Thanks for coming today. And the presentation of Fan is really interesting. The topic that I will share with you today is how to amplify or stimulate creativity in the Big data Era. Most materials of this sharing come from a study in which I participated during the last two years. It is a practical application of statistics. In this project, my responsibility is to analyze data that we grthered from online eduction platform, Coursera. Comparing with my other research projects in finance and statistics, the statistical methods that we used in this study are very simple. But some of the results are interesting. Except for statistical results of this study, I would like to share my understanding of how to find and improve your creativity so that you could improve your professional skills and learn more state-of-the-art knowledge. (Because most of my sharing contents are a little bit abstract, I will present following contents in Mandarin. Hope you could understand.)

This study focuses on the relationship between creativity and failure, which is very complex. Scholars are debating the positive and negative effects of failure on the quality and the quantity of creative outcomes. My coauthor, Professor Jablokow and several other professors open an online course named "Creativity, Innovation and Change". This course aims to help students develop creative potential, so students can enhance and transform their business, their community, and their personal life.

According to my understanding of this course, developing creative potential may help us to improve our professional skills and stimulate us to learn more state-of-the-art knowledge. This presentation also includes my reflections during the progress of this research project.

I would like to divide my talk into three parts.

First is to discover creativity.

Second is to collect and stimulate creativity through three differnt tools.

Third part includs some very simple statistical results.

1. First, let me ask you a question, who has higher creativity? You may choose man, woman, engineer or artists.

Creative Diversity:

This concept is based on the assumption that all human beings are creative, but in different ways.

This assumption conflicts with the popular view of creativity, which often sets apart certain people, such as artists, as so called “truly” creative, while others are not. Dr. Jablokow defined four key variables to distinguish the creativity of one person from another.

- first is creative level. It means your potential and manifest cognitive capacity.

- second is creative style, which means your cognitive preference for structure. Such as someone prefer situations where few rules exist, whereas others prefer situations where well-established rules exits.

- third is motive. It means how you channel your energy. In other words, how you encourage youself to keep creative thinking.

- Forth is opportunity. What is available and how you perceive it. Such as, you may not make your creative ideas come true if you don't have opportunities or resources.

– These four factors are equally valuable. But, particular combinations may be more effective in specific situations.

So when you want to solve a problem in creative way, thinking these four variables may help you to better understand your creativity.

The next part is stimulating creativity and collect ideas.

In this part, I will introduce three useful tools for stimulating creativity.

First is wild mind. What is wild mind? Wild mind is looking everywhere for opportunities. Observe more carefully around you and question how things work and what could be done differently or what opportunities could financially valuable for you. It kind like open mind.

Second is idea journal. It originally means you could use a notebook to capture your ideas once they come out. You may use recorder, voice memo in you smartphone. Anyway you like. Capturing ideas. It keeps you from forgetting important things.

Third is Intelligent fast failure. It focuses on the “rapid prototyping” of ideas, products, and processes, so that “rapid and smart” trial and error through experimentation becomes a significant source of information and knowledge. In other words, don't be afraid of failure. All these failure you made are valuable for your future successes.

With these concepts, let me introduce our data. In the online course, professors ask students to build the tallest free-standing tower possible using only shoes. Students calculate the “T-value” of each tower, which is defined as the quotient of the tower height and the number of shoes. And students were required to submit their failure time before they made their final prototype, shoe tower.

when we examine the correlation between Attempts and the T-value, the results imply that better overall performance is associated with more Attempts, with a slightly larger (but still low) correlation coefficient (0.132). In other words, the more attempts the students made (the more they “failed”) before finalizing their Shoe Towers, the more “efficient” was their final result (greater height, fewer shoes).

Besides, the correlation between number of shoes and attempt is negative, which means the more attempts the students made, the fewer shoes they used. These results support that students will perform better through Intelligent Fast Failure.

Next part is differences between gender. The first pair-wised boxplot shows the t-value of male and female. You could find the average of tvalue of male is 4 and the average of tvalue of female is about 5. Moreover the ANOVA shows there are no siginificant differences between male and female.

Analysis of Variance shows that the differences in \*\*IFF/Attempt\*\* between male and female are not significantly different.

今天我想与大家分享的是在大数据时代，如何提高专业技能，学习更多有用的知识，释放自己的创造力。

这个研究涉及的内容来自过去一年半时间里我参加的一个科研项目，这个项目主要研究创造力与失败之间的关系，数据来源于在线教育平台Coursera上关于创造力的一门课，"创造，创新和改变"。这门课由与我合作的老师Dr. Jablokow教授开设，旨在帮助学生提高创造力潜力，进而他们可以提高和改进自己的生意，社区以及生活[1]。我自己的理解认为，提高创造力还有助于提高工作技能与效率，能够创新性的解决实际业务问题。所以这次的分享包括部分我们的研究结果，也包括我对这个课程的理解以及在完成这个研究中自己的一些反思。

这个分享主要分为下面三个方面，1.大数据时代数据分析相关工作所需技能，2.创造力的发现与放大，3.相关研究结果展示与建议。

第一、批判性思维指的是通过一定的标准评价进而改善思维，是一种反思性的思维。通过对已有事物不断的质疑，研究，重新归纳以得到更完善的理论。这种思维方式在分析和解决问题时是不可或缺。而大数据时代诸多的问题，理论都会被重新研究，所以，对已有理论的质疑与反思是非常重要的。

第二方面，需要跨学科合作能力。这个名字听起来更像是学术研究必备的技能，但是，随着社会的发展，这已经不仅仅是科研所需的技能了。跨学科合作能力发生在平时工作和生活的方方面面。简单的例子比如说，数据分析或统计分析的分析师也需要多了解市场营销等领域的专业知识，只有那样，在做统计分析时做出的假设，拟合的模型才能更好的结合市场营销理论及经验。再比如说，在投资机构做行业分析的分析师一方面要非常了解公司估值，财务分析，二级市场等金融知识，另一方面也需要对所研究的行业有一定的了解，比如说新能源，锂电池行业或者是农业，畜牧业一定的了解。脱离了被估值公司本身的特定的行业，市场属性，估值可能差之毫厘失之千里。

第三，应用型研究应具有数据驱动的科研能力。科研能力我认为是包含了提出问题，分析问题，解决问题等一系列的技能。为什么要强调数据驱动呢？因为随着信息技术的不断突破，消费电子品的推陈出新，数据采集已经变得越来越方便与高效。这些变化所产生的大数据一方面给统计分析带来了许多挑战，诸如伪相关，存储瓶颈，可扩展性等，但是也带来了诸多便捷。巧妇难为无米之炊，没有数据，一切数据分析都是纸上谈兵，有了数据，那就需要扎实的统计学，计算机科学等方面的理论知识及动手能力。通过这些技能我们能从数据中找到有价值的结论与方法。应用到未来的业务场景中。

第四，创造力。创造力可视为一种现象，伴随着一些新颖的、有价值的东西被创造出来的过程。被创造的物品可以是无形的，如观点，科学理论，歌曲，或是有形的物体，如发明，产品，画作等等。只有在自己的领域中，发挥创造力，才能不断的突破，反思，优化，才能提出更多有价值的物品。

我合作教授研究创造力提出的创造力多样性理论认为，任何人都有创造力。只是由于处境的不同，有些创造力没有被发挥出来。

- 通过四个关键变量衡量不同人之间创造力的区别：

- 创造力水平：你的潜力以及表现出的认知能力

- 创造力类型：你对于结构的倾向，有的人倾向抽象的思考问题，有的人倾向具体的思考问题细节，这里的类型就是衡量人是偏向于更多的结构还是更少的结构下去分析解决问题。

- 动机：人们如何引导自己的动力或激情，来持续的发挥创造力

- 机遇：如何使用已有的资源来支持创造性工作。这与平时对于机遇的理解是类似的，比方说没有好的机会，平台去发挥创造力，那么一个人暂时所表现出来的创造力可能相对低下。

从这几个方面去分析创造力是非常有价值的。所以，在具体的环境以及条件下，你需要至少从这四个方面去思考，去提高解决特定问题时所需的创造力。

第一个是，wild mind, 在这门课中由Jack教授提出，我对于它的理解呢是开放的思考，也就是保持开放的心态去分析，思考你每天所能够接触到的事物。

第二个是，idea journal。直白的说就是把你任何时候灵光一现的点子都记录下来，然后定期整理，总结。这样能避免忘记，也能够系统的将一些不相关的创意进行整合。

第三个，IFF直接翻译呢就是智能快速失败，这一概念认为：失败不是无用的，是非常有价值的。在对一个特定项目、产品的快速思考与创建过程中，人们会快速并且明智的去吸取失败中的信息和知识，从而能够提出更好的应用，更优的设计方案。通过带有智能的快速失败，以达到反思，自我修正，自我优化，就更容易走向成功。其实这一现象在生活中是普遍接受的。

接下来分享的内容是我们研究中得出的比较简单的结论。希望这些简单并有趣的结论能够给大家发挥创造力提供自信，建立更好的认识。创造力与失败之间的关系一直是科学研究，业界应用所感兴趣的问题。许多学者都在讨论，失败是否对创造性成果的质和量有正向或负向的影响。这个Intelligent Fast failure, 它可以作为一种学习工具，用来解密失败所扮演的角色。通过计算与思考每次失误带来的后果，进而通过学习增加未来成功的几率。

这个研究要求学生用鞋子搭出一个尽可能高的塔。然后计算塔的高度除以鞋子数，用以表示创造性的结果是否高效。

我们的相关分析结果表示，尝试次数与T-value之间具有显著的正相关性，这表明，更多的尝试次数与更好的性能，或表现相关联。相关系数为0.132。也就意味着，在学生制作出最终鞋塔之前，失败越多次，他们的最终成果越高效。这里高效指更高的T-value值，也就是鞋塔更高，使用鞋子更少。

这表明学生通过在这个课程中学习智能快速失败这个概念，他们开始在原型设计的过程中智能快速的实现更好的创造性成果，也就是表现的更好。

这里的统计分析结果，我没有列举具体的数值，我倾向于通过直观的图让大家理解我们的分析结果。

1. 创造力的表现在男女之间是没有显著区别的。

2. 尝试次数在男女之间也没有显著区别。

3. 创造力表现在不同国家之间是有显著区别的

4. 尝试次数在不同国家之间也有显著区别

这些是我们第一篇和第二篇文章的部分研究结果，可以看出，中国学生的创造力以及努力程度相对都比较高，所以大家要有自信，在各自的工作和研究中，要保持开放思维，并用于试错，一定能够充分提高自己的创造性。目前更多的模型及数据分析还在继续，我们还将结合创造力类型进行研究，希望得出更多有指导意义的结论。

如果大家对自己的创造力类型感兴趣，也可以登录网站进行测试，在线统计分析结果将直观地展示你的创造力类型与全球许多国家的学生之间的差别。

[1] CIC