Advanced Training course:
Small devices & Big data for Food

August 15 - 17, 2018, *Aalborg University Copenhagen*

Arranged in cooperation with the Richfields consortium and Digital Foodscape Lab studies

Background

There is growing interest in consumer health and its relation to food, behaviour and lifestyle determinants. The digitalisation of societies create new sets of data on consumer behaviour – for instance in the cases of food choice and consumption. This offers new opportunities for social science, consumer studies, marketing studies and food intake studies. Also there is an increased availability of smart sensors that can assist there is a high prevalence of handheld devices and smart payment methods huge amounts of digital patterns. As consumers, we create footprints when we as domestic or public consumer purchases foods and when social media is used to communicate about food. These data sets create new potentials for scientists, policy makers and businesses to get insight in to behaviours of populations. However, data is often fragmented, structured in different formats, key information is lacking, and privacy and ownership are unresolved. These barriers prohibits policy makers, researchers and companies to develop effective public health nutrition strategies. For enterprises the barriers mean that it becomes difficult to reformulate food products and to develop healthier food availability strategies. The digital consumer society seems to be offering scientists new ways to better understand purchasing habits and food choices. And creating a future data sharing economy where consumers are donating their data open up new avenues for food business analysts, marketing researchers and scientists.

In addition to the progress in studies on big food data smart sensors are offering new potentials. An increasing number of European research groups are working on Informations and Communications Technology (ICT) based approaches to measure food choice and to assess dietary intake using real-time ICT technology in fully or semi assisted ways. The facilities differ in the food studied and in terms of whether they focus on purchase or consumption and whether they rely on real, fake and virtual food realities. Common to them are the cross disciplinary approach to the challenge in which behavioural psychology, nutrition, social and sensory science are brought together and in which academic resources, students, practitioners and enterprises are involved in the development.

Aim of the course

Students will learn about the potentials of applying data created by consumers, at Social Media (SoMe) as well as by businesses in consumer, behavioural, food and health studies. The students will learn about latest inventions in ICT assisted devices for food studies. The students will perform a Written Group Assignment (WGA) within following categories: ethics & privacy, application of Social data & network analysis, application of BCT and application, artificial intelligence and use of sensor technologies

ECTS credits:

5,0

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PROGRAM (subject to minor changes)

Wednesday, August15

9:00-10:15 Opening: introduction to the course

- ✓ Student presentation round
- ✓ Overview of course and introduction to course assignments, Bent Egberg Mikkelsen, AAU
- ✓ **Group match making.** Open space format-Assist by Mukti Ram Chapagain, AAU

10:15-11:00 keynote: big food data

A win-win situation for all? Bjarne Ersbøl, Professor, DTU compute.

11:45-12:45 lunch break

12:45-13:30 ***Current and emerging trends in the food sector.***

How can we understand the consumer 4.0 that is digitally connected 24/7. Bent Egberg Mikkelsen, Professor, Department of Learning & Philosophy, Aalborg University

13:30-15:30 Understanding food in Social Media Scapes(SoMeS)

- ✓ ***How can we track "bubbles" and "social food epidemics" on SoMeS?*** Anders Kristian Munk, Associate professor, Dept of Learning & Philosophy
- ✓ ***Do it yourself SoMeS hands on.*** *Work on our 2000 Facebook Group dataset.* ***Intro and supervision*** by Anders Kristian Munk, Associate professor and Asger Gehrt Olesen, asst. teacher, Dept of Learning & Philosophy, AAU

15:30- 17:30 Food sensorics. Hands on event in the AAU Foodscape Lab. *Using food small sensors to measure emotions resulting from food exposure.*

- ✓ Biological principles for measuring consumer response with smart sensors. Allan Hammershøi, Senior consultant, MediaAtHand
- ✓ GSR, EEG & PPG for measuring biometric response to chilies? Data output and how to choose the right method? Kiara Heide, Research fellow, iMotions
- ✓ Using behavioral signals in the FoodScape Lab. Hands on session. Can you tell the difference between Jalepeno, Trinidad scorpion and Habenero? Hannah Hoffman, intern at AAU digital foodscape lab studies

17:30-20:45 Do it yourself dinner at the Foodscape Lab, Aalborg University

20:45 Good night and see you tomorrow

PLEASE NOTE: Students needs to submit a working title of Written Group Assignment by 23:00. The topic should be addressing at least one themes from "Current trends in food sector".

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Thursday, August 16

08:30-09:15 keynote: bodies, technology, diet & distinction

Differences, challenges and possibilities in relation to Health capital and health inequalities, Professor Kristian Larsen, Department of Learning & Philosophy, Aalborg University.

9:15-10:45 Imaging & Artificial Intelligence (AI) session

- ✓ *AI imaging technology - Refine & testing Realtime Dietary Assessment Technology for food and meal recognition.* Kwabena T. Ofei. Post doc, Aalborg University

- ✓ *Imaging hands on demo,* Kwabena T. Ofei. Post doc. Department of Learning & Philosophy/Dept of Robotics, Aalborg University

10:45-11:15 Customer data privacy – how to protect

How do we respect digital data privacy of consumers – insights from the case of Meny/Dagrofa food retailer - Erhard Nielsen, Senior Data Analyst, , Dagrofa & Kristine Timand Pedersen, CPO, Dagrofa

11:15-12:15 Lunch break

12:15-13:15 Understanding e-shopping behaviour for food on omni channel consumers

How does weather, marketing, promotions, sociodemo – and psychographics influences e-shopping behaviour for food? Christian Linnelyst, Chief Marketing Officer, HomeMate omnichannel retailer

13:15-14:45 Blockchain and food traceability

- ✓ *Can Block-Chain Technology guarantee Food Authenticity? – case of the Olive Oil supply chain,* Kristoffer Just, new tech consultant, Digital Innovation & Management

- ✓ Hands on activity on Blockchain concept. Kristoffer Just

14:45-19:00 Work on assignments.

Under the guidance of the course supervisor team: Bent Egberg Mikkelsen, Professor; Anders Kristian Munk, Asst professor, and Kwabena T. Ofei. Post doc. Department of Learning & Philosophy, Aalborg University

19:00-22:00 Social dinner and Smart Sensors

Osram Green & Blue community garden. See how we use smart sensors to maintain an Urban Gardening Aquaponics facility in an educational context. And enjoy a nice social dinner afterwards in the Aqua Roof top restaurant.

Host: Lasse Carlsen, CEO at Bioteket. Pitches by Lilja Gunnarsdottir and Viktor Toth.

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Friday, August 17

8:30-9:00 Coffee and plenary briefing on assignment

9:00-9:45 Games & experience design for smart learning about food.
Visit to Samsung Media Innovation Lab for Education (SMILE). Lars Reng, associate professor and Henrik Schønau Fog Center for Applied Game Research Game Lab (CEAGAR)

9:45-11:00 Hands on demo on smart devices for food
Can we use them in street science? Try out the eShopper, the RoboFood and the Eye4Food? Rasmus Emil Odgaard, Søren Dahl Poulsen & Jelena Kuzmiconoka. AAU digital foodscape lab studies

11:00-11:45 Why Data Science on everyone's lips at the movement?
Needs and opportunity of data science in the food industry. Nicolas Horst, *Head of Devoteam Discovery | Your data Science experts*

11:45-12:45 Lunch break

12:45-14:30 In search for IOT - is there an internet of food & things out there?

- ✓ *Using connected smart sensors to follow food product through the supply chain. Assoc* Professor Åse Jervinger, Malmö University
- ✓ *Future IoT technology and its service potentials. Presentation includes,.* General introduction to IoT, IoT technology & IoT services. Per Lynggaard, CMI
- ✓ *Hands on activity on IOT concept- to develop service to the food value chain (preferably consumer end) by using IOT.*

14:30-16:30 Working on plenary presentations of assignments
Student will work on their group to prepare plenary presentation.

16:30-18:30 Plenary presentations of assignments and evaluation

- ✓ **Presentation format:** 6 min's using the Pecha Kucha format and in groups. Feedback, comments and questions from course supervisor team and from participants
- ✓ **Evaluation and next steps-**Moderated by Bent Egberg Mikkelsen.

18:30 Closure and thank you!

Practical info:

Venue: Aalborg University, AC Meyersvænge 15, Copenhagen Sydhavn. Auditorium 4.133 4. Floor Building D

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Learning goals

To give insight in the use of smart sensors, examples of AI language and imaging technologies, Block Chain Technology as well as Internet of Things technology for understanding consumer food behavior and examples of use of digital technologies in the food sector.

Programme and lecturers

The course will include pre-course learning tasks so that students will get to know each other before meeting. The online introductory learning tasks will be moderated according to Gilly Salmon's 5-stage model of e-learning with the aim to introduce the students to each other prior to the in-class sessions and to ease the future team-building and collaboration in class. These tasks are supervised by the course team of lecturers.

Pre-course activities

Activities before the course will include students filling in a template on their research, experiences and expectations. The template will assist students in having established some link before the first course day and will allow course coordinators to do the first sketch for group configuration.

Course assignment (WGA) – applying big data analytics and smart sensorics to solve emerging consumer demands. The course assignment is group based and based on the Problem Based Learning model. A group matchmaking process will be made by course administrators based on the templates handed in before the course. The WGA is the Written Group Assignment that students will work on during the course in groups. The idea of the WGA is to suggest one or more tools from the analytics and sensorics tool box to address one or more of current and merging consumer trends.

A. Emerging consumer trends in the food area

1. **HEALTH AND WELBEING (SAFETY):** Availability of health, safety and nutrition information (accurate product labelling or interactive health communication, promoting informed choice or preventing harmful chemical)
   Does your solution help people making healthy food choice and maintain healthy eating habit?
2. **EXPERIENCE (PLEASURE):** Provide personalized feedback or consumer engagement or elevate satisfaction
   Does your solution help people maximize food experience and pleasure?
3. **Sustainability (Social impact)**: Actors at all levels of the food chain (production, processing, retaining and consumption) took responsibility or being aware of their action and its impact in the society.
   Does your solution help to connect farm to fork (production to consumption) or bring positive social impact?
4. **Authenticity (Traceability)**: Access to information (trust) and maintain clear & accurate labelling.
   Does your solution help people to better know their food and its source?
5. **Convenience**: reduction in time and effort (mental and physical) for spend buying, storing, preparing, consuming and disposing food.
   Does your solution help people to buy, store, prepare or consume or dispose food more easily?

B. Analytics and sensorics toolbox

1. **Artificial Intelligence (AI) (Deep learning and Machine learning):** *Does your innovation use deep learning to understand and machine learning to find the pattern of people eating/shopping behaviour?*
2. **Data collection through small devices (sensors):** *Does your innovation use small device to collect data that cannot be collected otherwise?*
3. **Block-Chain technology (BCT):** *Does your innovation use BCT to provide transparency in food chain and its source?*
4. **Internet of Food Things (IOT):** *Does your innovation connect food value chain in order to collect data and bring food chain closer?*
5. **Consumer generated data (social media or shopping data):** *Does your innovation use consumer generated data through app or web-platform to understand people behaviour?*
6. **Crowd-sourced of data:** *does your innovation help people to donate data or collect publicly available data that can not be collect otherwise?*

The WGA should be structured as follows:

- **Background & rationale:** what food-nutrition and health related trends is addressed leading to the problem formulation.
- **Problem formulation:** max 5 lines
- **Aim:** what is the aim of the WGA
- **State of the art:** what others as been doing in this field – a literature search
- **Methods:** what kind of digitalization technology from the analytic & sensorics toolbox is needed and how would it be applied
- **Conclusion:** the findings is you proposal for a data and/or sensor structure and its related RQ's
- **Discussion:** The discussion should relate to what kind of ethical issues might be relevant to discuss in relation to your proposal, what kind of bizz models could emerge, what kind of research questions could be addressed, give examples of such questions, could citizens be involved in your data collection?

The WGA is 6 pages long and will be presented orally in plenary by each group. The WGA in its written form will be handed in 2 weeks after the course. It forms the completion of the course and the course diploma.

How to get there

Please find advice on how to get there on this link
http://www.en.cph.aau.dk/How+to+get+there/

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Reading list

1. **Blockchain of food :** How BCT can affect the food value chain and create consumer trust/transparency?
   - https://www.altoros.com/blog/blockchain-at-walmart-tracking-food-from-farm-to-fork/
2. **Emerging consumer trends in food area:** What are the latest trends in food consumption?
   - https://pure.au.dk/ws/files/70401792/Overview_of_Consumer_Trends_in_Food_Industry.pdf
3. **Data collection through sensors & small device:** How data can be collect through internet technologies and use them to connect food value chain.
   - Kaloxylos, A., Wolfert, J., Verwaart, T., Terolc, C.M., Brewster, C., Robbemond, R.M. and Sundmaker, H., 2013. **The use of Future Internet technologies in the agriculture and food sectors: integrating the supply chain**. *Procedia Technology*, *8*, pp.51-60.
4. **Consumer generated data:** How can we collect data from social media and analyze them to understand food related issues such as; consumer behaviour or ongoing trends?
   - Fried, D., Surdeanu, M., Kobourov, S., Hingle, M. and Bell, D., 2014, October. **Analyzing the language of food on social media.** *2014 IEEE International Conference in Big Data (Big Data),* (pp. 778-783). IEEE.
5. **Digitalization of food:** How the digitalization have been shaping the food consumption and how the digitalization process have been emerge.
   - Esposti, Piergiorgio Degli. **"Social Network's Diet and Digitalization of Food."** *Journal of Nutritional Ecology and Food Research* 2.2 (2014): 154-162.
6. **AI & IOT in food (case example):** What are the goals and use of AI & IOT in food chain?
   - https://www.forbes.com/sites/bernardmarr/2018/04/04/how-mcdonalds-is-getting-ready-for-the-4th-industrial-revolution-using-ai-big-data-and-robotics/#cb4d7ce3d33e
   - https://www.forbes.com/sites/bernardmarr/2018/05/28/starbucks-using-big-data-analytics-and-artificial-intelligence-to-boost-performance/#cf87b6965cdc

Presentation: What is PECHA KUCHA ? https://www.youtube.com/watch?v=32WEzM3LFhw