SVENSKA SÄLLSKAPET FÖR AUTOMATISERAD BILDANALYS

SWEDISH SOCIETY FOR AUTOMATED IMAGE ANALYSIS

MEMBER OF THE INTERNATIONAL SOCIETY OF PATTERN RECOGNITION

# SSBAktuellt

»»» nr 61 december 2019

www.ssba.org.se

**SSBAktuellt**
SSBAktuellt är ett föreningsblad med information av nationell karaktär. Redaktionen kan nås på e-post redaktionen@ssba.org.se

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# Innehåll



*Cover: Leaf in December*
*Photo: Elisabeth Wetzer*

# ›››› Ordförandes ord

Ida-Maria Sintorn

Hej!

Alldeles snart dags för lite julledighet – det ska bli skönt!

Mycket har hänt i föreningen under året med SSBA-symposium i Göteborg, och SSDL-symposium och SCIA i Norrköping under första halvåret och sedan en workshop i november som står att läsa om längre fram i nyhetsbladet. Mycket har föreningen också att se fram emot nästa år med SSDL- och SSBA-symposium i Helsingborg och sedan ICPR i Milano och förhoppningsvis en till workshop på höstkanten. Och så förstås de nya Masterprogrammen som drar igång i Lund och Uppsala.

Jag vill passa på att gratulera årets alla nya doktorer. Å föreningens vägnar skickar jag ett extra grattis till vår kassör Amanda Berg som blev doktor på LiU så sent som för några dagar sedan och SSBAktuellts redaktör Teo Asplund som blev dito på UU för några veckor sedan.

Tack alla för det år som gått och väl mött nästa!

## ›››› Call for Participation: SSDL/SSBA 2020

The 38th edition of the SSBA symposium and the 4th Swedish Symposium on Deep Learning (SSDL) are arranged by the Mathematical Imaging Group at Lund University as a joint event taking place March 16-18 2020 at Campus Helsingborg. SSDL 2020 will be lunch-to-lunch from Monday to Tuesday followed by SSBA 2020.


Confirmed speakers:

- Robert Jenssen, University of Tromsø (SSDL)
- Marco Kuhlmann, Linköping (SSDL)
- Torsten Sattler, Chalmers (SSBA)

...and more to come!

## ›››› ICPR—Call for Papers, Proposals for Workshops, Competitions, Tutorials, and Demos

# The First Women at ICPR Workshop

**The First Women at ICPR Workshop**

***"Making the invisible women visible"***

Sunday, September 13, 2020
Milan, Italy
In conjunction with ICPR 2020

**Organizing Committee:**
Co-Chairs Alexandra Branzan Albu (Canada) and Maria del Marsico (Italy)

Ingela Nyström (Sweden)
Lale Akarun (Turkey)
Bob Fisher (UK)

The first Women at ICPR workshop is intended to be a celebration of women's contributions to the IAPR.

It aims to foster a culture embracing inclusiveness and diversity values within the IAPR, by creating an opportunity for young and senior women scientists to interact and connect with each other.

This workshop builds upon past social events (coffee break and lunch) for women organized at ICPR 2016 (Cancun) and ICPR 2018 (Beijing).

While this workshop is in support of women, it is not exclusive to women attendees.

All are welcome to attend.

Excerpt from IAPR Newsletter, Vol. 41 No. 4, Oct. 2019, Page 8

# DGCI+ISMM 2020

The International Conference on Discrete Geometry for Computer Imagery (DGCI) and the International Symposium on Mathematical Morphology (ISMM) will be held as a joint event in Uppsala, 14-17 December 2020. For more information about this event, please contact Filip Malmberg, general chair (filip.malmberg@it.uu.se).

Topics include, but are not limited to:

- Models for Discrete Geometry
- Discrete and Combinatorial Topology
- Geometric Transforms
- Discrete Shape Representation, Recognition and Analysis
- Discrete Tomography
- Discrete Modelling and Visualization
- Discrete and Combinatorial Tools for Image Segmentation and Analysis
- Algebraic Theory
- Nonlinear Scale Space Theory
- Discrete Geometry and Combinatorial Topology
- Random Sets Theory and Geometrical Probability
- (max,+) Mathematics and Idempotent Analysis for Image and Signal Processing
- Image Filtering
- Image Segmentation
- Computational Mathematical Morphology
- Applications

# ›››› Soapbox Science Speaker Call

SLU

UPPSALA UNIVERSITET

## Join top female scientists as they take science to the streets!

**Engage the public with your research and inspire the next generation.**

The main aim of Soapbox Science is to interact with people that have not necessarily planned to come and learn about science. This can hopefully inspire people who never normally get exposed to science.

### Stand on a wooden box and talk for one hour

The event runs for three hours and each hour will host four speakers, who stand on (or next to) their boxes for the whole hour, simultaneously, and talk to the public.

One hour might seem like a very long time but previous experience shows that the format works and often speakers have to be hoisted off their boxes to let the next lot on.

### Time and place

Saturday afternoon, 16 May, 2020, in Uppsala.
24 April, 2020, in Gothenburg


Soapbox Science in Uppsala, May, 2019.

### More information and registration

For more information, please visit www.u-share.se/events.
You can also sign up directly as a speaker at:
http://soapboxscience.org/apply-to-speak-at-soapbox-science-2020/

U-Share

soapbox science

# Medical Image Analysis and Medical Engineering:

## *How do we provide solutions for tomorrow's clinical needs?*

Ingela Nyström

In a joint initiative, Medtech Science & Innovation (Medtech, http://medtech.uu.se/) and the Centre for Image Analysis (CBA, http://www.cb.uu.se/) arranged a workshop at picturesque Noors Slott close to Uppsala on December 3-4, 2019.

Over the last years, researchers at Uppsala University and Akademiska sjukhuset have launched initiatives and developed collaborative projects at the intersection of medical engineering and computerized image analysis. In fact, there is an increasing awareness of the possibility to develop new tools and techniques of potentially immense use to research and to the clinic. Already today, there exists a number of successful collaborations, which are scientifically interesting and rewarding to all involved parties. While these initiatives are an integral and important part of a growing field, the workshop identified several new projects.

Building on previous experiences and insights, the workshop had the following aims:

- Establish an awareness of what has been achieved so far
- Increase knowledge of new developments and needs in the field
- Initiate grant proposals

We invited PIs to the workshop who we identified having recognized knowledge about and strong interests in the topic. In total, there were 37 participants in the workshop during the two days; unfortunately, all were not present for the group photo *(Photo 1)*. The participants were representing research groups from more than ten departments at Uppsala University from both the Faculty of Science and Technology and the Faculty of Medicine. In addition, there were representatives from several units at the Uppsala University Hospital.

Photo 1: Group photo at CBA-Medtech workshop on December 3-4, 2019.

# Medical Image Analysis and Medical Engineering:

## *How do we provide solutions for tomorrow's clinical needs?*

Ingela Nyström

We were very pleased to have an inspirational talk given by Carl-Fredrik Westin, who since 20 years is at Harvard Medical School, but has his background, and is still affiliated, at Linköping University. He presented his views on how to build a successful research team and exemplified with a couple of his own projects spanning across disciplines and continents. Another talk was by Orçun Göksel from ETH Zürich, who presented a number of his research projects on ultrasound imaging as an introduction to his joining of Medtech in a close future.

Photo 2: The dining room at Noors Slott.

The program included a presentation round of all participants and their research interests, brainstorming on the synergies between the newer Medtech (founded in 2017) and the older CBA (founded in 1988), and an inventory of planned research activities and applications (ideas emerged on for example, AI for neuroimaging, additive manufacturing, and computer-assisted surgery planning). We were also presented funding opportunities from UU Innovation and UU Research Support Units. The many discussions and meetings between participants during coffee breaks, lunches and dinner (Photo 2) were rewarding. There were also opportunities to give feedback and ideas in writing. New contacts were established long into night (Photo 3) and everyone was given a good overview of the breadth of the challenges and possibilities in medical engineering with connection to digital images.

Photo 3: Brainstorming and discussions into the night hours.

We are now looking forward to strong collaborations, granted applications, and successful projects contributing to the clinical needs.

### Organizing committee

| | | |
|---|---|---|
| Per Adolfsson | per.adolfsson@akademiska.se | Board member Medtech |
| Joel Kullberg | joel.kullberg@radiol.uu.se | Board member CBA |
| Fredrik Nikolajeff | fredrik.nikolajeff@angstrom.uu.se | Director of Medtech |
| Ingela Nyström | ingela.nystrom@it.uu.se | Director of CBA |

# ›››› Sammanfattning från SSBA-internatet 2019

Ida-Maria Sintorn

Den 5-6 november hade styrelsen tillsammans med de medlemmar som anmält intresse för en lunch-till-lunch-internat på Storgården i Rimforsa. Internatet var den tredje i ordningen; SSBA-internat har tidigare arrangerats i Lovik, Stockholm (2016) och Ystad (2017). Totalt var vi 18 deltagare och både industri och akademi var väl representerade. Agendan var från början avsiktligt ganska öppen men där diskussionspunkter och mål sattes i första sessionen.

Det vi diskuterade i olika grupper och sedan tillsammans var:

- Industrins syn på utformning av utbildningsprogram och kurser. Stämmer det med industrins behov och önskningar? Hur kan industrin påverka och vad bör SSBA göra
- Jämförelse och diskussion kring de masterprogram kopplade till SSBAs ämnen som håller på att utformas på våra olika universitet.
- Forskningsstrategi – hur kan vi stärka vårt varumärke ytterligare? Utvidga vårt nätverk och samarbeten med grannländer? Profilering på ett nationellt plan? Utvidgning av vårt nätverk och samarbeten med systerorganisationer?

Så vad blev resultaten då? Kort sammanfattat per punkt ovan:

## Industrins syn och önskemål på utbildningsprogram och kurser

1. Baskunskaper önskvärt: statistik och datahantering, optimering, geometri
2. Riktigt programmeringsspråk önskvärt—C kopplar ihop bildbehandling och hårdvara
3. Datahygien, datakvalitet
4. Ofta kan studenterna antingen implementera (sw engineering) eller förstå (algoritm/matematik) vore bra med båda
5. Lära/öva läsa artiklar i ämnen som ändras snabbt som typ ML
6. ML/AI bara en liten del av totallösningen men ges väldigt stort fokus just nu i utbildningar.
7. Helhetsförståelse för generering av bilddata och lösningsvägar önskvärt
8. Om industrin får ansökan/CV där det står att du hobbyprogrammerat SUPERPLUS (eller projektbeskrivning) - erfarenhet att lösa riktiga problem

En lista med industrikontakter upprättades för att enkelt kunna få input och idéer för program, kurser, projekt och gästföreläsningar.

# ›››› Sammanfattning från SSBA-internatet 2019

Ida-Maria Sintorn

## Diskussion kring innehåll och utformning av utbildningssätenas nya master-program

På UU heter det kommande programmet närmst SSBAs intresseområde “ Image Processing and Machine Learning” , på LU “Machine Learning, Systems and Control” med två inriktningar; en mot reglerteknik och en mot maskininlärning.

1. Programmen har mycket gemensamt (bildanalys/datorseende, maskininlärning, optimering)
2. De olika lärosätena har tillräckligt olika inriktning för att attrahera olika intressen.
3. Programmen/planering av programmen är i lite olika fas (KTH går redan, UU startar 2020, LU startar HT 2020, LiU tidigast 2022)
4. Finns intresse av mer samarbete och kanske dela bra projekt i projektkurser eller låna in föreläsare från andra universitet.
5. Alla lärosäten har liknande förväntningar och farhågor för intresset för de nya programmen och den väntade stora andelen utländska betalande studenter och deras kunskapsnivå i främst engelska.

En lista med kontaktpersoner från de representerade lärosätena (LU, LiU, KTH, UU) upprättades för att enkelt ha kontakt och bolla och dela idéer och erfarenheter.

# ›››› Sammanfattning från SSBA-internatet 2019

Ida-Maria Sintorn

Forskningsstrategi - hur kan vi stärka vårt varumärke ytterligare?

1. Som litet land så vore det bra med gemensam strategi för att stärka och lyfta ämnet och vår position internationellt och hos anslagsgivare.
2. Michael Felsberg från LiU upprättar ett mindre forum med representanter som täcker våra olika universitet och tillämpningsområden för att börja diskutera utformning och förslag på nationell strategi för vårt ämnesområde. Förslag på representanter diskuterades och enades om av alla på workshopen.
3. Per-Erik Forsen (LiU), Atsuto Maki (KTH) lyfter frågan om eventuell framtida sam-/alternerande organisation av SSDL och den norska Northern Lights Deep Learning Workshop med dess huvudorganisatör Robert Jenssen (Tromsö).

Det var ett trevligt och mycket givande internat. Alla deltagare var eniga om att det är viktigt att hålla olika diskussionsforum och tillfällen till möten vid liv. Internatet blev, precis som tidigare år, ett bra forum för strategiska diskussioner och en möjlighet att tillsammans verka för att stärka svensk bildanalys. Vi ser fram emot ett liknande internat i SSBAs regi nästa år också!

# ›››› Report from Janelia Research Institute

Leslie Solorzano

Carolina Wählby and Leslie Solorzano were invited to the "First conference of Women in Computational Biology" at Janelia research institute in Virginia U.S.A. Carolina presented the role of image analysis of cell images. Automation of the acquisition and interpretation of data in microscopy has been a focus in biomedical research for decades.


This is an important achievement and recognition in an international environment that showcased extraordinary research being done by women in a field from which they are traditionally excluded. Applied mathematicians, statisticians, computer scientists, and biologists where present from universities like Princeton, Harvard, Carnegie Mellon, Stanford, Johns Hopkins, MIT, the Broad Institute and EMBL.

# Report from ISMM 2019

Teo Asplund Christer Kiselman

The 14th International Symposium on Mathematical Morphology took place in Saarbrücken, Germany at Saarland University, July 8-10, 2019. The 41 accepted contributions to the conference, from 101 authors and 11 different countries[1], cover a wide range of topics, such as tropical geometry, discrete topology, trees, multivariate morphology, machine learning, as well as a wide range of applications. During the conference three plenary talks by invited speakers were given:

- David Coeurjolly (CNRS, LIRIS, Université de Lyon, France): "Geometry Processing on Voxel Objects"
- Fred A. Hamprecht (HCI / IWR, Heidelberg University, Germany): "Watershed and Friends in the Age of Deep Learning"
- Boguslaw Obara (Dept. of Computer Science, Durham University, United Kingdom): "Combining Mathematical Morphology and the Hilbert Transform for Fully Automatic Nuclei Detection in Fluorescence Microscopy"

The three days were filled with great presentations, as well as interesting discussions during the two poster sessions.

Next year, the conference will join up with the International Conference on Discrete Geometry for Computer Imagery (DGCI) for a joint conference in Uppsala (see page 5 for further information).

[1]Austria, Brazil, France, Germany, Greece, India, Italy, the Netherlands, Sweden, UK, and USA

# ›››› New Master's Programme in Image Analysis and Machine Learning at Uppsala University

The programme aims to give students a comprehensive understanding of its two main subjects, both from a practical and theoretical perspective. The programme will address modern image analysis techniques and their applications, provide a robust and comprehensive understanding of machine learning from both a practical and theoretical perspective, and will support students to work in close proximity to leading experts and researchers in the field.

We are looking forward to applications by students with not only a theoretical foundation in computer science and mathematics, but also with an interest in developing intelligent machines that can help humans through efficient processing of visual data in a variety of real-life uses!

The application period for Master's programmes commencing 31 August 2020 is from **16 October** to **15 January 2020.**

For more information visit
https://www.uu.se/en/admissions/master/selma/program/?pKod=TBA2M&pInr=&lasar=20%2F21

# ›››› Machine Learning, Systems and Control – New Master's Programme at Lund University

The amount of available data in the world is exploding and advanced algorithms are used to extract information for use in different applications such as self-driving cars, optimized manufacturing, improved healthcare and more energy-efficient systems. The Master's programme in Machine Learning, Systems and Control at Lund University prepares students for a flexible future-proof career within this general area where advanced algorithms are used to analyze large datasets in a wide range of applications combining methods of statistical analysis, mathematics, signal processing, image analysis and control theory. Demand for experts with such knowledge is growing, meaning an optimistic job market for graduates.

The programme is a result of collaboration between the departments of Mathematics, Automatic Control, Computer Science and Electrical and Information Technology at Lund University.

The application deadline for the programme commencing late August 2020 is **Jan 15, 2020!**

For more information: https://www.lunduniversity.lu.se/lubas/i-uoh-lu-TAMSR

# ›››› New Master's Programme in Artifical Intelligence at Umeå University

The Master's programme in Artificial Intelligence gives broad knowledge in AI and deepened knowledge in profile areas such as theoretical foundations of artificial intelligence, human-AI interaction, intelligent robotics, machine learning or data science. Necessary prerequisites for admission to the programme are theoretical knowledge and practical skills regarding algorithmic problem solving, including well-developed programming skills.

The programme contains four mandatory AI courses common for all profiles, to be attended during the first year: on the foundation of AI, on AI and its methods and applications, on machine learning, and on designing interactive intelligent systems.

Students are expected to collaborate in interdisciplinary teams and with representatives from a societal organisation. Organisations include both industry and public organisations. Work tasks can range from developing the future digital tools for improving the environment, health, education of children, to tools for addressing societal issues such as democracy, justice, safety, or building infrastructures, software for self-driving cars and other transportation systems.

The application period for Master's programmes commencing 31 August 2020 is from **16 October** to **15 January 2020**.

For more information visit: https://www.umu.se/en/education/master/masters-programme-in-artificial-intelligence/

# ›››› Upcoming Conferences

- Northern Lights Deep Learning Workshop

Date: **January 20-21, 2020**
Location: Tromsø, Norway
Submission: **November 22, 2019**

- Network of European Bioimage Analysts Conference & Symposium **(NEUBIAS)**

Date: **Feb 29-March 6, 2020**
Location: Bordeaux, France
Abstract deadline: **January 13, 2020 / February 1, 2020**

- Swedish Symposium on Deep Learning + SSBA Symposium (SSDL + SSBA)

Date: **March 16-18**
Location: Helsingborg, Sweden
Deadline: **TBD**

- International Symposium on Biomedical Imaging **(ISBI)**

Date: **April 3-7, 2020**
Location: Iowa City, USA
1-Page Abstract Submission: **Jan 15, 2020**

- 4th IAPR International Workshop on Document Analysis Systems (DAS)

Date: **May 17–20, 2020**
Location: Wuhan, China
Deadline: **December 20, 2019**

- Eurographics & Eurovis

Date: **May 25-29, 2020**
Location: Norrköping, Sweden
Short paper submission: **December 20, 2019 / Feburary 21, 2020**
Poster submission: **January 31, 2020 / April 3, 2020**

- Workshop on Biomedical Image Registration

Date: **June 16-17, 2020**
Location: Portorož, Slovenia
Full paper submission: **January 15, 2020**
One-page abstract submission: **March 18, 2020**

- Computer Assisted Radiology and Surgery

Date: **June 23–27, 2020**
Location: Munich, Germany
Submission Deadline: **January 10, 2020**

- European Conference on Computer Vision **(ECCV)**

Date: **Aug 23-28, 2020**
Location: Glasgow, Scotland
Paper Submission Deadline: **March 5, 2020**
Tutorials & Workshops: **August 23 and 28, 2020**
Proposal Submission Deadline: **January 10, 2020**

- 9th Workshop on Artificial Neural Networks in Pattern Recognition (ANNPR)

Date: **Sep. 2-4, 2020**
Location: Winterthur, Switzerland
Deadline: **TBD**

# ›››› Upcoming Conferences

- 17th International Conference on Frontiers in Handwriting Recognition (ICFHR)

Date: **Sep. 8-10, 2020**
Location: Dortmund, Germany
Deadline: **March 1, 2020**

- International Conference on Pattern Recognition **(ICPR)**

Date: **September 13-18, 2020**
Location: Milan, Italy
Workshops & Competitions Proposal Deadline: **January 15, 2020**
Main conference paper submission deadline: **March 2, 2020**
Tutorials Proposal Deadline: **April 1, 2020**

- International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI)**

Date: **Oct 4-8, 2020**
Location: Lima, Peru
Intention to Submit: **February 18, 2020**
Full Paper Submission: **March 3, 2020**

# ›››› Upcoming Courses

## SeSE:

### Spring, 2020

- Scientific Visualisation, **Uppsala**
- Operationalizing Machine Learning at Scale, **Uppsala**

### Fall, 2020

- Introduction to Scientific Computing, **Lund**
- SeRC Visualization school 2020 , **Linköping**
- Computational Python, **KTH**
- Combining Partial Differential Equations, Machine Learning and Measurements for Increased Prediction Capability, **Linköping**
- Introduction to High Performance Computing, **KTH**

# ›››› Aktuella avhandlingar

Här presenteras de avhandlingar som publicerats sedan senaste numret av SSBAktuellt och kommit redaktionen till känna. Meddela redaktionen om aktuella avhandlingar.

## Doktorsavhandlingar

**Teo Asplund**
Uppsala universitet
*Precise Image-Based Measurements through Irregular Sampling*

**Amanda Berg**
Linköping universitet
*Learning to Analyze what is Beyond the Visible Spectrum*

**Xuan Gu**
Linköping universitet
*Advanced analysis of diffusion MRI data*

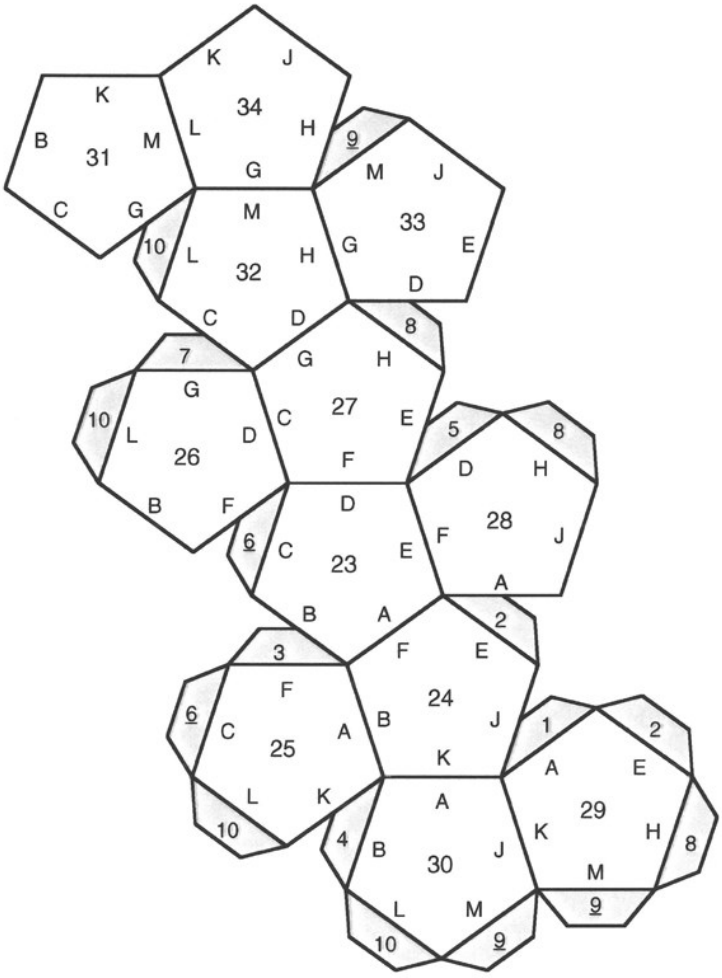
**Damian Matuszewski**
Uppsala universitet
*Image and Data Analysis for Biomedical Quantitative Microscopy*

**Felicia Seeman**
Lund universitet
*Connecting CMR and Physiology - Expanding the Capabilities of Cardiovascular Magnetic Resonance in Quantifying Physiology*

# Årets julstjärna

Gunilla Borgefors

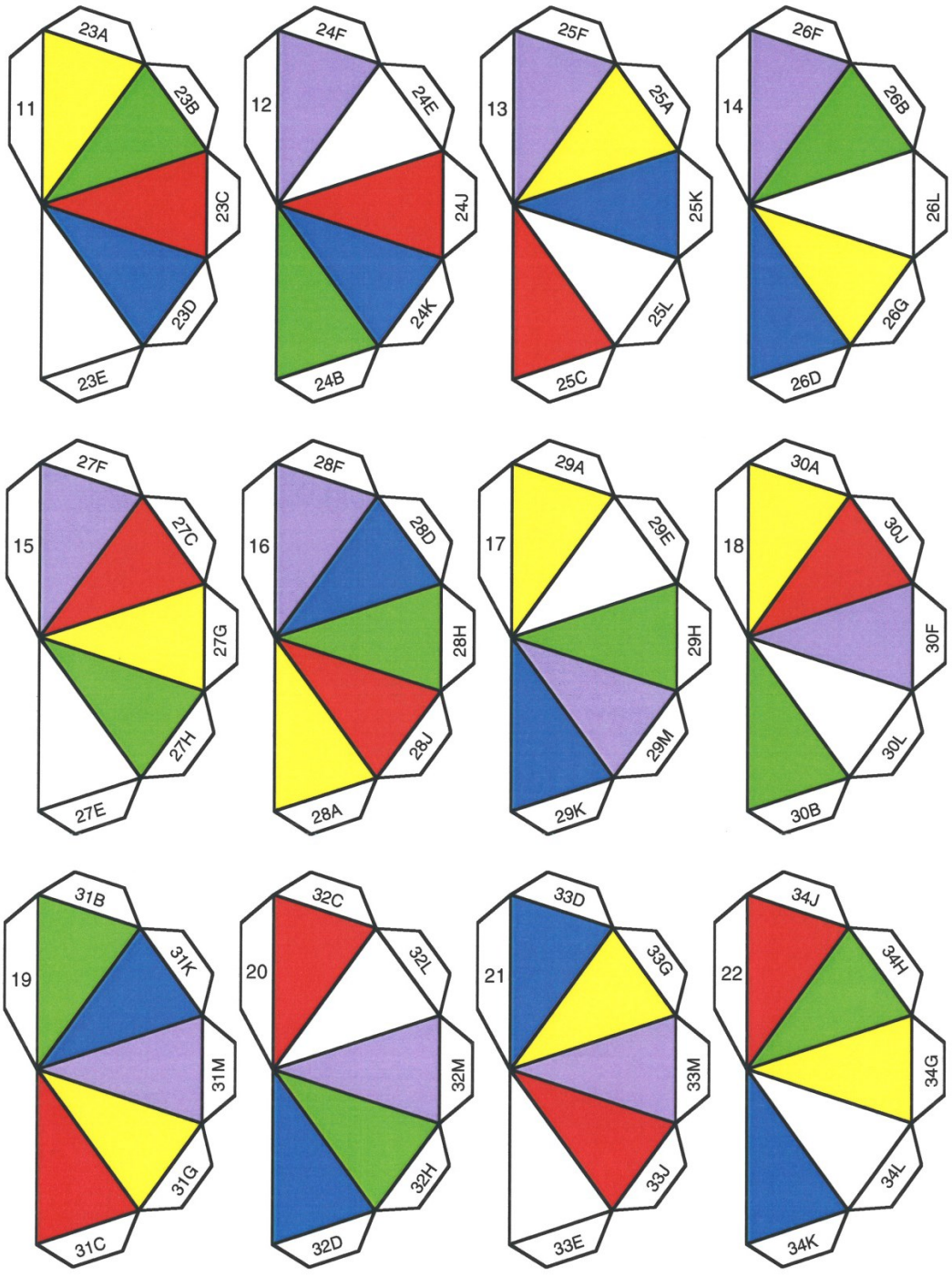
Bygg och se vad det blir!




Small stellated dodecahedron - inner core

# Årets julstjärna

Gunilla Borgefors




Small stellated dodecahedron - points