Exempeltitel

Undertitel (om man har det)



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# Abstract

En kort sammanfattning över ditt arbete och de viktigaste resultaten skrivet på engelska, cirka 5 meningar totalt.

Geografisk placering som källa i runstensforskning

地理位置作为符文石研究的来源

# Förkortningar och Begrepp Detta avsnitt behövs oftast inte.

**Skapas automatiskt i Word genom att gå till Referenser > Innehållsförteckning.**

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# Inledning

Ge en bred bakgrund till ditt arbete och varför det är relevant. Smalna successivt av och koppla bakgrunden till detta arbete. Fortsätt med syfte och frågeställning (syfte och frågeställning kan du ha i en egen underrubrik om du önskar det).

Syftet med denna rapport är \_\_\_\_\_\_\_\_\_\_\_\_, för att uppfylla syftet så kommer följande frågeställning(ar) att besvaras:

1. \_\_\_\_\_\_\_
2. \_\_\_\_\_\_\_

## Underrubrik – Exempel

Text är skriven på formatet Calibri med textstorlek 11.

# Teori

## Exempel: Regressionsmodeller

För att infoga ekvationer, gå till Infoga > Ekvation. Där kan du också välja att skriva egna ekvationer.

### Exempel: Lasso

#### Regularisering i Lasso

#### Välja Hyperparameter

### Exempel: Ridge

### Exempel: Elastic Net

## Exempel: Neurala Nätverk

# Metod

Hur har du genomfört ditt arbete? Exempelvis, hur har datan erhållits?

## Converting between SWEREF 99 and WGS84

The Scandinavian Runic-text Database use the SWEREF99 coordinate system, which is Swedens national coordinate system, and can only be used in and around Sweden. In our database, not only SWEREF99 is used but also only N (Northing) is saved in the database. N represents the north-south position, indicating how far north you are from the equator in meters. E (Easting) represents the east-west position, indicating how far east you are from the defined central meridian of the projection in meters. Unfortunately, E is missing in our database. In the powerBI softeware, the WGS84 coordinate system is used. In order to visualize SWEREF99 data with PowerBI, the conversion is needed. There are multiple libraries can be used to convert coordinates from SWEREF99 to WGS84:

.Net - [MightyLittleGeodesy](https://github.com/bjornsallarp/MightyLittleGeodesy)

Java - [CoordinateTransformationLibrary](https://github.com/goober/coordinate-transformation-library)

PHP - [CoordinateTransformationLibrary](https://github.com/david-xelera/CoordinateTransformationLibrary)

JavaScript - [latlong.mellifica.se](http://latlong.mellifica.se/)

Python - pyproj, Transformer

Here we tested Transformer class in pyproj library to handle transformation between two different coordinate systems. Transform method could take longitude and latitude as input and returns the corresponding easting and northing in the target coordinate system, or reverse. Applied Transformer we succeeded to transform N to the longitude but since the data missing of E we need to figure out other way to complement the data of E with respect to rows.

On the other hand, we also tested MediaWiki API through import requests library. For example, we give the title “Kvarntorpshällen” and define the parameters for the API call,

params = {

    'action': 'query',

    'prop': 'coordinates',

    'titles': page\_title,

    'format': 'json'

}

The corresponding latitude and longitude data could be saved as json form. However the drawback of this approach is that it requires write a loop for each entry in our database, which contains 11672 entries. This process could lead to significant computational overhead and increased processing time, especially when handing large datasets.

Another method we tested involves mapping the latitude for each row based on the values in the “Kommun” column and attaching it as the latitude of the “Koordinater” column. In total, there are 497 unique “Kommun” need to mapping the longitude to the “Koordinater” column. While this approach helped address the issue, it has a limitation in terms of accuracy: we can locate the tombstoe with the correct “Kommun” area, but this does not provide a precise position when visualized in PowerBI.

## Datainsamling

Exempel på en rubrik som är vanligt förekommande som läsaren förstår vart datan kommer ifrån.

## Agil arbetsmetodik

I denna rapporten ska ni beskriva och utvärdera hur ni har arbetat agilt i projektformen. Se t.ex. följande länk vad agilt arbete kan innebära:   
<https://agilemanifesto.org/principles.html>

Om ni inte vill ha med detta i rapporten här för att ni t.ex. ska publicera ert arbete som ett portföljprojekt så kan ni skriva om detta i ett separat dokument.

# Resultat och Diskussion

|  |  |
| --- | --- |
| 1730129111(1) | 1730129159(1) |
| (a) | (b) |

Figur 1: (a) Trend Analysis of Föremål Over Time and Location. (b) Trend Analysis of Stilgruppering and Signum: Temporal, Geographical, and Spatial Distribution

From Figure 1(a) we can see that Tombstones experienced a significant increase in use during the Viking and Medieval periods. Specifically, there are 62 and 78 unique Föremål during the Viking and Medieval periods, respectively. While at the early period, the Föremål is simply and few with around 10 items. Importantly, at the early period and Viking period, the tombstone with Föremål were distributed more even and mainly located in Svealand. But with the time flow, the tombstone were tend to localize Uppland. It indicates that people are more Gathering and formed a big living places. In addition, more runestones than tombstones were used with a large number of stone materials than wood or metal material. As noted by Alix Thoeming from the University of Sydney, the increase in rune stones reflects a form of expression of faith and identity that was lost during the process of Christianization [1].

* A: Often stands for "Äldre järnåldern" (Early Iron Age).
* U: Typically represents "Vikingatid" (Viking Age).
* V: Commonly used for "Vendeltid" (Vendel Period, which precedes the Viking Age in Scandinavia).
* M: Usually indicates "Medeltid" (Middle Ages/Medieval Period).
* Sentia: represents the period between 1500 to 1900.

|  |  |  |  |
| --- | --- | --- | --- |
| Pr 1 | Pr 2 | Pr 3 | Pr 4 |
| Pr 5 | RAK | Fp | KB |

# *Figur 2: Runestone styles from wikipedia [2]*

Pr1, Pr2, Pr3, Pr4, Pr5, Pr6 refer to different phases or types of Princely or Proto-Runic styles associated with figures like Ljung or Gräslund, indicating various artistic and typological developments in runestone design.This series style end with animal heads seen in profile. Fp is from the period c. 1010/1015 to c. 1040/1050, when Pr3 appeared. It is characterized by runic bands that end with animal heads seen from above. With regard to KB, it generally relates to the Kongliga Biblioteket, indicating a specific style associated with the Royal Library’s collections or references. RAK: This stands for Runverket Arkeologiska Källor, referring to runestones classified based on archaeological sources, specifically focusing on the design and inscriptions, which is the oldest style and covers the period 980-1015 AD. RAK style has no dragon heads and the ends of the runic bands are straight on the stone. sid typically refers to the sides of the stones that may have inscriptions or artistic elements. All the corresponding pictures are shown in Figure 2 [2].

In Figure 1(b), the classification of runestone designs is analyzed across both time periods and geographic distribution. It is evident that the RAK type runestones dominate in quantity, with a total of 558 runestones, indicating their popularity or prevalence during the studied period. Following this, the Pr4 style is also prominent, with 427 runestones, suggesting a strong representation across locations or possibly during a specific time frame. In contrast, the KB type is the least common, with only 48 examples identified, highlighting its rarity and possibly suggesting a unique or localized design style. This analysis sheds light on the stylistic preferences and regional variations in runestone designs over time, providing insights into cultural trends and artistic expressions in historical contexts. Interestingly, the analysis reveals that KB-type runestones only appear during the Viking period, with their distribution concentrated primarily in Uppsala, nyköping and Eskilstuna when we zoon into the map. This localized occurrence suggests a unique cultural or regional influence specific to these areas during the Viking time. Similarly, the Pr4-type runstones also domianly emerge during the Viking period (later c. 1060/1070 and lasted until c. 1100.) but display a wider geographic spread compared to the KB type. The main locations for Pr4-type include Uppsala, Gotland, Sigtuna, Enköping, Vallentuna, Norrtälje, Stockholm, Knivsta, and Upplands Väsby. This broader distribution might indicate a larger sphere of cultural influence or the spread of a specific artistic tradition linked to the Pr4 style. In contrast, the RAK-type runestones span a more extended period, appearing not only in the Viking Age (Vikingatid) but also during the preceding Vendel Period (Vendeltid) and the subsequent Medieval Period (Medeltid). Their distribution is more extensive and includes Sigtuna, Vallentuna, Linköping, Lund, Nyköping, Mjölby, and Norrköping, among other locations. It is worth to mention that this extended timeframe and widespread presence suggest that RAK style was either highly adaptable or carried a lasting symbolic value that persisted through multiple periods and across diverse regions. These patterns collectively illustrate how different runestone styles reflect both temporal and regional variations in cultural and artistic expressions, offering insights into the evolving landscape of Scandinavian tradition.

|  |  |
| --- | --- |
|  |  |
| (a) | (b) |

*Figur 3: (a) Tombstone Material Statistics: Trends by Time Period, Geographic Location, and Intended Purpose. (b) Ristare and korsform Statistics: Trends by Time Period, Geographic Location, and Intended Purpose.*

### Analysis of Material Differentiation in Rune Stones Across Time Periods and Regions

The fascinating diversity in rune stone materials and their distribution through history could offer a rich insight into the socio-cultural and environmental influences shaping rune inscription. Firstly, we can see from Figure 3(a) that stone plays as the predominant material which is used throughout the Viking Age, Vendel Period and Middle Age. It reflects its durability and symbolic endurance. It probably relates with ritualistic or memorial purposes tied to societal or religious beliefs. In addition, we can see that stone rune are mainly concentrated in southern Sweden (Skåneland, Svealand, Uppsala, Gotland, Enköping, Sigtuna, Vadstena, Vallentuna, and Borgholm). It indicates that this material is facilitate as a unified medium for the cultural expression across a geographically disperse population and people shared similar traditions often. In the middle age, wooden becomes notably popular with 2748 instance recorded. This increase might be attributed to both accessibility and the cultural change during the period. For example wood might be more available and adaptable at that time. On the other hand, Bergen and Trondheim in Norway possess a higher presence of wooden rune stones than other places. This geographic clustering might reflect specific regional resources or culture preferences. The use of metal runes stones stands out as a remarkable aspect though metal remains a small proportion. It is dominantly found in Gotland which is a region with a history of trade and wealth. In addition, Goland is a place for seafaring and trade which may have influenced the material choice since metal is more accessible than in other inland regions. On the other hand, the presence of Metal from the Viking age to the Middle age imply a unique choice, which might be possibly reserved for the high-status people. For example metal rune stones could symbolize power, wealth. Rune stones crafted from bone, horn and plaster are relatively rare. The materials might have been chosen for specific personal, decorative or some ceremony. For example, bone and horn are mostly associated with Sigtuna, Lund and Oslo. These locations are know for their political or religious importance. While plaster is mainly found in Gotland, Hässleholm, and Kristianstad. Plaster is easier to be crafted compared to stone which could be used as a decorative function.

Overall, the material choices and geographic distribution of rune stones illustrate a fascinating intersection of cultural propagation, resource availability and social needs. The enduring use of stone and metal make them more popular than other materials, which reflects continuity in reverence and permanence in the big region. While the use of wood and bone imply the adaptation of people to local resources and potentially evolving functions over time. These data suggests that the material medium itself could convey meaning except language. It is worthy to mention that a wooden rune in Norway might imply a different cultural meaning than a stone rune in Sweden. The choice of metal in Gotland shows a high-status use than wooden and plaster. So the choice of material will give a strong influence for the social and cultural cohesion.

# Lastly, the diversity in carvers and their stylistic preferences in rune stone carvings are studied in Figure 3(b). It found over 7000 individuals contributed to the creation of rune stones, which demonstrates that people put lots of time and energy for this substantial cultural investment. Beside, the large number of artisans indicates that carving is not only a simple trade but also indicates a widespread role with community and ceremony. Specifically, there are 770 different cross forms were crafted by these artisans, leading to both diversity and creativity in the execution of rune stone. During Viking age, with 3612 artisans, accounts for around half of the total known carvers, demonstrates at this period rune stones played a critical role and significance for the cultural and history. The prevalence of carvers during the Viking age highlights a period when runic inscriptions were at their peak due to the religious and social motivations. And rune stones server as durable witness to a person, clan or big event. There are about 558 carvers who produced RAK-style rune stones , with concentrations in Mjölby, Bornholm, Norrköping, and Linköping, etc. The distribution of RAK-style carvings in these regions indicates a cohesive cultural or artistic preference for this style. RAK is a more straightforward and possibly earlier rune stone style, which can reflect the traditionalist values or older carving custom in these areas. Fp-style rune stones are created by 216 carvers, approximately which are mainly located in Enköping, Strängnäs, Eskilstuna, Norrköping, and Nyköping. There were 427 carvers who contributed to the Pr4-style rune stones, which were largely located in Uppsala, Enköping, and Sigtuna. Pr4 is often associated with the Middle Ages and displays a more elaborate design than RAK or Fp, signifying perhaps a more advanced phase in rune-making that leaned toward stylistic elaboration and could have represented a unique cultural identity in these influential areas. In conlusion, the distribution of carvers and styles points to a vibrant tradition of carving that was not uniform but shaped by local influences, resources, and cultural priorities. Pr4 could indicate higher cultural or religious status, which aligns with the prominence of Uppsala as a religious and political center at Middle ages.

# Slutsatser

The evolution of rune stone purposes, materials, and carving styles reveals how Swedish and Norwegian societies balanced tradition and religion with adaptability. Material choices reflected both ceremonial needs and symbolic meanings, while the diversity of carving styles across Sweden indicates cultural priorities and changing influences over time. Overall, these characteristics highlight rune stones as rich cultural artifacts that represent regional identities, social values, and the legacy of heritage.

# Självutvärdering

1. Utmaningar du haft under arbetet samt hur du hanterat dem.
2. Vilket betyg du anser att du skall ha och varför.
3. Något du vill lyfta fram till Antonio?

# Appendix A

# Källförteckning

[1] Alix Thoeming, “HERE SHALL THESE STONES STAND, REDDENED WITH RUNES

EXPLORING INTERCONNECTIVITY AND SIMILARITY IN THE RUNE STONES OF 10TH-12TH CENTURY SWEDEN", University of Sydney (2013).

[2] https://en.wikipedia.org/wiki/Runestone\_styles