Applications of Neural Networks with Handwriting Samples

John Larkin
Tom Wilmots

November 11, 2016

Introduction

Statement of what you are proposing and how the proposal is organized.

The following proposal will demonstrate clearly how we intend to teach a computer how to write convincingly from simulating human handwriting. This project will effectively train the computer on various handwriting and use long term short term neural networks to develop an effective algorithm to simulate the training.

The proposal is organized in the following manner. First, the purpose of the project and the minimum product is outlined in more detail. This describes the minimum requirements for our software program. The crux of the outline is the project plan or timeline. Here, we carefully lay out our schedule for the next five months. This includes phases and tasks for each phase. Next, the project costs are outlined. As of right now, this is a tentative sketch considering unseen costs. We expect this cost to be minimal. Finally, we conclude with our qualifications for the project.

Purpose / Minimum Viable Product

Concise summary of what you are proposing, benefits of the proposed work, how it will be accomplished and what it will cost.

Our project's purpose is to develop a program using recurrent neural networks, specifically long-short term memory models to effectively predict and train a computer to synthesize handwriting. The benefits of such a model are applications of creating more realistic handwriting computationally, as well as expediting the predictions. This project is extensive and requires the knowledge of several topics such as recurrent neural networks, specifically long short term memory networks. It also requires new software such as the TensorFlow package. Pending permission of a tablet that can track penstrokes, the cost of the project will be relatively small. As of right now, we are estimating our costs to be $100 in the case where the tablet does not have extractable data.

Project Plan / Timeline

Here you discuss in detail how you will accomplish the project goals in a logical progression. Divide project into phases and list tasks for each phase. Explain how you will accomplish each task.

Please see below.

Deadline: Middle of March

Time left: Roughly 20 weeks (including 4 weeks of winter break)

Task	*Activity*	*Order*	*Duration (weeks)*	*Week Number*	*Status*
A	Download TensorFlow and succesfully complete “Hello World” tutorial	Starting Activity	1	0-1	Complete
B	Download IAM-OnDB Data	Starting Activity	1	0-1	In progress
C	Read through paper - annotate fully	Starting Activity	1	0-1	Complete
D	Complete Draft Proposal	Starting Activity	1	0-1	Complete
E	**Understand theory of RNN and LSTM**	**After A-C**	**5**	**0-5**	**In progress**
F	Understand TensorFlow package completely	After A-C	5	0-5	In progress
Winter Break					
G	Unpack data from IAM-OnDB dataset to visualize more completely	After D-E	1	5-6	To be completed
H	Understand tablet text features	After D-E	1	5-6	To be completed
I	Write program to collect and visualize tablet data	After H	1	6-7	To be completed
J	**Implement a small RNN on a small input size**	**After D-E**	**1**	**5-6**	**To be completed**
K	Email Alex Graves and talk to him about the	After D-E	1	5-6	To be completed
L	**Build the network for handwriting synthesis**	**After F-G**	**3**	**6-9**	**To be completed**
M	Experimenting and testing with our RNN (small samples with tablet)	After H	2	9-11	To be completed
N	Introducing sampling as a parameter to affect accuracy	After I	2	11-13	To be completed
O	**Summarize and write full report**	**After J**	**3**	**13-16**	**To be completed**

* The bolded events above are milestones in our project. We will be able to have evidence of our understanding and / or progress.