



College Clubs for AI

Overview

At REDX, we are matchmakers between technology and impact. We kindle innovation before entrepreneurship to create the next generation of Innovators.

The REDX SPOT-PROBE sessions for REDX AI Clubs is an actionable framework for 10 weeks that kindles thinking innovation before entrepreneurship and leverage AI to deliver impact.



Key Performance Indicators / Outcomes for REDX AI Clubs

- Completion of studying/ watching all AI learning resources
- Minimum 3 problem statements identified with a team of 5 participants per problem
- Field work completed
- Completion of documentation for all problem statements and solution ideas as prescribed by REDX

10-Week Framework

Week	Week's Event	Goal and output
-2	Send invitations and confirm innovators	Website, FB page, event page
1	Launch Day	'Actionable Goal' statements, Create participant directory
2	Orientation to Spot-Probe method (see Videos below), Goal selection (downselect to a few Goals statements)	Setup Google Doc directory for projects, (Allow individuals to express Goal choices but do not form teams yet.)
3	Resource Mapping session for each of your 'Actionable Goal' statement, (During the week: field visit, meet stakeholders and experts)	Create Teams for each of the Goal statements
4	Field visit for Problem validation	Meet all the stakeholders, document their responses to the Survey Questions Deduce answers for all the Research Questions, and <u>create 'Refined Actionable Goal Statements'</u>
5	Meeting with Senior Board and Stakeholders	Present refined 'Actionable Goal Statements' and 'Resource Map' in breakout session (one breakout per Goal) and document the response of experts and stakeholders. Get a list of which stakeholders to meet during the week.
6	Problem Canvas and initial Solution Canvas (During the week: field visit, meet stakeholders and experts)	Update Google Doc
7	Solution Canvas (Optional: Start building the solution)	Update Google Docs
8	Meeting with Senior Board and Stakeholders (Optional: Show demo of the solution)	Present refined Spotted problems and initial solutions for each 'Actionable Goal Statements' in breakout session (one breakout per Goal) and document the response of experts and stakeholders. Get a list of which stakeholders to meet during the next week.

9	Findings Plot and Validation Session with Stakeholders and Experts (Optional: Get feedback to demo of the solution)	Document response of stakeholders
10	Final Presentations. Release well articulated problem statements, apply few projects to get featured on parent REDx.io website.	Create 1 pager for each of the identified Spot-Probe projects. Provide REDx completion certificates.

Important Points:

- At the beginning of every week, share logistic updates with your team, set expectations (for learning, experiences, goals, fun etc) for the week
- At the end of each week, get together and reflect on the learning & experience from the week, share it with your peers, analyze if you were able to achieve the goals & expectations set in the beginning of the week, go through the agenda of next week with all, prepare for any logistics needed for the next week & get everyone's opinions on how can you improve your experience in the next week.

Who should take the 10 week SPOT-PROBE sessions?

The REDX AI Club Core Team (including all Project Leads) and the Club advisor need to complete entire 10 week session course. Other innovators and faculty members may also participate and all their activities must be documented by the REDX team.

Roles of each REDX AI Club core member in the SPOT-PROBE sessions

Webmaster

1. Creates, maintains and updates Club website, pages & groups on social media platforms (LinkedIn, FB, Twitter, Meetup, Github, etc)
2. Regularly posts updates about Club's interests and activities
3. Create graphics, content, design work, animation, etc
4. Tracks and enhances website traffic
5. Synthesizes/shares broader learning content - webinars, articles, learning tools, etc. on relevant technical topics and innovation with the Club innovators and community
6. Along with Advisor, responsible for completing all online documentation related to the Club - teams, people, mentors, actionable goal statements, etc (as directed in this document further).

Treasurer

1. Allocates available funds to different projects of the Club
2. Develops, implements, and monitors fund management procedures
3. Along with Advisor, raise funds by writing grants and proposals (as appropriate with Host organization)
4. Pay bills, reimbursements, maintain financial records
5. Along with the Advisor, conduct, present financial audits when needed

Coordinator

1. Host SPOT-PROBE sessions, facilitate learning activities of Club members and innovators on technology and innovation topics, stimulate innovative ideas and testing of new approaches
2. Make and maintain connections with REDX team, interested innovators, Club Advisor, Club board members, Mentors, collaborators, other technology or engineering clubs and local community sharing contacts, ideas, materials, and resources benefiting everyone!
3. Conceive and manage documentation of Club's projects, maintain database of contact details of the Club ecosystem - Mentors, collaborators, vendors, community members, etc.
4. Assist project innovators in getting access to resources, associate with collaborators, validate and deploy projects
5. Work on Project management tools (e.g., Trello, Slack, etc) to manage team and projects

Project Lead

1. Strategize and lead the project development and team through the SPOT-PROBE phase and beyond
2. Works with the Coordinator to set up project specific collaborator meetings, conceive and manage project-related documentation, access resources for project, and carries the project forward till the project's goals are met/deployed. There might be multiple project leads depending on the ideas that are pursued

Advisor

1. Creates 6-monthly budget for the Club
2. Maintains relationship and co-ordinate with funders and investors
3. Operates and manages funds received from REDX and other funding bodies.

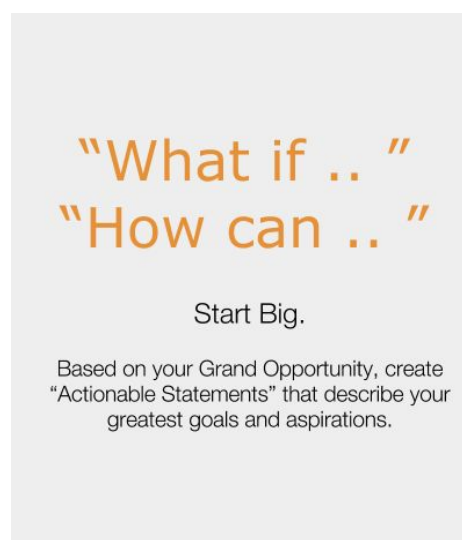
4. Ensures completion of all documentation of SPOT-PROBE sessions - as per documentation templates provided, photographs & videos of events, processes, brainstorm sessions, field visits, pitches, teams with senior board, etc
5. Help arrange and facilitate relevant and suitable field visits to meet stakeholders
6. Write grant proposals and raise funds for Club when needed
7. Represent the Club during financial audits

You can also add other roles. These core team members will coordinate most of the REDX Club's meetings, activities, projects, speakers, and other Club functions.

Detailed Programme Schedule

Week 1 – Launch

- Big event that gets the community involved - talent magnet for people and ideas.
- Launch Party: The goals of this event are to build connections with other students and organizations, to establish your REDX Club as a major presence in your school or community, and to draw large numbers of applicants to your Club. Using your club's connections and network, you can hold a big event for hundreds of people from such different sectors of society as business, research institutions, government, civic organizations, and industry. These people will benefit your project and provide necessary resources for your club in the future.
- Typically, a launch party will have a host, several speakers from different professions, REDX club members, and audience from society. The whole party should not take longer than four hours. It is recommended to start the event in the afternoon and end before 9 PM.



Define Grand Opportunity

create "Actionable Problem Statements"

"What if ..." or "How to..."

Do not describe the problem as

- (i) aspiration ('how to reduce poverty amongst farmers in developing countries')
- (ii) wish ('what if poor farmers can have universal basic income') or
- (iii) annoyance ('how to eliminate tax paperwork for farmers')

Actionable Problem Statement is

- (i) 'What if farmers had digital tools to ..'
- (ii) 'How to boost farmer income with ...'

Some agenda guidelines for the Launch Party

- A hrs - B hrs (A + 60 mins) - Welcome, Introduction to REDX AI Club & Host organization by Core team & Advisor + Video of Power talk/ Intro by Prof. Ramesh Raskar
- B hrs - C hrs (B + 90 mins) - Set the context followed by insights on 'Actionable Goal' statements from Project Leads
- C hrs - D hrs (C + 30 mins) - House Rules, Create participant directory (on whatsapp, Fb, google groups etc)
- D hrs - E hrs (D + 60 mins) - Snacks Party & networking

Week 2: Orientation to SPOT-PROBE method, Goal selection

- Use the '[Teams template](#)' to set up a directory for projects, (Allow individuals to express Goal choices but do not form teams yet)

Agenda guidelines

- Watch videos as recommended below:
 - a. [Accelerating Ideas by Ramesh Raskar](#)
 - b. [6 formulas to help you innovate](#)
 - c. [Keynote - REDX: Flipped Venture Model for Impactful Innovations @ TiE Global Summit 2016](#)
 - d. [How to setup a GitHub account](#)

- Set up [google directories](#) of your
 - a. SPOT-PROBE sessions schedule
 - b. Teams according to 'Actionable Goals' (to allow individuals to express Goal choices)
 - c. Documentation for Projects as per [Project Documentation template](#) provided
 - d. [Profiles & contact details of Senior Board & Mentors](#)
 - e. A [SPOT-PROBE sessions' feedback form](#) to be filled by everyone at the end of the week (as provided)
 - f. Materials, components, resources you have access to at your Club
 - g. All participants' contact details & profile links as provided in the [REDX people contacts](#).
 - h. Setup GitHub accounts for each team.

Week 3: Resource Mapping session for each of your 'Actionable Goal' statement

- Create Teams for each of the Goal statements
- During the week: field visit, meet stakeholders and experts

Agenda guidelines:

- Skill Mapping & Team forming: Understand skillset existing in the teams (formed according to 'Actionable goal' statements), try having as much diversity as possible - every team could have someone from software (AI/computer science), design, other technical and business background.
- Thoroughly go through the process of Identifying and probing most impactful problems [as recommended](#)
- Watch Design thinking & behavioural science videos as recommended:
 - ◆ [An Introduction to Design Thinking Process Guide](#)
 - ◆ [Stanford Design Thinking Virtual Crash Course](#)
 - ◆ [Introduction to Design Thinking \(Certificate Course by Microsoft\)](#)
 - ◆ [Changing behaviour by Design](#)
- Create a document of 'Resource Map' to understand the 'Actionable Goal Statement' and the problem better.

Resource Map

A Post-It Exercise

With your team, get a better idea about the scale of the grand opportunity by accumulating as much information as possible (written on post-its) for the following categories:

People & Organizations

Organizations, Companies, Startups, Govt. Orgs.

Data and Information

Partners

People, VCs, Influencers

Known Published Challenges (e.g. UN, Gates, DBT/DST)

Users & Beneficiaries

Graph of Users and Use Cases

Influencers

Buyers/Sponsors

Partners

Where do we need research?

Speak with Experts!

Breakthroughs & Risks

Breakthroughs

Payoffs, results, benefits → IMPACT

Friction – regulation, biases, etc.

Financial risks

Execution risks/ limiting factors (e.g., time, distance, lack of existing infrastructure)

→ Create the following documents:

- 'Research Questions' (on the basis of Unknowns for internal purposes)
- 'Survey Questions' (questions you want to ask & assumptions you want to validate with the stakeholders)
- 'Datasets' (available and to be captured datasets around the domain and problem)

Week 4 - Field visit for Problem validation

- Strategize the visit's purpose and role of each team member. Guidelines given below might be helpful:
 - [Validating the Problem](#)
 - [Using Validation to build the right product](#)
 - [Never Ask what they want](#)
- Meet all the stakeholders, document their responses to the Survey Questions
- Deduce answers for all the Research Questions, and create 'Refined Actionable Goal Statements'

Week 5 – Meeting with Senior Board and Stakeholders

- Present 'Refined Actionable Goal Statements' and 'Resource Map' in breakout session (one breakout per Goal)
- Document the response of experts and stakeholders.

- Get a list of which stakeholders to meet during the week.

Agenda Guidelines:

- Prepare & PRACTICE a 3 minute pitch for your project that includes ‘What & Why’ of your Refined Goal statement, and Resource map. You can be as creative as possible to present your project (we don’t want to limit your creativity by asking to create a ppt! :))
- Present to the Club Senior Board, Advisor(s) and Head(s) of your organization. Each team takes a total of 5 mins - 3 mins pitch + 2 mins Q&A from Board.
- Get general feedback about the Club’s approach, activities and energy so far, followed by specific feedback on individual projects
- Create a Google sheet for documenting their feedback, and other relevant stakeholders/ experts in your Senior Boards network that you can connect with.

Week 6 – Problem Canvas and Initial Solution Canvas (During the week: field visit, meet stakeholders and experts)

Problem Canvas

The Problem Canvas is a guide for associating problems with available skillsets in order to discover techniques or approaches to solving these problems.

Step 1

Make a list of all the problems or opportunities associated with your topic.

Example: Future of Farming

- Greenhouses
- Crop Prediction
- Farmer Finances
- Weather Stations

Step 2

Make a list of all the skills or areas of study that you and your team can leverage in creating solutions (not limited by the topic)

Example:

- Sensors
- AI
- Crowdsourcing
- Communications

Step 3

In a table, associate each problem with the skills you listed in order to come up with techniques to approach creating grand opportunities.

Try your best to fill all the squares, and even put in multiple ideas.

		Techniques			
Problems		Sensors	AI	Crowdsourcing	Communications
	Greenhouses	Option 1			Option 8,9
	Crop Prediction	Option 2,3		Option 4	
	Farmer Finances		Option 5		Option 10
	Weather Stations	Option 7		Option 6	

An example Problem Canvas

- Document Projects' details as per templates of Problem Canvas and initial solution canvas provided
- Meet stakeholders to validate information in your Problem and initial solution canvas. Document insights thoroughly.
- Watch videos on Frugal Innovation, Paper prototyping, Rapid Prototyping - 3D printing, laser cutting, soldering, microcontroller programming like Arduino, CAD modelling, MATLAB programming, MIT App Inventor, etc
 - [Creative problem-solving in the face of extreme limits](#)
 - [Paper Prototypes](#)
 - [Fast Solutions for Brighter Future- Rapid Prototyping](#)
 - [Rapid Prototyping: Concept, Technology, and Applications](#)
 - [How Arduino is open-sourcing imagination](#)
 - [Maker Movement](#)
 - [From Maker to Change maker](#)
 - [Introduction to Open Innovation](#)

Week 7 – Solution Canvas (Optional: Start building the solution)

- Document your final idea in the Solution Canvas.
- Create quick ML prototypes in TensorFlow or any of the ML Frameworks using pretrained models and public datasets available around the problem you are trying to solve. If any hardware is involved in the solution design then attempt creating paper prototypes without any electronics or use rapid prototyping techniques. In case of web/ mobile applications - you could make a dummy cardboard device with different sections of paper rolls passing through it like screens/ pages of the App unless you can build a demo app within a few hours.

Now that we know what techniques are available to us in order to address each problem, we need to rank them by their level of impact: the cost, the time required, and the reach.

Solution Canvas

A guide for determining the technique that will create the solution with the most impact.

In another table, list all the techniques from the Problem Canvas and associate them with the factors of impact.

Fill in the cost and time spaces with numbers to compare your techniques in terms of each factor of impact.

Reach refers to all the types of people who would benefit from the approach you've come up with. Write down as many groups as you can think of who would be impacted within the "billions".

An example Solution Canvas

		Constraints		
Scenarios		Cost	Time	Reach
	Option 1	4	1	Rural farmers, elderly
	Option 2	3	6	School children, Rural farmers, parents
	Option 3	6	10	Police force, Policy makers, Rural farmers, school children
	Option 4	1	2	Elderly
	Option 5	8	9	University students, young professionals
	Option 6	10	5	Rural farmers, young professionals, parents
	Option 7	2	7	School children, Doctors
	Option 8	5	4	Teachers, University professors, Rural farmers
	Option 9	9	8	Cab drivers, delivery workers, Delivery management
	Option 10	7	3	Entrepreneurs, Rural farmers, young professionals

Week 8 – Meeting with Senior Board and Stakeholders (Optional: Show demo of the solution)

- Present refined 'Spot'ted problems and initial solutions for each 'Actionable Goal Statements' in breakout session (one breakout per Goal)
- document the response of experts and stakeholders.
- Get a list of which stakeholders to meet during the next week to validate the final solution ideas/ prototypes.

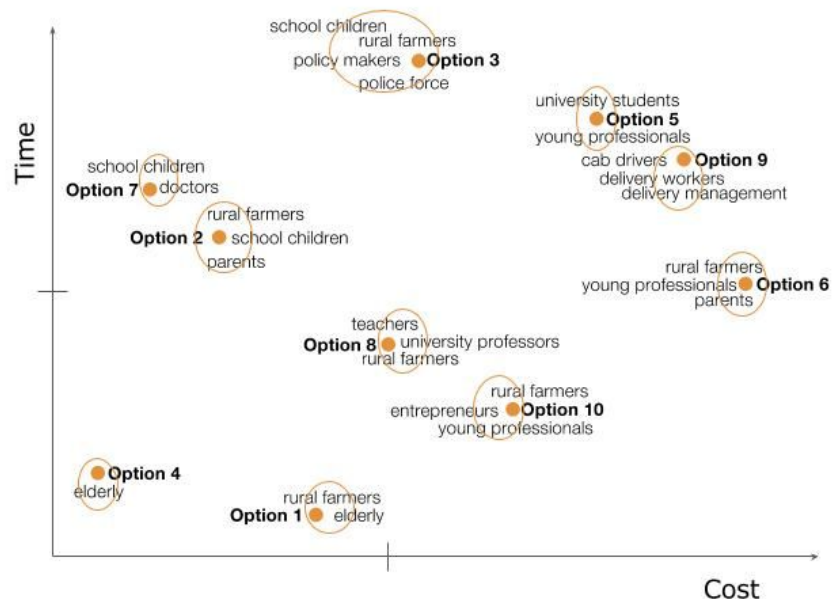
Week 9 - Findings Plot and Validation Session with Stakeholders and Experts (Optional: Get feedback from stakeholders to demo of the solution)

- Document response of Stakeholders
- Watch videos on Entrepreneurship, Sustainability, Importance of Open Source for Social Impact, Licensing options & Support communities for Open Source projects
 - [Breakthrough designs for ultra low-cost products](#)
 - [The Open Source Era](#)
 - [Open Source Guides](#)
 - DIY & Open Source Culture - Makezine, Hackaday, Open source Hardware, etc
- UnConference it: At the end of the week, set up demo tables for every project and present the prototypes to different teams in your club

Findings Plot

A way to visually interpret the results from the Opportunity Investigation

As shown in the example, create a plot of your findings in the solution canvas, and create a word cloud of the different directions of reach in order to visually represent the breadth of impact that each solution has.



Week 10 – Final Presentations. Release well articulated problem statements, apply few projects to get featured on parent REDX.io website.

- Open House: Presentation/ Demonstration of your project in a public event
- Create 1 pager Poster for each of the identified Spot-Probe projects.
- REDX Certification Ceremony: provide REDX completion certificates.

Solution Presentation

Some questions to answer as you put together your presentation

- WHY – Big idea
 - How is it done today? What are the limits of current practice?
- WHO – Who cares?
 - If you're successful, what difference will it make?
- WHAT – What's new? What difference will it make?
 - What are you trying to do? Articulate objectives without using jargon.
Why do you think it will be successful?
- HOW – Map of Users, Resource Requirements, Risks and Workarounds, Milestones
 - What are the risks and payoffs?
How much will it cost?
How long will it take?
What are the midterm and final "exams" to check for success?

Create a separate slide with your solution map

Agenda guidelines:

- Arrange for a public event 'Demo Day' to showcase your projects. Invite all members of the REDX team, host organization, Senior Board, all stakeholders and experts you've interacted with, prospective collaborators (government officials, media, implementation partners, citizen scientists, etc), family and friends
- Pitching Session (Max. 2 hours) - Similar to the launch day, address the audience with background on REDX, host organization and your REDX club. Each team gives a 3 minute pitch presenting the Problem Canvas, Solution Canvas, Potential Social Impact, Road map to 'Grow' the Projects and 'Shout out to Collaborators' to share needs and offer help.
- Demo Session (Max. 1.5 hours) - Set up project tables to demo your ideas/ prototypes to visiting guests. Do not try to sell your projects yet, pitch & get feedback in a register/ Google document, share your contact details & gather contacts of people who are interested in your projects (you never know who can be your potential collaborator).
- Create a 1-pager document and share with us - we can use that to promote your REDX Clubs and present your work wherever we visit globally.
- At the end of the Demo sessions, provide certificates to all teams' members through seniors from host organization, Club Senior Board, Mentors, and other Influencers around.

REFLECTION AND IMPLEMENTATION

What Next?

Steps to Implement Your Grand Opportunity

Recommended Courses & Videos

Artificial Intelligence and Machine Learning:

Beginner:

1. Intro data science - <https://www.udacity.com/course/intro-to-data-analysis--ud170>
2. Intro to ML - <https://www.udacity.com/course/intro-to-machine-learning--ud120>
3. Another intro to ML - <https://www.udacity.com/course/machine-learning--ud262>

Intermediate:

1. Intro to A/B testing - <https://www.udacity.com/course/ab-testing--ud257>
2. Real time analytics with Apache storm - <https://www.udacity.com/course/real-time-analytics-with-apache-storm--ud381>
3. Data visualization with D3.js - <https://www.udacity.com/course/data-visualization-and-d3js--ud507>
4. Data analysis with R - <https://www.udacity.com/course/data-analysis-with-r--ud651>
5. Neural Networks for Machine Learning - <https://www.coursera.org/learn/neural-networks>
6. <http://cs231n.stanford.edu/syllabus.html>
7. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-867-machine-learning-fall-2006/>
8. A paper-reading roadmap: <https://github.com/songrotek/Deep-Learning-Papers-Reading-Roadmap>

Advanced (very involved):

1. Reinforcement learning - <https://www.udacity.com/course/reinforcement-learning--ud600>
2. Deep learning - <https://www.udacity.com/course/deep-learning--ud730>
3. Advanced Deep Learning and Reinforcement Learning - https://www.youtube.com/playlist?list=PLqYmG7hTraZDNJre23vqCGIVpfZ_K2RZs

Videos by Andrew NG:

1. <https://www.youtube.com/watch?v=LLx4dIlP83I>
2. <https://www.youtube.com/watch?v=CLDisFuDnog>
3. <https://www.youtube.com/watch?v=n1ViNeWhC24>
4. <https://www.youtube.com/watch?v=LFDU2GX4AqM>

Other Courses:

1. Bay Area DL School -- <http://www.bayareadschool.org/>
2. Summer School Montreal -- http://videlectures.net/deeplearning2016_montreal/

3. Larochelle -- <https://www.youtube.com/watch?v=SGZ6BttHMPw&list=PL6Xpj9I5qXYEcOhn7TqghAJ6NAPrNmUBH>
4. Hinton's Coursera -- <https://www.coursera.org/learn/neural-networks>
5. de Freitas Oxford -- <https://www.cs.ox.ac.uk/people/nando.defreitas/machinelearning/>
6. Stanford NLP -- <http://cs224d.stanford.edu/>

Other Videos:

1. Extreme Computational Imaging (DARPA "Wait, What?"), Ramesh Raskar, MIT Media Lab: 25:35 <https://www.youtube.com/watch?v=ZTRWjSlqARk>
2. CPEU3 - Big Data, Sandy Pentland, MIT Media Lab: 53:48 <https://www.youtube.com/watch?v=imyddrY4nEg>
3. #HBRLive: The Internet of Things, Privacy, and The New Deal on Data, Sandy Pentland, MIT Media Lab: 31:55 https://www.youtube.com/watch?v=omC_2F3Q0Hg
4. Brilliant designs to fit more people in every city, Kent Larson, MIT Media Lab: 16:41 https://www.ted.com/talks/kent_larson_brilliant_designs_to_fit_more_people_in_every_city?language=en
5. Eric Ries: "The Lean Startup" | Talks at Google: 58:08 <https://www.youtube.com/watch?v=fEvKo90qBns>
6. Lean Canvas Course, Ash Maurya: 13:04 <https://www.youtube.com/watch?v=qjqrWB8xHfw>
7. Innovating for a Sustainable World, Jason Jay, MIT Sloan 2015: 1:00:01 <http://mitsloan.mit.edu/sustainability/video/innovating-for-a-sustainable-world-reunion-weekend-2015>
8. Using Improvisation to Develop Leadership, Daena Giardella, MIT Sloan: 3:30 <https://www.youtube.com/watch?v=-KfuzO6t998>
9. Upside: Anything is Possible, with Pashon Murray, MIT Media Lab Director's Fellow: 1:00 <https://www.youtube.com/watch?v=jAN61QK0aUI>
10. ghdLAB (Global Health Delivery Lab): In the world, for the world, Anjali Sastry, MIT Sloan: 5:17 <https://www.youtube.com/watch?v=WiaDcQ1pLDs>
11. Entrepreneurship 101: Who is your customer? Bill Aulet, MIT Sloan
12. 6 weeks, 4 hours per week <https://edge.edx.org/courses/course-v1:MITx+15.390.1x+4T2016/info>

Data Sets:

1. <https://github.com/openimages/dataset>
2. <https://data.gov.in/>
3. <http://data.worldbank.org/country/india>
4. <http://deeplearning.net/datasets/>
5. <https://www.cs.toronto.edu/~kriz/cifar.html>
6. <http://yann.lecun.com/exdb/mnist/>
7. <http://authors.library.caltech.edu/7694/>

Developer Resources for Computing for Clubs

1. AWS ML
2. Azure ML
3. Tensorflow

Book: <http://www.deeplearningbook.org/>

After courses :

Go to these places to apply your skills

1. Data science challenges to improve skills - www.kaggle.com
2. <https://www.drivendata.org/> (kaggle equivalent for social good)
3. <http://datalook.io/> - (Some really nice project ideas like adopt-a-pet. Can be a great source for ideas)
4. www.datakind.org
5. BM ML challenges for social good - <https://ibmhadoop.devpost.com/>
6. TensorFlow experiments, libraries, and projects - <https://github.com/jtoy/awesome-tensorflow>
7. <https://www.tensorflow.org>
8. Curated list of Machine Learning frameworks, libraries and software (by language): <https://github.com/josephmisiti/awesome-machine-learning> -
9. Deep Learning Papers Reading Roadmap: <https://github.com/songrotek/Deep-Learning-Papers-Reading-Roadmap>
10. Deep Learning Papers: <https://github.com/sbrugman/deep-learning-papers/blob/master/README.md>