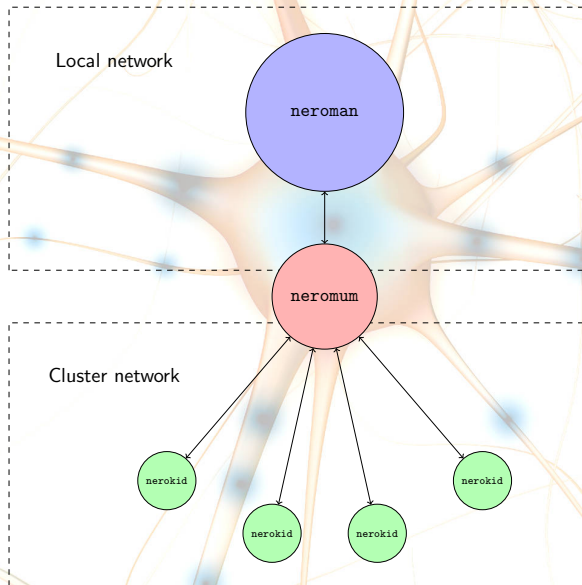Quality
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Local network

neroman

neromum

Cluster network

nerokid

nerokid

nerokid

nerokid

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Demo

Live demonstration of the final product including:

1. Cluster & experiment configuration
2. Experiment submission
3. Fetching updates/results
4. Viewing plots

Focus on the GUI this time.

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Recap

In essence the product is a Python-based tool that enables computational researchers to conduct their research more effectively.

- ▶ It utilizes SSH and TCP sockets to distribute computational experiments into remote computer nodes.

- ▶ It is framework agnostic in that it permits the use of a very wide variety of tools to actually conduct the computing needed (Theano, Torch, Scipy, Matlab, R, C++, whatever).

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User feedback

We utilized lots of end user testing and received great
feedback from a Triton admin:

- ▶ Thought that our design and architecture was well
  devised.
- ▶ Offered performance improvement ideas.
- ▶ In general he liked our usability as did our PO.

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Quality

Quality assurance was based on

- the DoD, and
- our QA practices

We updated our DoD and practices several times.

Definition of done

We defined Done at the BI, sprint and project level.

- ▶ BI level: unit tests, code confromity, commenting, documentation, peer review
- ▶ Sprint level: BIs Done, unit and system tests ok, sprint goal achieved.
- ▶ Project level: all sprints Done.

QA practices

Used QA practices and tools:

- Unit test framework
- Commenting & documentation
- System testing
- Peer review

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Quality attributes

Added emphasis on these attributes:

- Usability
- Reliability
- Extendability
- Performance

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Process overview

- ▶ Teamwork sessions almost every Wed & Fri at Maari
- ▶ Scrum as required
- ▶ Tried to employ professional SD practices
- ▶ Tools: Github, Agilefant, Flowdock, WhatsApp, Google Calendar, ShareLaTeX, Skype, Floobits

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Schedule

Time	Event	Participants
30.10. 16-18	Project kickoff	team, PO
13.11. 15-17	S0 demo	team, Coach
16.11. 11-13	S1 planning	team, PO
04.12. 16-17	S1 & progress review	team, PO, Coach
04.12. 17-18	S2 planning	team, PO
13.01. 19-20	S2 review & S3 planning	team, PO
01.02. 14-16	S3 review & S4 planning	team, PO
29.02. 13-14	S4 & progress review	team, PO, Coach
29.02. 14-15	S5 planning	team, PO
30.03. 16-18	S5 review & S6 planning	team, PO
13.04. 16-17	S6 & project review	team, PO, Coach
19.04. 16-20	Quality award & party	team, Coach

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Sprints

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- ▶ S1: Develop a prototype that offers the most basic functionality via a CLI Done
- ▶ S2: Develop a stable version for end user testing Done
- ▶ S3: Finish asynchronous system functionality and create a GUI mockup Done
- ▶ S4: Publish Neronet as an open source project Done
- ▶ S5: Finish Neronet 1.0 Done
- ▶ S6: Grab the quality award! ?

There were few stories that were deferred or completely cancelled, but no unpleasant surprises.

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Effort

Spent and budgeted effort in hours by team member and sprint:

S	Samuel	Teemu	Tuomo	Joona	Iiro	Matias
0	140/50	36/35	45/35	40/35	36/35	43/35
1	52/30	37/33	42/33	46/33	32/33	37/33
2	42/30	27/33	41/33	25/33	27/33	30/33
3	24/15	28/33	14/33	23/33	20/33	27/33
4	37/15	35/33	28/33	32/33	25/33	32/33
5	18/20	31/40	49/40	16/40	39/40	29/40
6	17/15	9/18	10/18	16/18	16/18	10/18
	330/175	203/225	229/225	198/225	195/225	208/225

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Remarks

Final remarks:

- ▶ The project realized the initial vision
- ▶ Complicating factors
- ▶ Simplifying factors
- ▶ Additional points

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Complicating factors

Complicating factors

- ▶ PO mostly in London
- ▶ Little additional CSE expertise available (only the Coach)
- ▶ Very difficult domain
- ▶ Very inexperienced team
- ▶ Only five developers
- ▶ PO nor the Scrum master had participated in the course before

Simplifying factors

Simplifying factors

- ▶ Our PO was very motivated and straightforward
- ▶ Our coach gave us very valuable support
- ▶ We had high motivation

Additional points

- ▶ Sprint team leader system
- ▶ User guide/manuals in communication
- ▶ Early end user testing
- ▶ OS future focus

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