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Spoken Tutorial:
A Collaborative and Scalable Education Technology
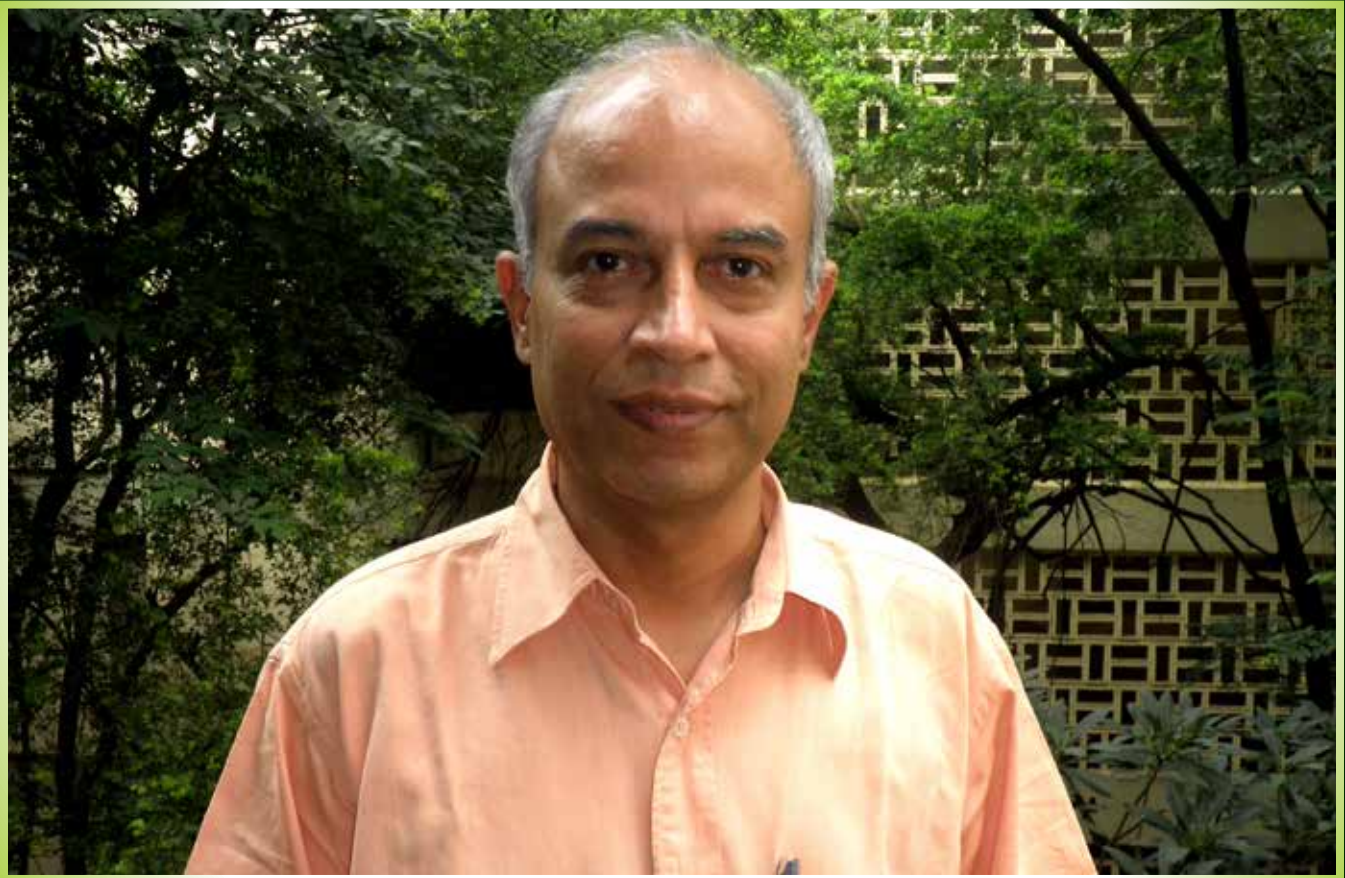
A spoken tutorial is a an audio-video tutorial that explains an activity performed on the computer. An expert explains the working of a software, by demonstrating it on the screen, along with a running commentary. A screencast software makes a movie of the entire activity, both the screen and the spoken part. This movie is the spoken tutorial. The running commentary can be in English or in any other language.

Spoken tutorial is a recording of an actual session. As a result, it can capture every step that is required to explain an activity. This completeness, combined with an accompanying audio-video tutorial makes the spoken tutorial the best way to document and to explain a software or a computer based activity. Creating a document in any other way is inefficient. A ten minute video, for example, can have about 100 screen transitions. Imagine the work involved in taking screen shots and using them to create a pdf document.

The size of the video created is of the order of 1MB per minute, for a 800x600 screen size in normal resolution. The file size needs to be small for transmission through low bandwidth and also to pack a large number of tutorials on a CD, meant for countrywide circulation.

We have been using this methodology to create a series of tutorials in open source software families, such as LaTeX, Scilab, GNU/Linux, ORCA and Python. We have selected the duration of a typical spoken tutorial to be about ten minutes long. Although only a small topic can be covered in ten minutes, by stringing them together, one can come up with study plans that are capable of teaching advanced topics as well.

Our approach involves the creation of a script before creating the video, just as a movie is based on a script. It is possible to translate the script into other languages and use it to change the audio part only - screen shots continue to be in English. The effort required to change the audio is only about 5% of creating the original. For example, visit http://spoken-tutorial.org/Xfig_

Spoken_Tutorials and see the Gujarati link for Simple diagrams. This method has the potential to reach out to people weak in English, while not compromising on the employability.

Spoken tutorials can also be used to bridge digital divide. For example, one can use it to explain how to write emails, how to buy train tickets online, and how to open a bank account. One can explain how to do a web search and locate low cost agricultural loans. We can also make available information on primary health care and first aid. Finally, unlike print ads, the Internet based ads can be more easily located. The government has mandated all government agencies to issue Internet based ads for recruitment. In my opinion, not having access to IT makes one a second class citizen. Spoken tutorial has the potential to empower every child in our country.

The target audience for a spoken tutorial is a remote child, working alone at midnight without anyone to help her. This is the only time when she will get time to study, after completing all her chores. In order to make this technology accessible to her, we restrict ourselves to free and open source software (FOSS) only. The low cost tablet PC to be launched by MHRD soon, will make the required hardware also within her reach.

The task at hand is huge. Creation of 10,000 original spoken tutorials and to dub them into 20 Indian languages seems to be a good target to set. We have an honorarium of ₹ 5,000 to create one original tutorial and Rs. 1,500 to dub it into a local language. Required funds are available through a generous grant from the Ministry of Human Resources Development (MHRD).

Although extremely easy to create, quality has to be ensured to make the spoken tutorials useful. Thus the targets make the spoken tutorial project a mammoth task. To do this in a reasonable time, participation by many people in a collaborative manner is indispensable. How to ensure quality when the creators could be disparate people, such as students, housewives and unemployed, seems to be a good R&D problem to address in the area of educational technology. This is a problem our group has been working on for the past three years.

I will now highlight the collaborative nature in creation and use of spoken tutorials. Let me begin with the creation. The sequencing of the tutorials and their content is to be decided by an expert. The script for an individual tutorial can be written by a person who knows that activity well - she need not be an expert in the entire software. Novice check of the script is an important requirement of our process. A novice who has validated a script can create the tutorial through screencast, and also get paid for it. Our project must be one of the few that pays a person to learn.

Using a novice to do the check and to encourage them to create the tutorial increases the number of people available for the project. Moreover, this makes even the beginners wanted and actively helped by the experts. Contrast this with the procedure to interact in FOSS forums, where the beginners are nobody and a wrong question could invite the wrath of the experts and may even force the novice to leave FOSS completely for good.

We came up with the idea of novice check after interacting with the office bearers of the Web and Coding Club at IIT Bombay. Although there are more than 1,000 members in this club, not more than about 5% are experts. It will be interesting to try our methodology and see if we can encourage a large number of beginners to become experts in select areas. The above discussed problem of expert-novice interaction is universal and hence our model can be deployed in any college, for example.

Let me now talk about translation and dubbing. We need people who have a good command over a language to do the translation. We have found the people from the previous generation to be mature and capable of providing good translations. Unfortunately, they are not necessarily comfortable in giving the voice and dubbing, as this involves the use of technology. This is where our younger generation comes in. Although may not be good in translation, they are quite comfortable in speaking and using modern technologies. We have honoraria of ₹ 1,000 and ₹ 500, respectively, for translation and dubbing of a ten minute spoken tutorial.

This approach allows difficult technologies also be made available to languages with low population, such as Sanskrit and Boro. One need not have experts in the domain. What is required is for one to translate only the spoken part.

I would like to point out another form of collaboration that has happened in dubbing. The creator of PHPacademy has agreed to give his video tutorials on PHP/MySQL to be used by our project. Our PHP programmers, who hail from rural areas, have found it difficult to transcribe and create the script of these tutorials, as the accent is difficult to follow. The school going IIT Bombay campus children have had no difficulty in transcribing, however. The fact that they are raised in a city and exposure to English from early childhood makes them eminently suitable for this task. As a matter of fact, they also dubbed the tutorials in "Indian English". These tutorials can now be used by anyone who aspires to be a web designer, irrespective of their command over English and irrespective of the quality of teachers they have. This shows the effectiveness of collaboration - contribution by a few people, even children, can help the entire society.

How does one learn through these tutorials? Open the tutorial, reduce the size of the screen and keep it in one corner of the desktop. Open the target software by the side. Listen to a command in the tutorial, pause and practise on the software. If the command works, go to the next one. If not, rewind and listen to it again. Repeat until the entire tutorial is completed. One needs a head phone and a computer for this type of learning. It allows every participant to learn at their own pace and in their own language. As these tutorials are created for self learning, the domain expert need not be present to conduct the workshop. The organiser of the workshop only needs to know "how to use" this material. As a result, anyone can conduct these workshops. We have validated this approach through student club organised workshops in a college in Alwar, Rajasthan and SASTRA university in Thanjavur. We provided the instructional material through a CD and moral support through Skype. We also conducted online exams, before and after the workshops and gave certificates. The Alwar students showed an 85% improvement after the workshop. Moreover, all of them passed the second test.

Using ORCA spoken tutorials, our staff member Krishnakant Mane conducted a workshop for visually impaired children at IGNOU, Delhi. Although there were a lot of chaos in the morning, such as computer not booting, head phone not working, etc., in the morning, there was a pin drop silence in the afternoon, as everyone was learning on their own. Those who lagged behind would have completed the unfinished tutorials on their own, at home.

For the last three weeks, we have conducted spoken tutorial based workshops at IIT Bombay. We ran the LaTeX workshops every day, from 6 pm for two hours. More than 200 students went through these workshops, half of them being Ph.D students. We have now started linux workshops. Once again, there is an enthusiastic response from the campus community.

A word about the conduct of these workshops is in order. We have come up with a set of instructions to be followed in the workshop. The participants have to follow them strictly. For example, we ask the participants to use the command pdflatex only to compile the LaTeX documents. If instead they try the command latex and get stuck because TeXNicCenter does not know how to locate the resulting dvi file, we claim helplessness. In view of this, one can say that our process is rigid. But if one wants to learn LaTeX in two hours, there seems to be no better way. Moreover, this approach allows non-experts also to conduct the workshops, an important requirement for scalability. This approach will also allow one person to handle a large number of participants. The only help the organiser has to give is to point out what instruction is not followed and to ask the participant to start the 10 minute tutorial from scratch. If the organiser gives domain dependent answers, we need to worry about their competence. Moreover, as there could be many types of questions and difficulties, many experts are required in every workshop.

We have completed about 400 tutorials. We are now trying to get partners who will share our enthusiasm to create the content and to organise workshops. We are now working with a startup at IIT Madras and an NGO in Bengaluru. We hope to generate at least 600 more tutorials and conduct 100 spoken tutorial based workshops by 31 March 2012, the last date for funding by MHRD. But there are indications that this project will continue, as the National Mission on Education through ICT that is funding this project is likely to continue in the next plan period as well.

We invite all readers to participate in our project. We also need the state of the art technologies. A summary of this project is available at http://spoken-tutorial.org/What_is_ a_Spoken_Tutorial. ■

» About the Author

Prof. Kannan M. Moudgalya received a B.Tech degree in chemical engineering from IIT Madras, a Master of Electrical Engineering degree from Rice University and a Ph.D (Chemical Engineering) degree, also from Rice University. He has been a professor at IIT Bombay for 22 years. He spent one year at the University of Alberta as a visiting professor.

Prof. Moudgalya works in the areas of control, simulation, mathematical modelling and education technologies. He has been applying feedback control techniques for optimal utilisation of computing systems. His students have used feedback control techniques in diverse problems, such as, quality of service, optimising resource allocation and admission control for web based applications.

Prof. Moudgalya has a large number of publications in international journals and conferences. He has written two textbooks: (1) Digital Control, published by John Wiley & Sons and (2) Optimization: theory and practice, jointly with Prof. M. C. Joshi, published by Narosa.

Prof. Moudgalya held the posts of Associate Dean (R&D), Head of Office Automation and Head of Distance Education, at IIT Bombay. He is currently a Member of the Standing Committee of the National Mission on Education through ICT. He contributes to this Mission through projects in the areas of spoken tutorials (http://spoken-tutorial.org), open source software (http://scilab.in), talk to a teacher (http://co-learn.in) and virtual labs (http://co-learn.in/web_sbhs).

CSI President Mr. M D Agrawal launches PHP & MySQL Spoken Tutorials at IIT, Mumbai

PHP and MySQL Spoken Tutorials were launched at the hands of CSI President Mr. M D Agrawal on 30th August 2011 in IIT, Mumbai.

The Spoken Tutorial project is the initiative of the "Talk to a Teacher" project of the National Mission on Education through Information Communication through Technology, launched by MHRD, Govt of India.

A variety of Spoken Tutorials on various Free and Open Source Software (FOSS) in various Indian regional languages are made available through this project.

For further information about this initiative, please use following web links –

http://spoken-tutorial.org/What_is_ a_Spoken_Tutorial

http://spoken-tutorial.org/wiki/index.php/Project_Overview

For inquiries about CSI Communications magazine, please write to **csic@csi-india.org**