

Applications of Net Interactive Documents



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Abstract

When studying a document on the internet (a Webpage, a file, a digitized brochure or document) users usually can only read but cannot interact with the document or the information provider (IP for short) or other users. However, allowing users to send feedback to the IP might help the IP to improve the document, to find out user preferences, or if the users ask questions, they can answer them professionally. Large Servers so far do not allow E-Mails as feedback, since IPs are worried to get buried in work. Our idea was to associate with different documents or groups of documents different persons, expert in the area at issue. Hence users can expect good results and the members of the IP are never overloaded. In experiments with millions (!) of documents and users, the experience with this approach has proved to be successful in e.g. [1]. However, if the users are even allowed more (like adding comments such as information, media- objects or useful links) - clearly all under the control of the IP but visible to other users- they are not just helping themselves, but the IP and also other users. Indeed, why not also allow discussions (moderated by the IP) between users, to establish communication between users. By defining subgroups of users as the only ones to be able to see certain comments, things can still be made easier and better controllable. An experimental system for this has been developed and is being further enhanced. The author of this paper is one of the members of the team of the effort called Net-Interactive Documents (NID for short). Some of its many applications are described in the body of this paper. The main question of readers of this paper might be: Why has this not been done earlier? The answer is that large IPs were worried that they would be overwhelmed by additional work. As has been explained above this problem can be overcome.

Keywords: Interactivity; Feedback; Questions; Document improvement; Information

Introduction

When browsing the Internet, one encounters a great deal of interactivity, whether it be in computer games, in social networks, in E-Learning modules, in blogs, etc. But why does this kind of interactivity not exist in documents? If you look at well-known digital newspapers, for example, you can already see the beginnings of interactivity in the form of comments. The comments can usually be inserted at the end of an article, so it is possible for users to exchange ideas among themselves. But if users want to comment on a certain part of the article, they can only do so by quoting that part in their comment. Thus, there is only a very limited kind of interactivity between users. Some digital publications, such as Der Spiegel, Der Standard, Kleine Zeitung, der Freitag, ACM, etc. allow such limited contributions. An interesting feature that some IPs offer is that users can rate the comments as "worth reading" or "not worth reading". In addition, they can share comments or even report inappropriate comments. A good example are the journals of the ACM that allow any comments, anonymous or not, but all comments are reviewed by the editors before publication.

In addition, some website with news offers a separate blog for specific discussions. The Austria Forum has several million users per year. To make the Austria Forum (AF for short, see [1]) and its

content more tailored to the wishes of users, the AF team decided to introduce a feedback button. The offer of anonymous feedback was used by only a small percentage of users, so far. However, those using it liked the new feature and still send suggestions, criticism, corrections or proposals for improvement to the editors. Even if the feedback button is not used by the majority of users yet, it still turned out to be valuable. This is where the idea for NID came from. NID offers feedback that is not location-bound, i.e., there is no comment section, instead users can insert comments and annotations at any place in the document. This facilitates a new concept of user interaction and feedback in digital documents. Net Interactive Documents (NID for short) allow users looking at a document on the internet not just to read it, but to send feedback, add to it and start or participate in a discussion - all controlled by experts appointed by the IP who put up the information in the first place- all associated with certain parts of the material. A detailed description of NID can be found in [2]. It has surprised the instigators of the idea Bilal Zaka and Hermann Maurer and the author, who joined later, how many interesting and different applications this approach is opening. A few are described in a certainly not complete list of possibilities in what follows.

NID for Digital Libraries

The first idea to use NID was for digital libraries. This means converting analog documents into digital ones to make them available via internet in addition with some interactivity: In addition to reading documents, users can write annotations and have discussions. A benefit for libraries is that they get feedback from readers. Readers have much more possibilities to use the documents, like they can enhance the text with images, videos or even links. By creating new links, they can also point to other documents that might be of interest. Also important: In a library that uses NID it can use it to encourage document-reviews that are added to documents; it can announce events and get feedback which events are more desirable than others, or suggestions for events the library administration had not thought of, or for the wish that certain documents are added to the library. Another reason why NID stands out from other digital documents is that one can create groups of users. Groups of users will then be able to have their own documents to which only they have access. Groups can then have discussions among themselves and add annotations without other users noticing. This way, it is also possible to hold a reading session digitally, without major losses in terms of the lively exchange of content.

Conference Proceedings

NID can be a great asset when used properly for conference proceedings: The official conference proceedings consist of a brochure with general information about the conference, and has title, authors and an abstract for each full paper. For the proceedings, the organizers/editors of the conference are responsible, and any feedback concerning the proceedings goes to them. However, from the title and abstract of each contribution there is a link to a separate document with the full paper and/or the presentation. Feedback or questions concerning such a document go to the authors, i.e., to the experts, and do not concern the editors of the proceedings. Good examples of this are EuroSpi2 & Die Mongolei [3&4].

NID for Organizations as Knowledge and Information Depot

Another important point is receiving and sharing information within an organization. If a product has special features, this must be mentioned and recorded for others, potentially over long periods. Let us take a car manufacturing company as an example. A mechanic has thought of a special feature, but this is not mentioned in the manual, either because it was forgotten or simply taken for granted. Such a feature could be speed control: The speed control on my car does not break when going downhill, meaning I exceed the speed I set. This would not happen if even the seemingly unimportant information is added as it is discovered directly by the mechanic in the NID document, so that other later mechanics are reminded of this. This is certainly more realistic than changing and reprinting the entire manual. Thus, new information and

innovative features are not lost for future constructors and future customers, and more and more annotations are added to the NID document, thus compiling more and more knowledge in the company, even when persons are changing. Another important application aspect of NID for organizations and companies is that they can easily distribute the documents for employees through one system. For each department a separate group is created on NID. This group then has exclusive access to the documents intended for it. This means that there are many groups on the NID server, all of which are assigned to some department. The administrator of a group is responsible for questions, suggestions and proposals for improvement. The employees in the department can also have discussions among themselves and add annotations. This certainly improves internal communication and distribution of information. Changes to documents can be implemented easily and the documents increase communication between employees.

NID is also attractive to companies because of the feedback possibility it provides for employees. Employees can leave their opinion (also anonymously) in a NID document. This helps the employer to better respond to wishes and suggestions of employees. Improvements can thus be implemented where desirable, giving employees the feeling that their wishes are not ignored. Nowadays it is hard to write an email directly to a company. Usually, messages are intercepted by some employees. Thus, messages usually never reach the intended recipient directly. But this can be changed with NID. Experts may be "far away" for ordinary people, but can now be reached easily, be it employees or customers. Thus, internal as well as external suggestions can be received and processed directly by the persons in the company most expert in the area concerned. Criticism or requests can also be answered through annotations. If a customer or employee expresses criticism in the form of an annotation, the company can also respond directly and carry out changes if applicable.

Information for Customers

For a company it is important to be able to offer customers a good service, including answering questions competently, react to criticism or allow proposals for improvements.

When users buy a product of such a company, we suggest that they also get a link to the NID document containing a detailed description of the product (if desired also in several languages). In this NID document, users can find all the information about the product and can contact the customer service or specialists by making an annotation at any place in the document. The appropriate persons are notified by NID immediately that a new annotation has been added. The dedicated expert can answer the question easily, because NID shows the context in which the question was asked. This provides good interaction between customers of an organization. After all, if a customer has some question, others might have the same. Adding it as an annotation or starting a discussion, the answer is also visible to others.

Another commercial application is the simple distribution of advertisements. As publisher of an NID document, one can insert advertisements based on annotations. The annotations can contain links, short promotional videos or even promotional photos. If customers are interested in the product, they can simply click on the link in the annotation and will be redirected to the NID document about the advertised product. Of course, a link to the product can also be inserted directly. The advantage of this is that advertisements are not very intrusive: Users will see the advertisement only when they move the mouse over the annotation area. Users can be curious about what is behind the blue marked area and check it out, but if they feel annoyed by it, a movement of the mouse makes the information disappear.

Webshops

The advantages for web-shops should be obvious. One can use NID as a question-and-answer portal concerning the description of a product. Different employees are responsible for each product category and therefore there are different contacts for different questions. This makes it possible for employees to work efficiently, as they know exactly which product is meant when a customer makes an annotation. This eliminates the often-sluggish e-mail contact, as everything is revealed by the annotation. Asking for information in a web store (or any company) is often tedious, because one first has to find the store's e-mail address, if one is provided! Often, just a list of FAQs is offered where one may or may not find the answer one is interested in. More often than not companies only provide phone numbers one can call, often leading to long waiting times on the phone, maybe some music being played after the announcement: "We are very busy right now, you will be the next one to be served. Please have a bit of patience."

Most companies with large WWW sites can profit from NID as described, including even food delivery services. Often, dishes do not include necessary and interesting information for the customers. Details such as whether the meal is vegetarian, or vegan are often not obvious. Or for people with allergies, an option to ask questions would be beneficial. Also, the annotations made by customers can remain in the NID document or in the menu, so that future customers can immediately benefit from such information. If one runs a flower and plant online shop, for example, one can use a NID document to insert descriptions of all available plants, including possibly interesting stories, advice etc. For each species of plant, a separate expert is responsible, who can then answer the customer's questions competently. This ensures that customers are well advised, and questions can be answered immediately. Of course, users can also discuss issues among themselves and answer questions. However, the discussions among customers will be supervised by experts and only released after a thorough inspection, so that no wrong information is spread. Customers can also add pictures of the plants purchased in an annotation and have a lively exchange with other users, including a kind of

competition who has the most beautiful picture of a certain type of plant.

Teaching Applications

NID can also be used for teaching and training purposes. A NID document can be a main component of the course. Lectures are delivered with the help of the document. Learners are encouraged to add annotations with interesting information. Grading of students can partially be based on meaningful annotations done by students. Students can also ask questions in the document and participate or start discussions. Annotations and questions can also be added anonymously to decrease the threshold to participate. Annotations made by students are reviewed by a person designated by the original author of the NID document. An important factor with school or university materials is access. Access can be made impossible for people who are not logged in or do not belong to a certain group. This is crucial for material whose general publication would violate copyright laws but is (at least by Austrian laws) allowed for educational purposes for medium size groups. Examples of teaching materials are the documents by Hasso Hohmann [5] from the architecture lecture at the TU Graz (using the "trick" mentioned to even include material that could not be made available for the general public) or the school materials of the FIDEL project [6].

Another way to bring NID documents into the classroom is to create quizzes. One can create quizzes for NID documents that are visible to all or only certain groups. This allows the teacher to test the students' perceptions of the document content and knowledge. Grading can be based on the correct answers to quiz questions with a certain type of quiz but can also just be used as feedback to the lecturer that either some items have to be explained more fully or students have to be asked to review once more certain sections of the material presented. Of course, teachers can also add videos. It can be just a short clip from YouTube or an entire lecture unit. Thus, it is possible to create a document so that students can work through it on their own (as was necessary at some stages of COVID). Since it is also possible that only voice messages are added, a course can be made available without the worries of creating a video.

Digital Newspaper

Large online newspapers are starting to appreciate the value of interactivity. If you take a look at newspapers like Spiegel [7], Kleine Zeitung [8], der Standard [9], The Independent [10], daily mail [11] or scientific journals like ACM [12], you can see the beginnings of certain interactivities using comments made by readers.

Digital newspapers can also benefit from NID and its features. Many newspapers get very little feedback from their readers and therefore don't know if the articles are well received. Often, however, there is no possibility to leave feedback, or it is

cumbersome to do so. Some online newspapers allow to leave a comment at the end of an article. It is therefore rather difficult to leave a critique or feedback on a particular paragraph or remark. With NID, readers can add comments anywhere and also send feedback directly to the publisher of the article. The publisher of the newspaper can see from the feedback which contributions are well received. The newspaper publisher can also use annotations to link to similar articles that might be interesting for readers. Feedback on an article depends, of course, on the article itself. If it is just an informative neutral article, feedback messages will be fewer than if it is a “hot issue” topic like COVID vaccination was for a long time. And of course, all interactive features of NID are again available, but under the control of the IP, to avoid aggressive and controversial contributions.

Research Organizations

Research institutions can use NID to publish the latest information about their projects and research. This will enable them to provide interested people with the information easily. Due to the main factor of interactivity of NID, research organizations can get direct feedback from users or realize that some topics need further explanations. Research organizations can illustrate their novel scientific concepts via videos, images, and voice messages in addition to text. This makes them especially nice for readers and can replace endless pieces of text. They also actively involve readers and thus hopefully encourage users to appreciate the concepts. To increase feedback, editors can ask questions e.g., by offering a quiz but must allow to ignore it as to not annoy impatient users.

Addition to Teaching Applications

Teaching applications are wide-ranging. A good example is the FIDEL project, which was already mentioned in section 7. In the FIDEL project, which started in September 2021, NID cooperates with two schools. This project is designed to familiarize students with technology and NID in particular. The challenge is for students to work interactively with each other and with the NID documents. The concept is that there is a separate category “Fidel: The Library of the Future”. In this category all subcategories are listed. The subcategories deal with various topics, such as climate change, human rights, health, and many more. The task of the students is to comment, analyze or possibly to also write documents. One of the sub-tasks of students can be to write a report, either about a current topic, such as climate change, Corona, etc., or about a private topic, such as events or trips they have experienced during the vacations, or on a school excursion. Other students have the task to comment those reports, add links, videos or pictures. The grading can be partially based on the quality of contributions of the students. Teachers can convert their own teaching materials to NID. They and students can add annotations, images, links, etc. Teachers can also offer add voice messages added to a NID document in case of absence from class for whatever reason. If

questions arise, students use again annotations, the discussion feature, or just the feedback button.

Art Exhibitions

This application can be explained best by means of an example. For a recent large art exhibition, painters were asked to send their works to a jury. The selection process of what would be made available in the exhibition was carried out by a tiny group of curators. Thus, decisions were based on the likes or dislikes of just a few. With NID, this selection process can be made more democratic and interactive. The first step would be to digitally process all pictures and convert them into a NID book. Many people have problems to “understand” a piece of modern art, which artists want to express their feelings, views, or thoughts. These message that painters wants to convey to the viewers are, unfortunately, often lost. This can be changed with NID. When sending a painting, artists also send a bit of the impressions the painting should convey. The result is a NID book with all the paintings and a brief “description” of each of them. This NID book is made available to the public. Interested persons can vote for, say, the 10 pictures they like best. The voting can be based on several procedures using NID functionalities, but we skip details here. The paintings with the largest number of positive votes will be the ones to be shown at the exhibition. Such a process makes the decision process much more democratic.

A problem that does come up is not typical just facing NID: The lack of a safe login procedure. NID must guarantee that each user will participate in the voting process only once. This means that one cannot register more than once with a different email address or name. Many websites and digital newspapers are struggling with this security gap. It is difficult to guarantee the authenticity of a user, because one could theoretically always create new accounts with different e-mail addresses. Another problem is the faking of identities. For example, a user could pretend to be a well-known politician and add inappropriate annotations. Furthermore, artists could create multiple accounts so that they can vote for their artwork as often as possible. To overcome these problems, a good option would be to introduce a login with a mobile phone signature. In COVID times, many users have gone through the adjustment period due to the green pass associated with COVID. Of course, the mobile signature is a bit of a hurdle for less tech-savvy users. However, with external help, setting up a mobile signature is no problem and is also one of the most secure avenues for a login. The previously discussed problems that can lead to security gaps in a login would be eliminated, increasing the security tremendously.

Public Projects

As has been described in the last section, selecting items for an exhibition can be made more democratic, involving many more people. This is of course also true for just about any public project. When e.g., a city plans a new project, be it a construction project

such as a shopping center, or new bus- or tram connections, or a large building complex, etc., citizens should be able to get ample information and provide feedback or ideas, an ideal application for NID. A large group can formulate what they find good or not so good about the project, what changes might make a difference, leading maybe to a new proposal, and maybe even allowing citizens to once more offer their opinions. Thus, decisions by some person or council (close to dictatorial ones) would be replaced by a more democratic process. This is desirable as such but might also increase interest and participation of the population in policy making. The fact that the percentage of nonvoters keeps growing seems like a proof that voters feel they cannot really change things. As a result, an indirect referendum takes place using NID documents. Citizens feel more involved in political events and are also more enlightened.

Other Applications

The previously discussed uses of NID are only a fraction of how many exist that will emerge in the future. Just think of museums, where NID would be an optimal application to ensure the best possible information presentation to visitors. Every visitor can scan the QR code after paying the ticket and read additional information in the NID documents and ask questions. The museum staff can use the additional feedback from the visitors.

The same principle can be applied to all cultural events. An interesting aspect is also the political one. Parties can publish their election program in NID documents, so citizens can leave their feedback at any time and even ask questions. This document then contains the annotations, presuming that these have been approved by the persons responsible for them. These contributions can be quite interesting for a large part of the population, and thus many questions are answered once and are always readable in

the NID document for all. Scientific institutions can upload the latest research to a NID server and thus easily spread information without e-mail traffic. Thus, all interested parties have easy access to the latest scientific publications and can ask questions directly to the publishers. Consider the possibility that NID is used to comment on hotels, on restaurants, on big events, etc. Maybe, users particularly active could get some incentive. This is mentioned here explicitly, since our experience of usage of NID depends also on users feeling rewarded: With a better grade in school, with participation in a lottery for a free meal, etc. After all, when they use interactivity in other internet-based applications, they also get some reward be it many “likes” or “followers”, be it a good standing in a computer-game, or getting a good grade since an E-Learning Module has shown a high level of knowledge.

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