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COMPUTER SCIENCE

SERIES

2

ARTIFICIAL
INTELLIGENCE

Volume 1

**CUSTOMIZING
SERVICES USING
AFFECTIVE COMPUTING**



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Series 2: ARTIFICIAL INTELLIGENCE Volume 1: CUSTOMIZING SERVICES USING AFFECTIVE COMPUTING

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Presentation

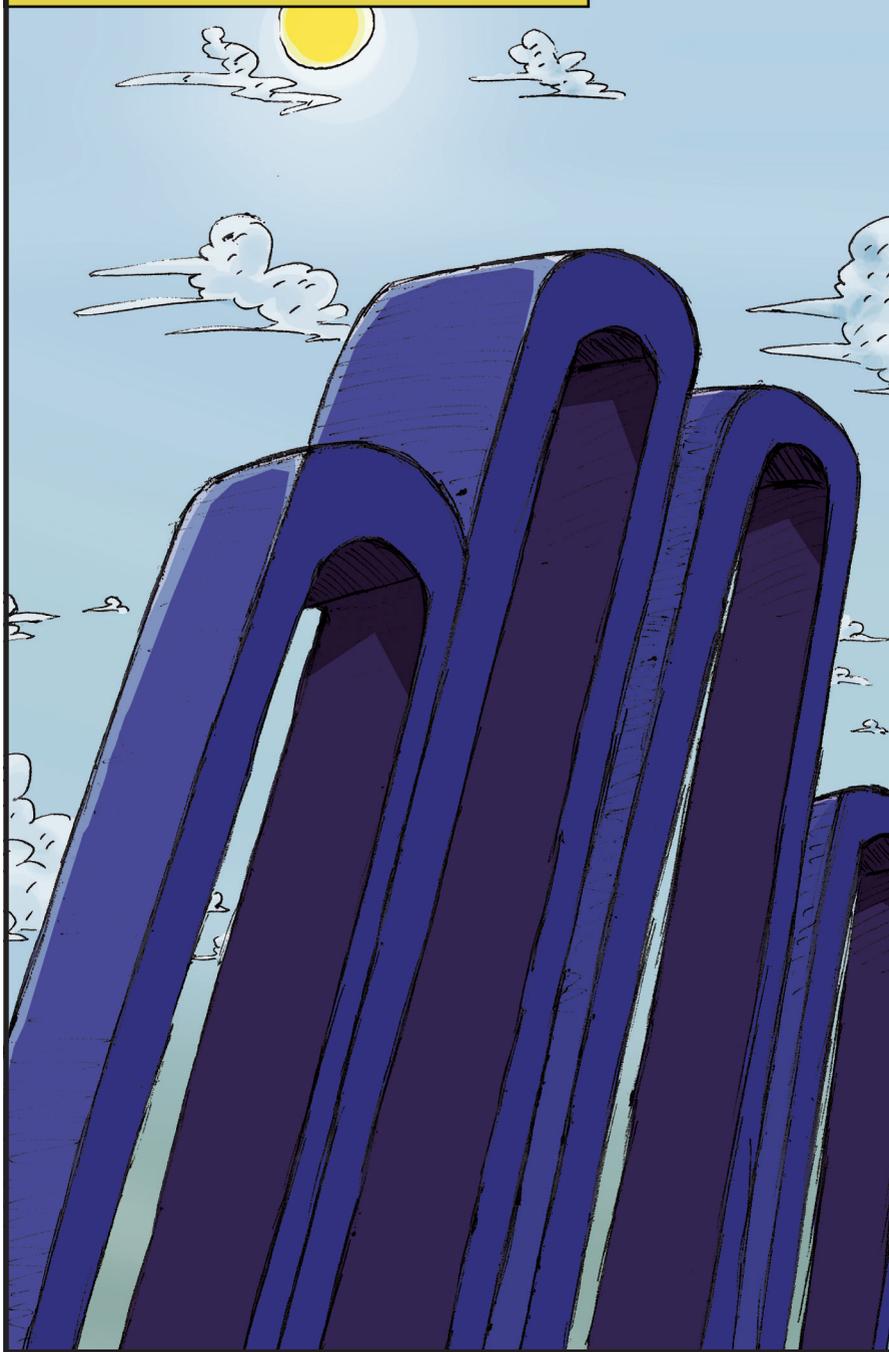
This booklet is part of the extension project for popularization of Computer Science in Sergipe supported by PROEX-UFS. It is also linked to the project of the Productivity's Fellowship (Bolsa de Produtividade CNPQ-DTII) coordinated by Prof. Maria Augusta Silveira Netto Nunes being developed in the Computer Science Department / Graduation Program in Computer Science (PROCC) at UFS. The target audience of the booklets is pre-undergraduate students and undergraduates. The goal is to foster public interest in the area of Computer Science in Sergipe and nationally.

One of the emerging areas in Computer Science is the Affective Computing, which is defined as the ability to develop in computers the skills to interpret and infer psychoaffective characteristics such as human personality and emotion, to then use this information to improve the human-computer interface or interaction.

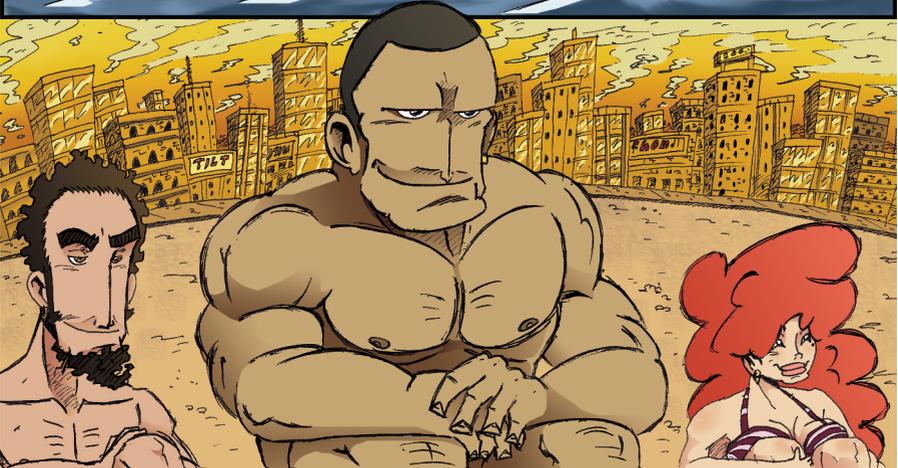
This booklet presents the use of the Affective Computing considering its main characteristics, such as personality and emotions. These themes have been partially introduced in other booklets of the authors, available at <http://meninasnacomputacao.com.br/gutanunes/publication.html>. In summary, the booklet briefly introduces the use of concepts developed and applied by the Affective Computing, including the area of Recommender Systems and computational decision-making. These areas have been presented as emerging technologies and frequent demands on social networks and Internet, for example, being used primarily for customizing interactions, interfaces, products and services via computer network.

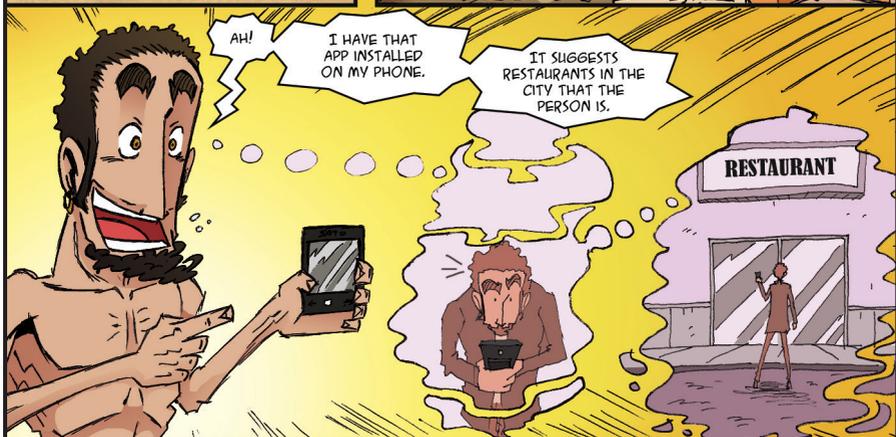
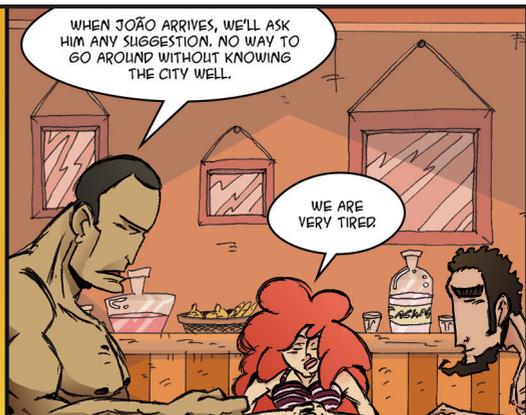
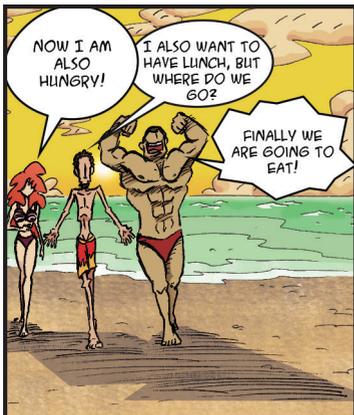
(Maria Augusta Silveira Netto Nunes)

ATALAIA ORLA ARCHES, SUNNY MORNING.



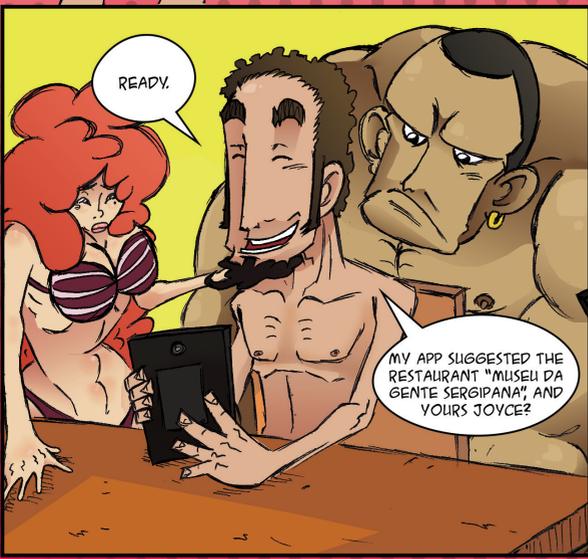






OF COURSE!
I USUALLY USE IT IN RIO DE JANEIRO AND IT ALWAYS GIVES GOOD SUGGESTIONS FOR RESTAURANTS.

AHHR ... THOSE GOOD RESTAURANTS THAT I GET TO KNOW BECAUSE OF THIS APP



READY.

MY APP SUGGESTED THE RESTAURANT "MUSEU DA GENTE SERGIANA", AND YOURS JOYCE?



MY APP SUGGESTED ANOTHER RESTAURANT "KIBE E VARIADOS" DO YOU KNOW IT?



AND NOW, WHERE DO WE GO?

THESE APPS HAVEN'T HELPED A LOT.

HOPEFULLY, JOÃO WILL BE SOON HERE.

IH!
THERE IS HE!



HELLO.

BIG JOÃO, WE WERE JUST WAITING FOR YOU.

HI GUYS, HOW ARE YOU? ARE YOU ENJOYING THE CITY?

YES, WE ARE. WE HAVE BEEN ON THE BEACH ALL MORNING.

WELL, THE BEACH IS GREAT, BUT WE WANT TO GO FOR LUNCH. WHICH PLACE WOULD YOU RECOMMEND?

WE ARE ALL VERY HUNGRY!

A FEW MINUTES LATER...

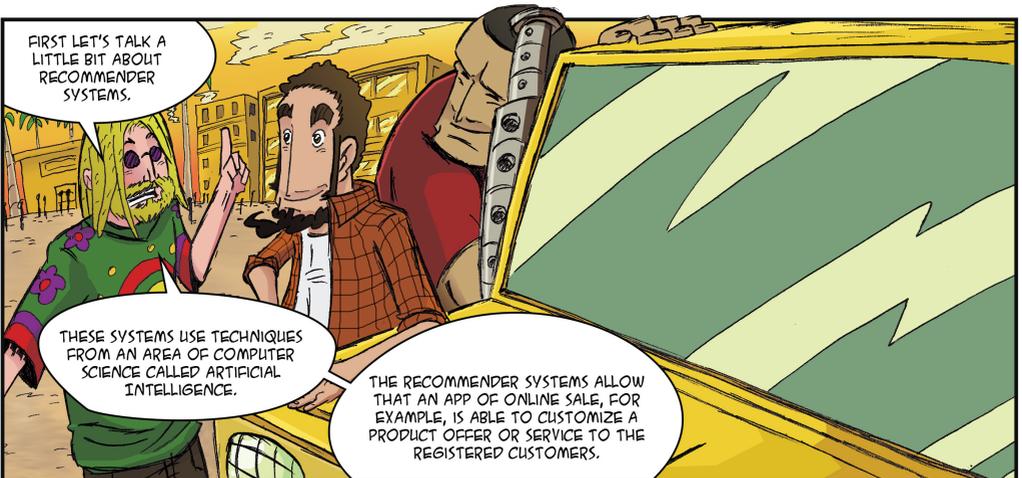
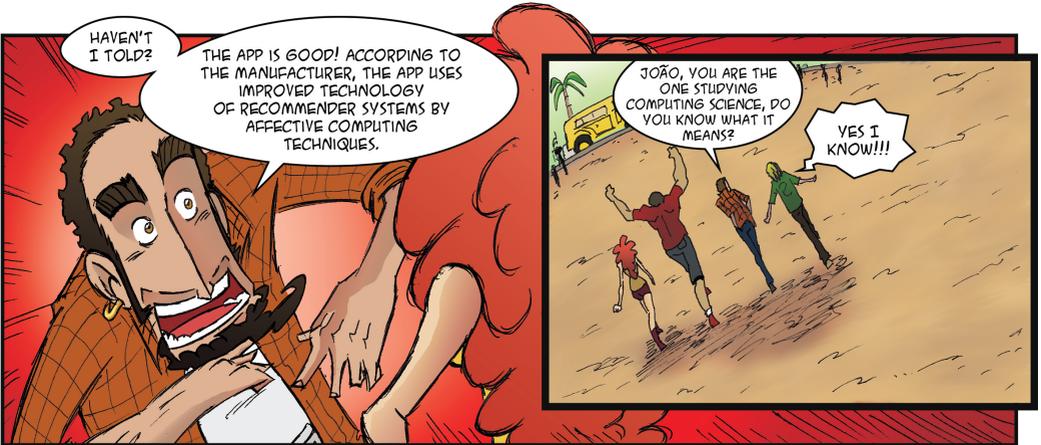
WELL, I THINK THAT THE RESTAURANT MUSEU DA GENTE SERGIPANA WOULD BE A GOOD OPTION.

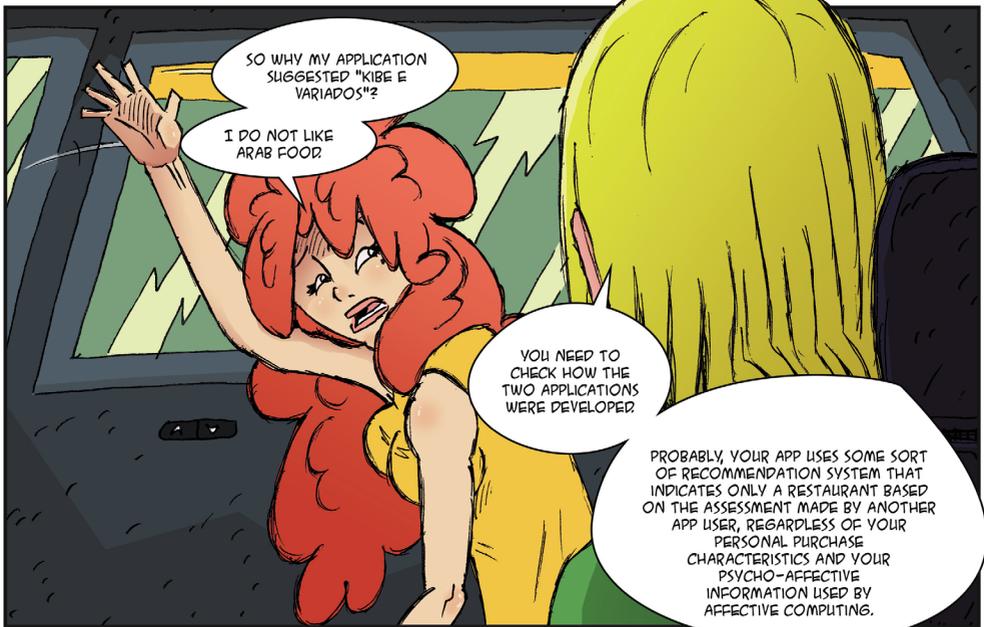
FUNNY, MY APP GAVE ME THE SAME SUGGESTION.

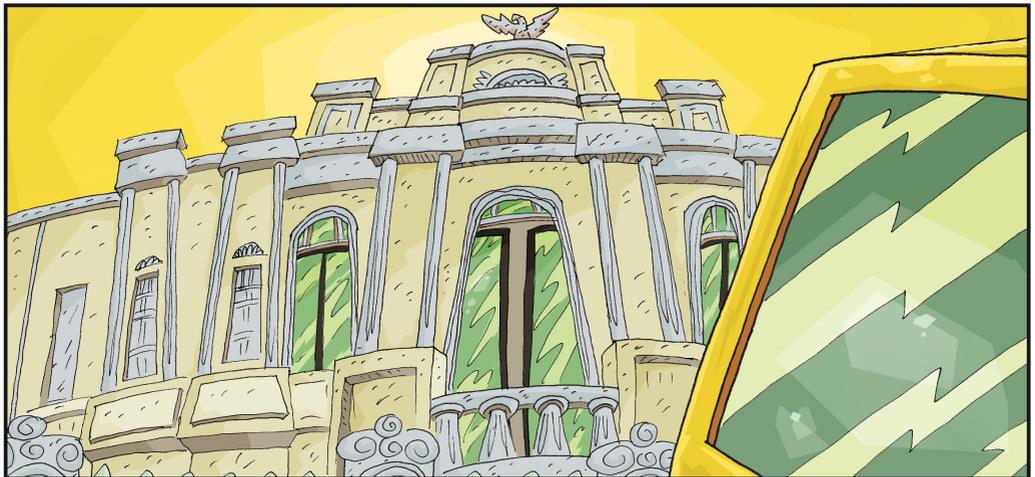
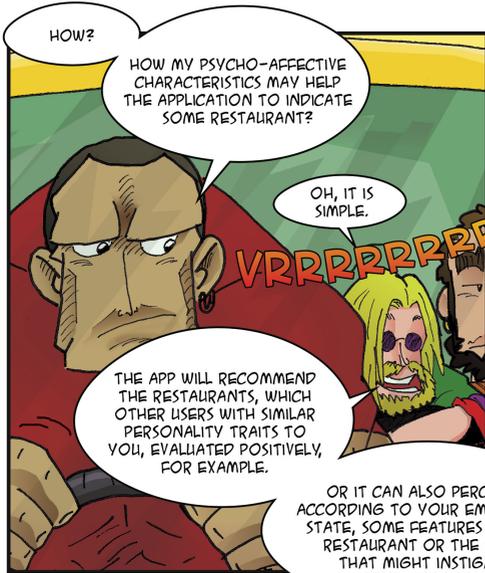
AND THAT HAS REALLY WORKED

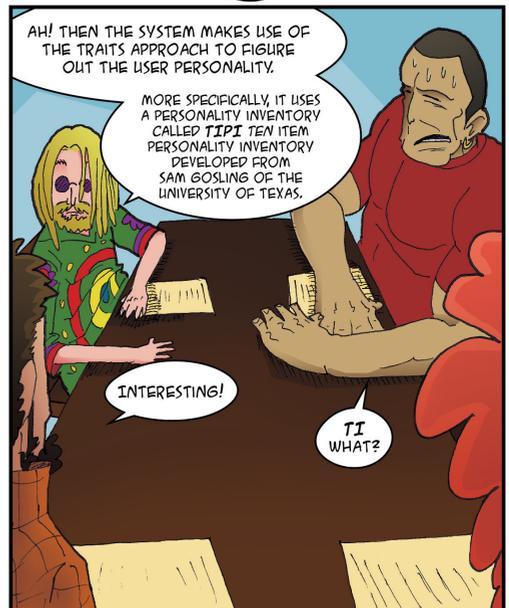
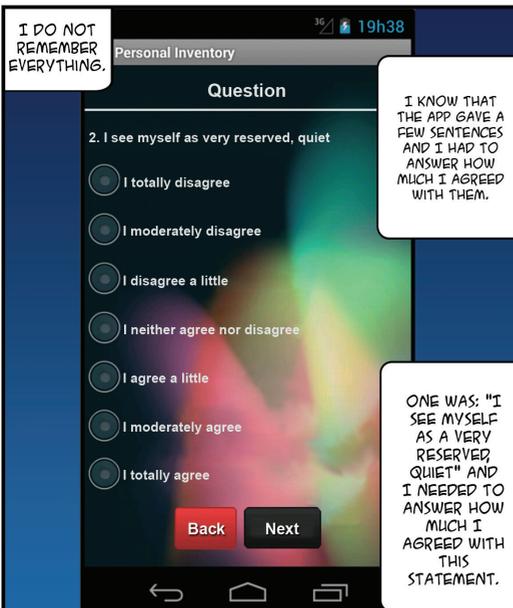
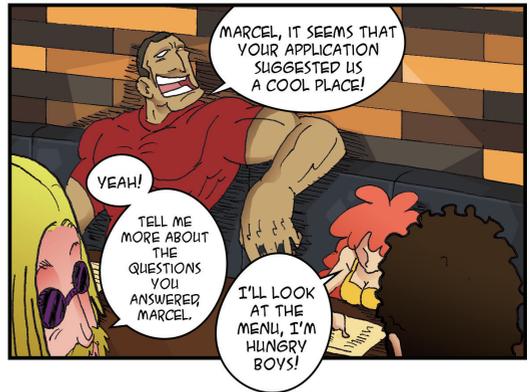
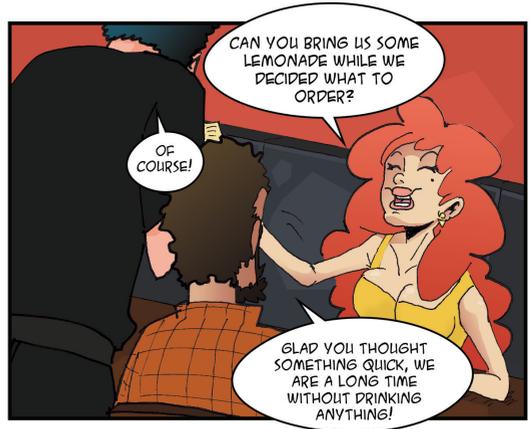
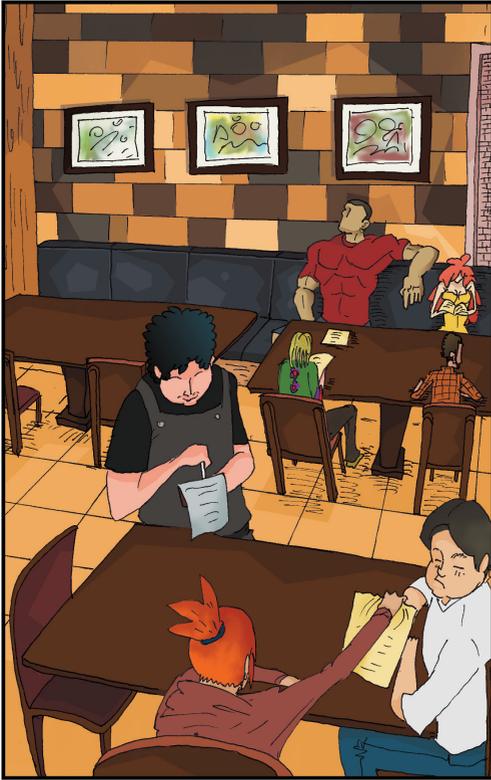
I DO NOT UNDERSTAND.

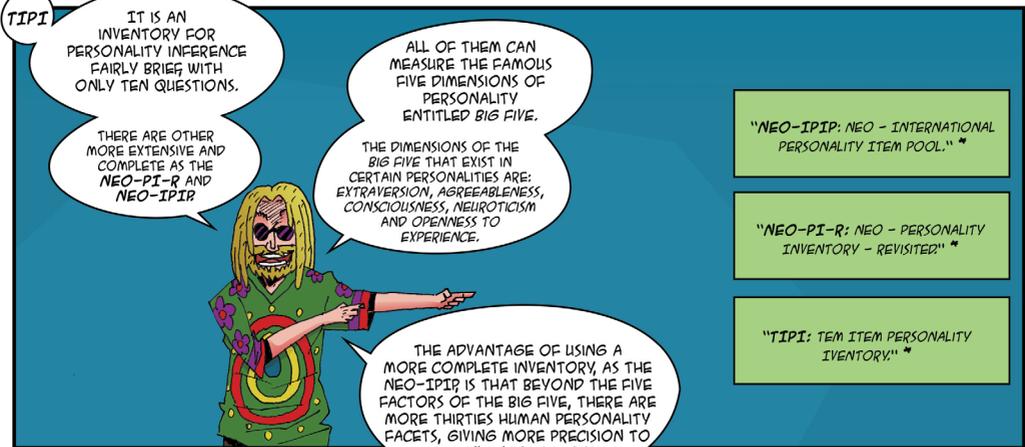
WHY DID MY APP SAY SOMETHING QUITE MYSTERIOUS?











TIPI
IT IS AN INVENTORY FOR PERSONALITY INFERENCE FAIRLY BRIEF WITH ONLY TEN QUESTIONS.

THERE ARE OTHER MORE EXTENSIVE AND COMPLETE AS THE NEO-PI-R AND NEO-IPIP

ALL OF THEM CAN MEASURE THE FAMOUS FIVE DIMENSIONS OF PERSONALITY ENTITLED BIG FIVE.

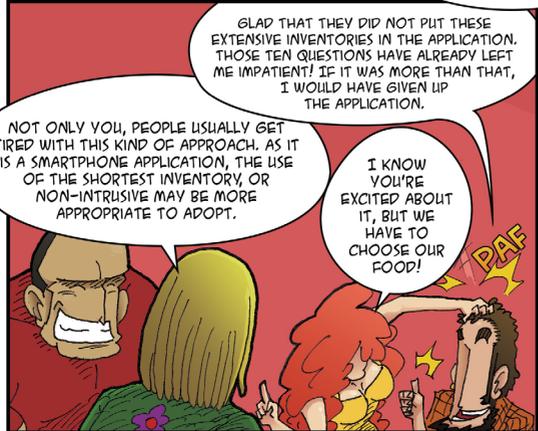
THE DIMENSIONS OF THE BIG FIVE THAT EXIST IN CERTAIN PERSONALITIES ARE: EXTRAVERSION, AGREEABLENESS, CONSCIOUSNESS, NEUROTICISM AND OPENNESS TO EXPERIENCE.

"NEO-IPIP: NEO - INTERNATIONAL PERSONALITY ITEM POOL." *

"NEO-PI-R: NEO - PERSONALITY INVENTORY - REVISITED" *

"TIPI: TEN ITEM PERSONALITY INVENTORY" *

THE ADVANTAGE OF USING A MORE COMPLETE INVENTORY, AS THE NEO-IPIP IS THAT BEYOND THE FIVE FACTORS OF THE BIG FIVE, THERE ARE MORE THIRTIES HUMAN PERSONALITY FACETS, GIVING MORE PRECISION TO THE INVENTORY RESULT.



GLAD THAT THEY DID NOT PUT THESE EXTENSIVE INVENTORIES IN THE APPLICATION. THOSE TEN QUESTIONS HAVE ALREADY LEFT ME IMPATIENT! IF IT WAS MORE THAN THAT, I WOULD HAVE GIVEN UP THE APPLICATION.

NOT ONLY YOU, PEOPLE USUALLY GET TIRED WITH THIS KIND OF APPROACH. AS IT IS A SMARTPHONE APPLICATION, THE USE OF THE SHORTEST INVENTORY, OR NON-INTRUSIVE MAY BE MORE APPROPRIATE TO ADOPT.

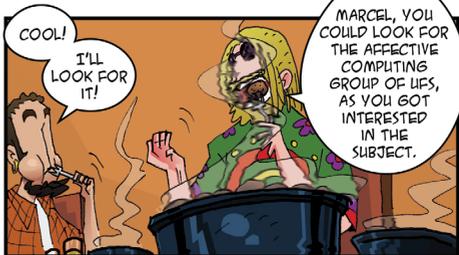
I KNOW YOU'RE EXCITED ABOUT IT, BUT WE HAVE TO CHOOSE OUR FOOD!



I AM PART OF A RESEARCH GROUP AT THE UFS ON AFFECTIVE COMPUTING.

HI!
PLEASE.

SO WHEN I HAVE THE OPPORTUNITY TO TALK MORE ABOUT IT I JUST SWEEP ME.



COOL!
I'LL LOOK FOR IT!

MARCEL, YOU COULD LOOK FOR THE AFFECTIVE COMPUTING GROUP OF UFS, AS YOU GOT INTERESTED IN THE SUBJECT.



AND WHAT ABOUT THE PHOTO THAT MARCEL TOOK WHEN USING THE APP?

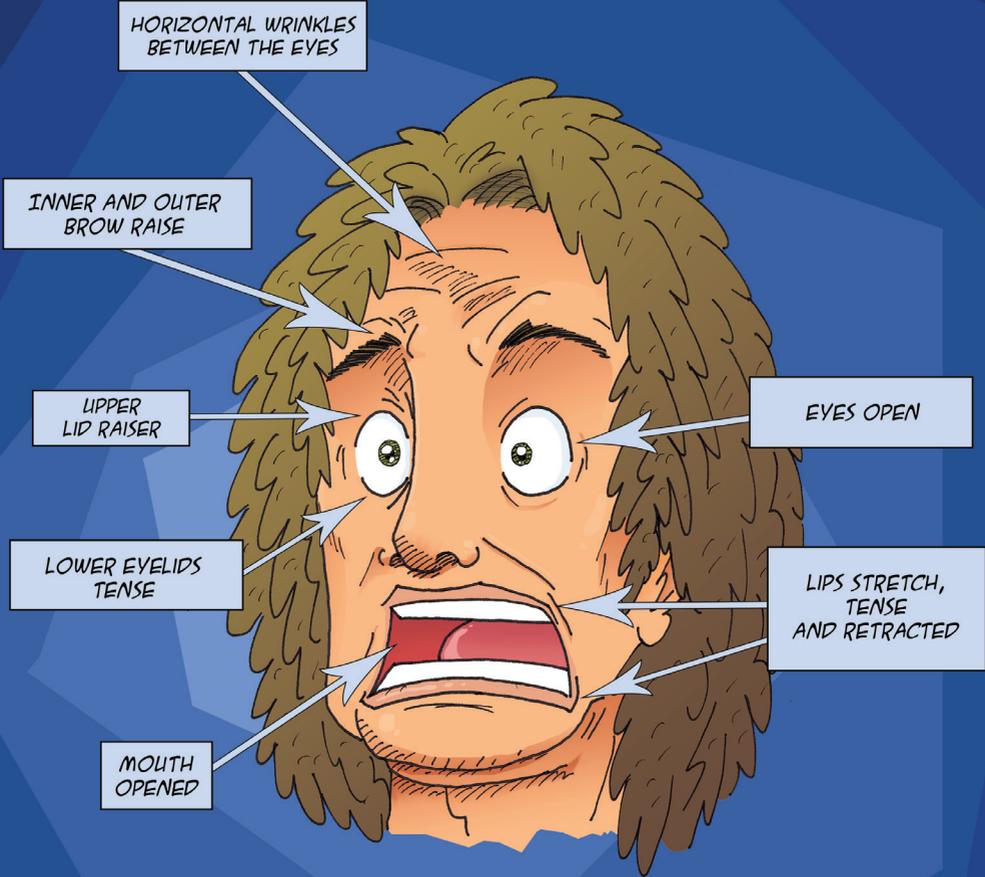
IT IS ANOTHER FEATURE THAT THE APPLICATION CONSIDERS TO RECOMMEND A RESTAURANT.

BESIDES INFERRING THE PERSONALITY, IT TRIES TO RECOGNIZE THE USER EMOTIONS. THE APPLICATION RECOGNIZES THE USER EMOTION THROUGH THE FACIAL EXPRESSION.

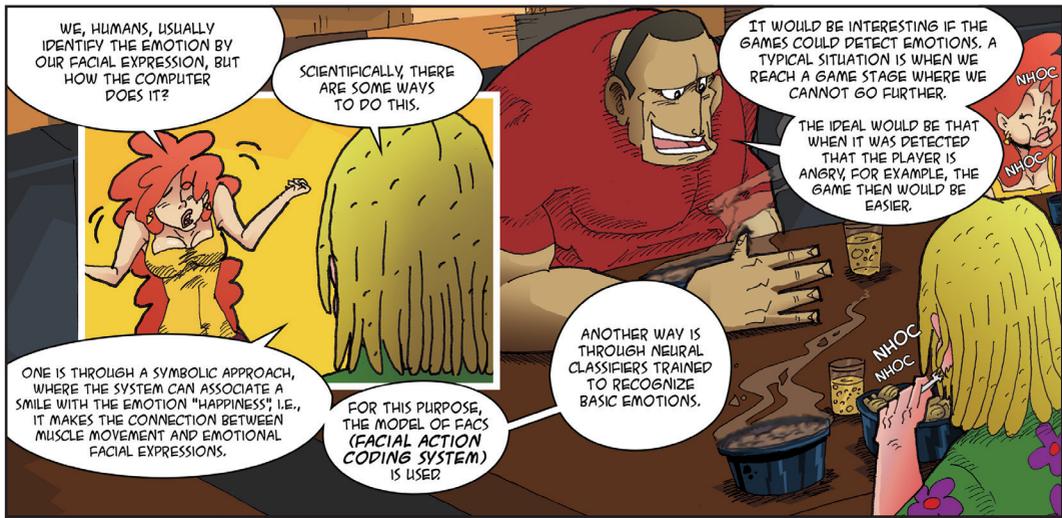
FOR EXAMPLE, IF MARCEL HAD A MORE SERIOUS EXPRESSION, THE APP MIGHT HAVE SUGGESTED A MORE FORMAL PLACE.

* [HTTP://200.17.41.213/~GUTANUNES/HP/PUBLICATIONS/PERSONALITYMLPORBAIXARESOLUCAO.PDF](http://200.17.41.213/~GUTANUNES/HP/PUBLICATIONS/PERSONALITYMLPORBAIXARESOLUCAO.PDF)
* [HTTP://200.17.41.213/~GUTANUNES/HP/PUBLICATIONS/NUNESDCOMP2012.PDF](http://200.17.41.213/~GUTANUNES/HP/PUBLICATIONS/NUNESDCOMP2012.PDF)

FEAR EXPRESSION ACCORDING
TO THE FACS



"FACS: FACIAL ACTION CODING SYSTEM. TOOL THAT HELPS THE HUMAN FACIAL DETECTION BY DESCRIBING THE MUSCLE MOVEMENTS (ACTION UNITS) RELATED TO EACH EMOTION".



WE, HUMANS, USUALLY IDENTIFY THE EMOTION BY OUR FACIAL EXPRESSION, BUT HOW THE COMPUTER DOES IT?

SCIENTIFICALLY, THERE ARE SOME WAYS TO DO THIS.

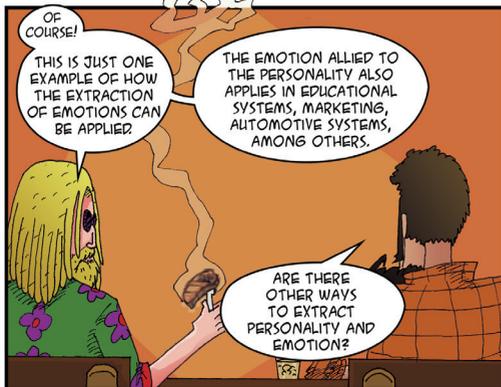
IT WOULD BE INTERESTING IF THE GAMES COULD DETECT EMOTIONS. A TYPICAL SITUATION IS WHEN WE REACH A GAME STAGE WHERE WE CANNOT GO FURTHER.

THE IDEAL WOULD BE THAT WHEN IT WAS DETECTED THAT THE PLAYER IS ANGRY, FOR EXAMPLE, THE GAME THEN WOULD BE EASIER.

ONE IS THROUGH A SYMBOLIC APPROACH, WHERE THE SYSTEM CAN ASSOCIATE A SMILE WITH THE EMOTION "HAPPINESS", I.E., IT MAKES THE CONNECTION BETWEEN MUSCLE MOVEMENT AND EMOTIONAL FACIAL EXPRESSIONS.

FOR THIS PURPOSE, THE MODEL OF FACS (FACIAL ACTION CODING SYSTEM) IS USED

ANOTHER WAY IS THROUGH NEURAL CLASSIFIERS TRAINED TO RECOGNIZE BASIC EMOTIONS.



OF COURSE!

THIS IS JUST ONE EXAMPLE OF HOW THE EXTRACTION OF EMOTIONS CAN BE APPLIED

THE EMOTION ALLIED TO THE PERSONALITY ALSO APPLIES IN EDUCATIONAL SYSTEMS, MARKETING, AUTOMOTIVE SYSTEMS, AMONG OTHERS.

ARE THERE OTHER WAYS TO EXTRACT PERSONALITY AND EMOTION?



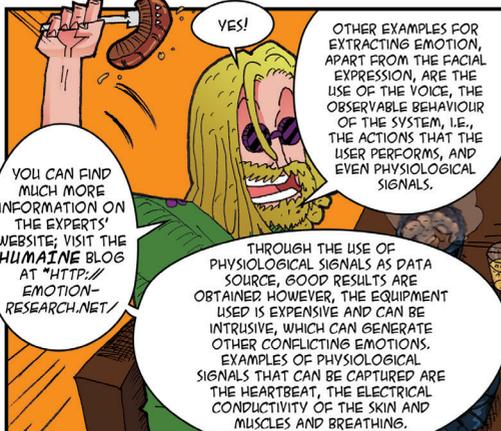
AND HOW IT WORKS THE EMOTION RECOGNITION BY VOICE AND OBSERVABLE BEHAVIOUR?

BY THE VOICE, THE RESULT REACHED AN AVERAGE SUCCESS OF 65%.

THE PROBLEM WITH THIS METHOD IS THE INTERFERENCE FROM EXTERNAL SOUNDS THAT CAN DISTORT THE RESULTS.

THE LEAST INTRUSIVE TECHNIQUE IS BY THE USER BEHAVIOUR VIA THE SYSTEM INTERFACE BECAUSE IT DOESN'T REQUIRE EFFORT; IT ONLY REQUIRES THAT THE SYSTEM IS USED

BUT MUCH MORE ON THIS SUBJECT IS BEING RESEARCHED THE EXTRACTION OF EMOTION OR FEELING VIA TEXT MINING IS ONE OF THESE LESS INTRUSIVE TECHNIQUES IN DEVELOPMENT.

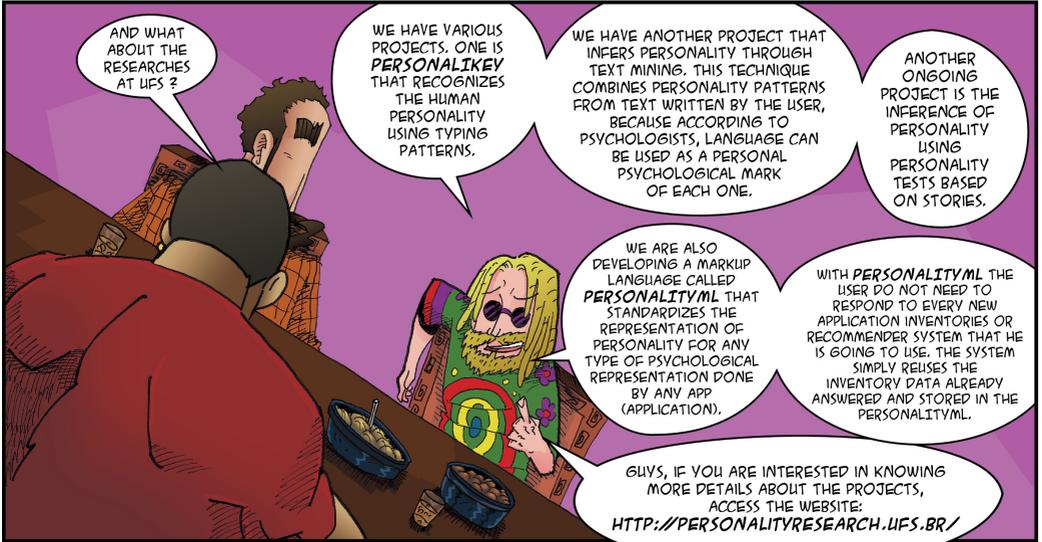


YES!

OTHER EXAMPLES FOR EXTRACTING EMOTION, APART FROM THE FACIAL EXPRESSION, ARE THE USE OF THE VOICE, THE OBSERVABLE BEHAVIOUR OF THE SYSTEM, I.E., THE ACTIONS THAT THE USER PERFORMS, AND EVEN PHYSIOLOGICAL SIGNALS.

THROUGH THE USE OF PHYSIOLOGICAL SIGNALS AS DATA SOURCE, GOOD RESULTS ARE OBTAINED HOWEVER, THE EQUIPMENT USED IS EXPENSIVE AND CAN BE INTRUSIVE, WHICH CAN GENERATE OTHER CONFLICTING EMOTIONS. EXAMPLES OF PHYSIOLOGICAL SIGNALS THAT CAN BE CAPTURED ARE THE HEARTBEAT, THE ELECTRICAL CONDUCTIVITY OF THE SKIN AND MUSCLES AND BREATHING.

YOU CAN FIND MUCH MORE INFORMATION ON THE EXPERTS' WEBSITE; VISIT THE HUMAINE BLOG AT "HTTP://EMOTION-RESEARCH.NET/"



AND WHAT ABOUT THE RESEARCHES AT UFS ?

WE HAVE VARIOUS PROJECTS. ONE IS **PERSONALIKEY** THAT RECOGNIZES THE HUMAN PERSONALITY USING TYPING PATTERNS.

WE HAVE ANOTHER PROJECT THAT INFERS PERSONALITY THROUGH TEXT MINING. THIS TECHNIQUE COMBINES PERSONALITY PATTERNS FROM TEXT WRITTEN BY THE USER, BECAUSE ACCORDING TO PSYCHOLOGISTS, LANGUAGE CAN BE USED AS A PERSONAL PSYCHOLOGICAL MARK OF EACH ONE.

ANOTHER ONGOING PROJECT IS THE INFERENCE OF PERSONALITY USING PERSONALITY TESTS BASED ON STORIES.

WE ARE ALSO DEVELOPING A MARKUP LANGUAGE CALLED **PERSONALITYML** THAT STANDARDIZES THE REPRESENTATION OF PERSONALITY FOR ANY TYPE OF PSYCHOLOGICAL REPRESENTATION DONE BY ANY APP (APPLICATION).

WITH **PERSONALITYML** THE USER DO NOT NEED TO RESPOND TO EVERY NEW APPLICATION INVENTORIES OR RECOMMENDER SYSTEM THAT HE IS GOING TO USE. THE SYSTEM SIMPLY REUSES THE INVENTORY DATA ALREADY ANSWERED AND STORED IN THE **PERSONALITYML**.

GUYS, IF YOU ARE INTERESTED IN KNOWING MORE DETAILS ABOUT THE PROJECTS, ACCESS THE WEBSITE: [HTTP://PERSONALITYRESEARCH.UFS.BR/](http://PERSONALITYRESEARCH.UFS.BR/)



OH MY GOD! TIME PASSED VERY FAST. LET'S ASK FOR THE BILL?

IT'S TRUE. I TALKED SO MUCH THAT I BARELY ATE.

WAITER!



IN THE CAR ON THE WAY TO JOÃO'S HOME.

NOW WE HAVE ALL THE INFORMATION, IT IS ALWAYS GOOD TO OPT FOR SOFTWARE THAT MAKE USE OF RECOMMENDER SYSTEMS WITH AFFECTIVE COMPUTING TECHNIQUE, BECAUSE IT ALLOWS BETTER CUSTOMIZATION IN THE



TO BE
CONTINUED ...

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Productivity's Fellowship from CNPq

She is a Doctor in Informatique from Université de Montpellier II – LIRMM, in Montpellier, France (2008). She conducted doctoral training in the INESC-ID- IST Lisboa, Portugal (Aug. 2007- Feb. 2008). Has a Master in Computer Science from UFRGS (1998) and holds a bachelor in Computer Science from UPF (1995). Currently, she is a Professor at the Department of Computing (JFS). Member of the Graduate Program in Computer Science (PROCC) and the Master Program of Intellectual Property Science (PPGP) at UFS. She has academic-technological expertise in the area of Computer Science and Intellectual Property in Technological Innovation. She is a member of the Advisory Board on Innovation (Câmara de Assessoramento em Inovação) (FAPITEC/SE). She is a member of the Association of Science of Sergipe (Associação Sergipana de Ciência). She is a member of the CEIE-SBC. She has also academic and administrative experiences as Coordinator of Undergraduate Program, Graduate Studies and Head of Department.

Her research is focused mainly in the technological innovation area using Affective Computing in computational decision-making, mainly aimed at personalization in e-commerce via Recommendation System. Recommendation of work teams in companies and e-training. Her working areas are: Artificial Intelligence, Human-Machine Interaction, Affective Computing, Distance Learning, Computers in Education and Accessibility. Additionally, she works with Technological Innovation, Intellectual Property to empower entrepreneurs in the IT field and providing consultancy in Software Registration and patent. Her academic and technological projects are usually multidisciplinary (including areas as E-commerce, Psychology, IT, Education and Accessibility). <http://www.personalityresearch.com.br/> <http://scholar.google.com.br/citations?user=rte6o8YAAAAJ>

She is the Coordinator of the International cooperation agreement no. 1888.090/2012-UFS-Université de Montpellier II – Ordinance no. 0136-21.01.13, Case no. 23113.002869/12-98.

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She graduated in Psychology at the Federal University of Sergipe (2009) and has a Master in Psychology at Federal University Fluminense (2012). She works mainly with the following themes: society, psychology, social psychology, socialization trajectories, hermeneutic phenomenology, health, illness and ethic. She is currently a substitute Professor in the Department of Psychology at the Federal University of Sergipe.

JESSICA DE JESUS PINTO

She has a technical course in Programming and Computer Systems Support at the Federal Institute of Sergipe (2010) and graduation in Computer Science at Federal University of Sergipe (in progress).

JOSE ANTONIO DE ANDRADE REIS***Scholarship – PROEX UFS***

He has experience in editorial design, digital interfaces design and illustration with emphasis on creating characters and scenarios. It is responsible for all graphics and visual part of the Sirius Games project since 2013. Graduation in Graphic Design at Federal University of Sergipe (in progress).

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