# Crowdtrust - Trustworthy Information From The Crowd Group Project

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January 5, 2013

**Abstract**

Outsourcing is becomming increasingly popular in a lot of areas and as a result providing these required services has become big business. Companies are using the Internet to accept jobs from requestors which often require some human intelligence such as tagging images, they then distribute these jobs to a crowd of workers and return the results to the requestor. This process is called crowdsourcing.

At the moment Amazons *Mechanical Turk* is the only real crowdsourcing 'giant' in the market, with over 500,000 workers it offers anyone with a computer and internet connection the ability to 'earn $$$ while working from home!'. Requestors (companies or individuals) can then submit a HIT(Human Intelligence Task) to the mechanical turk system, this HIT is then displayed to all users along with a reward for its completion, the results are then sent back to the requestor and they decide whether the work is worth paying for. This system raises a problem though, How do I know how accurate my results are? You have no control over which worker selects your HIT and your task of 'Transcribe this podcast' could be carried out by a lacklustre employee in India who doesn't speak very good English. The solution most requestor guides offer is to submit your job to multiple workers but this pushes up your costs linearly and leaves you to make a difficult decision to make on the number of workers to consult.

We seek to create is a solution to this problem by providing a framework in which requesters can submit jobs with a required level of accurary. Our system then decides how many users it needs to consult to achieve this based on their expertise.

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## 2.1 What Is Crowdsourcing

Our project concerns *crowdsourcing* 'the book' would describe crowdsourcing as the principle of obtaining an accurate and appropriate result by having many different contributors performing a task but we'd like to start with a story which we believe encapsulates the idea of crowdsourcing in its most positive and useful light.

In January 2009 Timothy Gowers (Fields Medal winner and avid blogger) used his blog to post a striking question *Is massively collaborative mathematics possible?*. He posted a difficult and unsolved mathematical problem he was particularly interested in and invited people to contribute to its solution in the comments section. The project initally got off to a slow start but once the ice was broken the comments flooded in. 37 days , 27 contibuters and 800 comments later Timothy Gowers was able to announce that not only had they solved the original problem but they had also solved a harder generalisation of it, he called his experiment the *Polymath Project* .

This is a nice example of how crowd sourcing can be used to combine the skills of many individuals and produce answers to a complex problems, but there are many motivations to outsource your task to the crowd:

- *Computational Difficulty:* Timothy Gowers provided a nice example of a computationally difficult problem It is extememly unlikely you would be able to write a Java program or use Wolphram Alpha to produce a complex mathematical proof, some problems require what we like to call the 'human touch'. Problems which require the human touch are in no way confined to the realms of complex mathematics identifing an unknown bird in a picture for example would prove quite difficult on a computer you may need access some a program like Google Goggles but even then you would probablly need a good quality photograph, whereas one avid bird enthusiast in the crowd might be able to easilly identify the bird and reuturn the correct answer.

- *Saving Time:* In 2009 aviator Steve Fosset crash landed deep in the Nevada desert, his friends knew they had a very small and time critical window to find him alive and they had little faith in the current search and resuce operations. They organised for satellite images to be taken of the desert and the images were passed to a crowd who were asked to identify foreign object which could be potential crash sites. This is a nice example of how the crowd can be used to literally cover a large ammount of ground in a small ammount of time. Not all examples of saving time are quite this dramatic though, image tagging is an extemely arduous task for an individual or small group of people to perform and tagging a relatively large set of images could take weeks or even months, outsourcing this to the crowd could have the job done in a number of hours.

- *Saving Money:* Time is money as they say and this goes hand it hand with the point above. If you have to pay a team of high salary computing professionals to tag images for your project when you could be paying them to write code this is not cost effective, however passing this job off to a crowd of lower paid people could potentially save you a lot of money.

- *Reaching A Willing Audiance:* Unless it's something they enjoy the fact is that people are not willing to work for free, this is why getting the general public to do things such as complete surverys can be difficult as a large number of people will simply not want to do it. The crowd memebers will be inventivised to perform work and as such will be more likely to complete your survey.

## 2.2 Analysis of the Marketplace

## 2.3 Problem Description

1. *How do we get these problems to the crowd?*
   It is unlikely many people with a problem to be solved would want to go to the trouble of creating a crowd themselves as this would be comparitive to the complexity of the problem itself therefore there is a need for a third party crowd management system.

2. *What problems can we ask the crowd?*
   Specialised crowds have been successful and certainly have their uses for instance www.stackoverflow.com can be thought of as a crowd specialising in the solution of computing problems, however it is unlikely I would be able to find a specialised crowd to indentify bird pictures or to search satellite images for crash sites, therefore I need access to a generalised crowd able to adapt to and solve a wide variety of problems. The crowd management party therefore needs to provide the ability to ask a wide variety of questions and the ability to easily encorporate new questions in response to new technology.

3. *How many people do we ask, who do we ask and how can we trust what they say?*
   Crowd members will be a representitive sample of the general population, some will be brighter than others and some will be willing to put in more effort than others based on this you can place all annotators on a scale of trustworthiness which rates how much you believe an answer they give you. This rasises the question of 'how many people do I ask?', is consulting a small number of very trustworthy people better than a large number of non trustworthy people?, However I can't simply ask the same subset of people over and over again as workload will build up and my answers will be delayed. If I have a 'specialist' question do I direct it to someone with knowledge of that specialism? Clearly a sophisticated algorithm is needed on the crowd management side to address these problems.

A solution to these problems provides us with the basis for our project we are to:

*Design and implement a framework that allows the optimum number of contributors to be selected on the basis of their trustworthiness for a desired accuracy of the outcome/result and that evaluates the trustworthiness of contributors on the basis of the accuracy of the results they provide.*